NATIONAL SCIENCE BOARD
Science & Engineering Indicators

Innovation

Translation to Impact: U.S. and Global Science, Technology, and Innovation Output

Supplemental Tables

NSB-2026-2 | May 01, 2026

The National Science Board (Board) is required under the National Science Foundation (NSF) Act, 42 U.S.C. § 1863 (j) (1) to prepare and transmit the biennial *Science and Engineering Indicators* (*Indicators*) report to the President and Congress every even-numbered year. The report is prepared by the National Center for Science and Engineering Statistics (NCSES) within NSF under the guidance of the Board. It is subject to extensive review.

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Table STRN-1. U.S. federal and state agencies cited in the funding acknowledgement section of S&E articles, by citation frequency: 2002–22

(Number and index)

Name	All publications (number)	Publications in the top 1% most-cited journal articles (number)	Highly cited article ratio
Department of Health and Human Services	1,886,755	46,492	2.53
National Institutes of Health	1,847,096	45,928	2.55
National Cancer Institute	303,082	9,073	3.05
National Institute of General Medical Sciences	221,186	4,947	2.27
National Heart, Lung, and Blood Institute	188,744	4,812	2.60
National Institute of Allergy and Infectious Diseases	164,724	4,113	2.53
National Institute of Diabetes and Digestive and Kidney Diseases	139,557	4,021	2.93
National Institute of Mental Health	120,116	3,935	3.33
National Institute of Neurological Disorders and Stroke	114,735	3,057	2.73
National Institute on Aging	102,261	3,754	3.74
National Institute on Drug Abuse	74,171	1,556	2.13
National Institute of Child Health and Human Development	68,070	1,620	2.42
National Center for Advancing Translational Sciences	65,885	1,554	2.42
National Center for Research Resources	63,783	1,302	2.09
National Eye Institute	49,897	1,133	2.33
National Institute of Arthritis and Musculoskeletal and Skin Diseases	46,742	1,344	2.93
National Institute of Biomedical Imaging and Bioengineering	35,564	1,213	3.62
National Institute on Alcohol Abuse and Alcoholism	34,383	670	1.98
National Institute on Deafness and Other Communication Disorders	31,964	615	1.99
National Institute of Dental and Craniofacial Research	27,791	717	2.63
National Human Genome Research Institute	20,827	1,216	5.97
Centers for Disease Control and Prevention	29,779	634	2.18
Public Health Service	27,002	522	1.99
National Science Foundation	879,448	20,029	2.71
Department of Energy	245,185	6,087	2.94
Office of Science	98,880	2,898	3.18
Basic Energy Sciences	46,245	1,474	3.33
Biological and Environmental Research	10,352	357	3.53
Chemical Sciences, Geosciences, and Biosciences Division	7,529	176	2.41
Advanced Scientific Computing Research	4,329	106	3.66
Nuclear Physics	2,918	68	2.59
National Nuclear Security Administration	17,421	203	1.59
Office of Energy Efficiency and Renewable Energy	13,291	459	4.34
Oak Ridge Institute for Science and Education	6,218	90	1.59
Office of Nuclear Energy	5,077	50	1.51
Office of Fossil Energy and Carbon Management	5,064	101	2.66
National Energy Technology Laboratory	4,146	88	2.85
Advanced Research Projects Agency - Energy	3,502	90	3.78
Department of Defense	179,833	5,047	3.70
Navy	67,045	1,872	3.82
Office of Naval Research	62,900	1,812	3.94
Defense Advanced Research Projects Agency	39,318	1,404	5.90
Army	25,374	461	2.33
Research, Development and Engineering Command	11,625	253	3.19
Army Research Laboratory	11,375	248	3.19
Army Medical Research and Development Command	4,542	72	1.70

Table STRN-1. U.S. federal and state agencies cited in the funding acknowledgement section of S&E articles, by citation frequency: 2002–22

(Number and index)

Name	All publications (number)	Publications in the top 1% most-cited journal articles (number)	Highly cited article ratio
Army Corps of Engineers	2,414	28	1.27
Defense Threat Reduction Agency	7,374	163	2.66
Air Force	6,558	136	3.12
Multidisciplinary University Research Initiative	5,086	220	5.89
Military Health System	4,756	97	2.14
Congressionally Directed Medical Research Programs	3,179	74	2.43
National Defense Science and Engineering Graduate	4,519	167	4.58
Strategic Environmental Research and Development Program	2,169	31	1.51
National Aeronautics and Space Administration	90,141	1,853	2.46
NASA Astrobiology Institute	1,767	51	2.94
Ames Research Center	1,759	27	2.07
Goddard Space Flight Center	1,352	17	1.47
Glenn Research Center	1,019	17	2.48
Department of Agriculture	69,728	1,197	1.77
National Institute of Food and Agriculture	31,785	512	1.65
Agricultural Research Service	7,997	100	1.27
U.S. Forest Service	6,907	118	1.76
Animal and Plant Health Inspection Service	1,028	13	1.27
Natural Resources Conservation Service	932	13	1.45
Economic Research Service	735	6	0.83
Department of Veterans Affairs (VA)	38,226	728	1.94
Office of Research and Development	6,415	85	1.37
Rehabilitation Research and Development Service	1,347	21	1.59
Health Services Research and Development	5,360	78	1.48
Biomedical Laboratory Research and Development, VA Office of Research and Development	1,149	22	1.96
Center for Integrated Healthcare, Department of Veterans Affairs	1,004	7	0.73
Office of Academic Affiliations, Department of Veterans Affairs	812	13	1.60
Quality Enhancement Research Initiative	645	21	3.28
Department of Commerce	31,071	693	2.44
National Oceanic and Atmospheric Administration (NOAA)	21,151	457	2.24
National Marine Fisheries Service	1,550	21	1.38
Northwest Fisheries Science Center	379	9	2.46
Climate Program Office	695	25	3.73
NOAA Research	339	3	0.92
National Institute of Standards and Technology	8,809	221	3.13
Center for Nanoscale Science and Technology	452	7	1.81
Department of the Interior	24,922	349	1.47
Geological Survey	14,235	253	1.85
Fish and Wildlife Service	6,970	31	0.45
National Park Service	2,697	39	1.48
Bureau of Land Management	1,549	9	0.60
Bureau of Reclamation	1,037	14	1.42
Bureau of Ocean Energy Management	624	9	1.51
Environmental Protection Agency	17,245	319	1.93
Office of Research Infrastructure Programs	10,928	93	0.85
Office of Extramural Research	10,489	94	0.90
Department of Education	10,242	160	1.70
Office of Special Education and Rehabilitative Services	302	8	2.68

Table STRN-1. U.S. federal and state agencies cited in the funding acknowledgement section of S&E articles, by citation frequency: 2002–22

(Number and index)

Name	All publications (number)	Publications in the top 1% most-cited journal articles (number)	Highly cited article ratio
Office of Special Education Programs, Office of Special Education and Rehabilitative Services	192	2	1.05
United States Agency for International Development	9,533	187	2.01
Bureau for Economic Growth, Education, and Environment, United States Agency for International Development	302	3	0.96
Department of Transportation	8,732	125	1.91
Federal Highway Administration	2,110	29	1.71
Federal Aviation Administration	1,905	25	2.09
National Highway Traffic Safety Administration	545	5	1.12
Office of the Assistant Secretary for Research and Technology	531	13	3.94
Federal Railroad Administration	371	5	2.29
Federal Transit Administration	194	3	1.73
Pipeline and Hazardous Materials Safety Administration	116	1	1.19
Cancer Prevention and Research Institute of Texas	7,286	282	4.01
Department of Justice	5,815	110	1.99
Office of Justice Programs	5,176	95	1.94
National Institute of Justice	3,812	72	1.98
Office of Juvenile Justice and Delinquency Prevention	670	12	1.85
Office of Sex Offender Sentencing, Monitoring, Apprehending, Registering, and Tracking	360	2	0.72
Bureau of Justice Assistance	342	6	1.80
Bureau of Justice Statistics	120	2	1.69
Office for Victims of Crime	101	0	0.00
Federal Bureau of Investigation	123	4	3.51
National Institute of Corrections	106	2	2.46
Department of Homeland Security	5,244	92	2.28
Science and Technology Directorate	821	32	4.97
Domestic Nuclear Detection Office	372	3	1.05
Federal Emergency Management Agency	324	4	1.32
Smithsonian Institution	4,381	105	2.60
National Museum of Natural History	1,031	13	1.30
Smithsonian Astrophysical Observatory	781	30	4.15
Anacostia Community Museum	168	2	1.72
Smithsonian Conservation Biology Institute	129	7	5.43
Office of the Director of National Intelligence	3,980	138	6.31
Intelligence Advanced Research Projects Activity	2,840	106	7.51
Intelligence Community Postdoctoral Research Fellowship Program	965	22	3.36
National Security Agency	3,625	45	1.46
Space Telescope Science Institute	3,233	123	3.98
Small Business Innovation Research	3,178	35	1.54
President’s Emergency Plan for AIDS Relief	1,852	9	0.49
Pennsylvania Department of Health	1,773	31	1.79
Office of Research on Women's Health	1,564	31	2.04
Nuclear Regulatory Commission	1,427	8	0.78
Office of AIDS Research	1,308	13	1.02
Department of State	1,273	13	1.15
Bureau of Educational and Cultural Affairs	271	3	1.18
Office of Behavioral and Social Sciences Research	886	20	2.30
Appalachian Regional Commission	714	18	2.86
Department of Housing and Urban Development	633	6	1.03

Table STRN-1. U.S. federal and state agencies cited in the funding acknowledgement section of S&E articles, by citation frequency: 2002–22

(Number and index)

Name	All publications (number)	Publications in the top 1% most-cited journal articles (number)	Highly cited article ratio
North Pacific Research Board	593	12	2.13
National Endowment for the Humanities	549	3	0.71
Social Security Administration	524	11	2.18
AmeriCorps	367	11	3.32
Institute of Museum and Library Services	362	4	1.42
Legislative-Citizen Commission on Minnesota Resources	343	4	1.20
Joint Fire Science Program	301	6	2.05
Small Business Technology Transfer	294	3	1.46
National Defense University	292	7	3.13
Center for Strategic Research	101	3	3.61
Office of Strategic Coordination	281	5	1.92
Common Fund	127	3	2.44
Small Business Innovative Research and Small Business Technology Transfer	279	2	1.79
Department of Labor	259	5	2.43
National Endowment for the Arts	196	3	1.62
Kansas Department of Transportation	178	0	0.00
Central Intelligence Agency	145	2	1.63
Alzheimer's Disease Neuroimaging Initiative	134	6	5.08
Office of Disease Prevention	132	6	4.72
Marine Mammal Commission	121	2	1.68
Office of National Drug Control Policy	121	3	2.52
Department of the Treasury	115	0	0.00
Connecticut Department of Agriculture	106	2	2.06
Pennsylvania Department of Military and Veterans Affairs	101	2	2.00

Note(s):
Articles are classified by their year of publication. Whole counting is used. An article is considered to be federally funded if the funding information tied with the publication record in Scopus links it with one of the U.S. federal agencies. Not all Scopus publications have funding information available, and coverage has evolved with time; for more information, see Figure SATRN-1. The count of publications linked to funding from each parent agency includes those linked to its child entities. Only child entities linked to at least 100 publications and 1% or more of the total number of publications funded by that agency are shown. Sums for the child agencies may exceed the count for the parent agency because publications frequently acknowledge funding from multiple sources. Relative citation scores are not computed for publications that are not thematically classified; thus, the relative citation index is not simply the ratio of the count of publications in the top 1% over the total number of publications because publications without a relative citation score are excluded at the denominator.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Scopus abstract and citation database, accessed August 2025.

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Table STRN-2. Contributions to New GitHub repositories by selected entities: 2009–24

(Number)

Institution	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Federal total	14	27	32	72	241	631	800	1,005	1,894	1,304	1,700	1,779	2,037	2,248	2,436	3,008
Department of Agriculture	0	0	0	0	4	1	6	9	13	22	12	35	28	44	36	54
Department of Commerce	1	0	0	2	1	22	15	12	21	24	25	28	23	44	63	84
Department of the Interior	0	0	1	1	15	25	27	31	67	64	46	78	75	64	62	77
Department of Defense	0	0	0	0	7	2	0	5	4	5	14	3	2	3	2	13
Department of Energy	6	16	17	34	120	283	346	474	586	692	873	1,036	1,158	1,277	1,396	1,645
Department of Health and Human Services	0	0	1	2	10	14	27	21	49	46	64	79	99	135	155	154
Department of Homeland Security	0	0	0	0	0	0	1	2	1	0	3	3	0	4	10	16
Department of Justice	0	0	0	0	0	0	0	0	0	0	1	2	9	9	5	5
Department of Labor	0	0	0	0	0	0	0	0	3	1	0	0	3	0	0	0
Department of the Treasury	0	0	0	2	13	10	18	5	2	0	2	2	1	1	2	9
Department of Transportation	0	0	0	0	0	0	1	13	1	4	18	12	32	3	24	3
Department of Veterans Affairs	0	0	0	0	0	3	1	3	11	5	5	10	5	2	10	15
Environmental Protection Agency	0	0	0	0	3	2	5	11	11	9	7	4	7	11	11	16
Federal Election Commission	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
General Services Administration	0	2	0	1	5	14	5	7	6	4	3	5	13	5	3	4
National Aeronautics and Space Administration	0	0	0	1	2	2	3	16	41	27	18	21	23	39	34	76
National Science Foundation	0	0	0	0	0	0	0	0	0	0	1	2	2	8	9	11
Office of Personnel Management	0	0	0	0	0	0	0	0	0	8	6	10	7	21	18	4
Social Security Administration	0	0	0	0	0	0	0	3	0	0	0	3	1	1	3	2
Department of State	0	0	0	0	0	4	6	0	0	2	1	1	0	0	0	0
All other federal	7	9	13	29	61	249	338	393	1,078	391	600	445	549	577	593	820

Note(s):
This table reports the number of new GitHub repositories contributed to by selected U.S. federal entities from 2009 to 2024, using a whole-counting method. A repository is counted once for each federal agency that contributed to it, based on the earliest year of agency involvement. The federal total reflects the total number of agency-repository combinations per year, counting each repository once per contributing agency. All other federal row includes contributions from federal organizations not listed individually. Counts for specific agencies represent repositories with at least one developer affiliated with that agency.

Source(s):
Westat and National Center for Science and Engineering Statistics, tabulations of GitHub data, December 2025.

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Table STRN-3. Annual economywide business startups and startups with licensed university technology: 2000–24

(Number)

Year	Economywide	With licensed university technology
2000	446,204	451
2001	436,993	425
2002	455,162	398
2003	467,532	374
2004	505,056	460
2005	518,727	444
2006	541,317	554
2007	509,517	555
2008	471,285	593
2009	395,235	596
2010	379,145	646
2011	395,680	670
2012	408,546	705
2013	405,350	821
2014	411,948	905
2015	421,155	1,012
2016	442,414	1,037
2017	439,859	1,089
2018	442,078	1,092
2019	453,027	1,043
2020	455,725	1,119
2021	485,256	1,027
2022	521,312	973
2023	508,777	907
2024	NA	962

NA = not available.

Note(s):
Business startups are establishments born within the last 12 months. University startups are based on a survey question that asks how many startup companies were formed in a given year that were dependent on the licensing of the institution's technology for initiation. Startup companies reported by universities in AUTM data refer only to those companies that were formed in the reporting year specifically to develop the technology being licensed.

Source(s):
Census Bureau, Business Dynamics Statistics, economywide data through 2023, available at https://www.census.gov/data/datasets/time-series/econ/bds/bds-datasets.html, accessed February 2026; and AUTM, Statistics Access for Technology Transfer (STATT) Database, accessed January 2026.

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Table STRN-4. Citations of S&E articles in USPTO utility patents, by cited field, cited author country, and patent sector: 2013–24

(Number)

Field, country, and sector	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
All fields, all sectors	616,592	684,578	675,011	656,690	670,169	634,138	715,814	689,981	656,423	627,283	645,541	641,571
Foreign	316,326	357,146	357,331	349,791	360,603	344,216	385,425	374,404	358,369	348,498	359,142	360,993
Unknown country	3,371	3,434	3,149	2,917	2,847	2,583	2,377	2,066	1,684	1,441	1,401	1,601
United States	296,896	323,998	314,531	303,982	306,719	287,340	328,012	313,511	296,370	277,344	284,997	278,978
Academic	191,547	208,790	205,817	201,376	203,288	192,967	222,057	213,673	201,230	187,285	193,271	188,488
Business	57,152	63,014	58,483	54,956	55,596	49,826	54,921	50,858	47,909	45,175	46,486	45,083
Federal government	11,601	12,333	11,995	11,569	11,558	11,272	12,315	12,064	12,023	11,126	10,913	10,793
FFRDCs	5,908	6,765	6,296	6,297	6,302	5,824	6,725	6,119	5,609	5,494	5,523	5,579
Nonprofit	15,648	16,971	17,160	15,933	16,079	14,978	17,825	17,255	16,542	15,883	15,851	15,857
State and local government	297	308	267	300	234	226	269	249	257	183	187	191
Joint and unknown sectors	14,742	15,817	14,514	13,552	13,662	12,247	13,900	13,292	12,800	12,198	12,767	12,987
Agricultural sciences	3,219	3,537	3,242	3,096	3,167	3,186	3,776	3,972	4,244	3,563	3,783	3,830
Foreign	1,862	2,114	2,108	2,038	2,109	2,107	2,675	2,840	3,122	2,693	2,913	2,948
Unknown country	13	9	10	4	7	5	8	6	5	4	5	5
United States	1,344	1,414	1,124	1,053	1,051	1,073	1,094	1,126	1,117	866	865	877
Academic	911	999	797	700	732	743	752	787	779	606	634	659
Business	149	129	112	117	103	123	104	120	111	104	86	74
Federal government	194	185	143	168	148	153	167	166	171	110	101	100
FFRDCs	3	4	5	9	11	4	12	5	3	3	4	5
Nonprofit	5	5	6	4	5	4	5	4	4	3	2	5
State and local government	0	1	1	1	0	0	1	2	1	1	0	0
Joint and unknown sectors	81	91	58	55	51	45	53	41	48	38	37	34
Astronomy and astrophysics	94	117	100	170	117	114	117	156	128	169	241	166
Foreign	68	79	66	111	74	59	55	58	63	73	97	83
Unknown country	0	0	0	0	0	0	3	3	3	2	2	0
United States	25	37	34	59	43	55	59	95	63	94	141	83
Academic	13	22	19	39	18	31	30	54	32	56	97	48
Business	2	3	3	5	1	5	2	6	3	2	4	4
Federal government	2	5	5	7	10	8	15	15	16	16	16	11
FFRDCs	6	6	5	4	9	8	8	13	9	15	17	14
Nonprofit	2	3	0	0	2	1	1	4	2	1	4	4
State and local government	0	0	0	0	0	0	0	0	0	0	0	0
Joint and unknown sectors	1	0	2	4	3	1	4	3	2	4	4	3
Biological and biomedical sciences	159,842	173,686	175,143	166,128	171,881	169,110	192,972	192,812	182,761	173,570	175,086	171,440
Foreign	77,872	85,746	85,674	80,835	83,945	83,087	93,745	93,080	87,887	83,410	82,890	81,191
Unknown country	760	747	703	652	639	614	536	439	253	239	250	248
United States	81,210	87,193	88,766	84,641	87,297	85,409	98,691	99,293	94,621	89,921	91,946	90,001
Academic	51,669	55,105	56,481	54,161	55,963	55,502	64,993	65,788	62,685	59,933	62,025	60,387
Business	14,308	15,541	15,643	14,743	15,381	13,973	15,475	14,984	13,957	12,740	12,595	12,208
Federal government	5,080	5,467	5,472	5,231	5,241	5,132	5,647	5,741	5,651	5,258	5,036	4,994
FFRDCs	976	1,105	972	959	884	917	1,112	1,017	1,001	1,000	990	915
Nonprofit	5,429	5,907	6,256	6,031	6,409	6,572	7,902	8,266	7,963	7,866	8,059	8,248
State and local government	80	93	90	87	68	87	92	93	100	66	66	67
Joint and unknown sectors	3,668	3,975	3,851	3,429	3,353	3,225	3,471	3,404	3,264	3,057	3,174	3,183

Table STRN-4. Citations of S&E articles in USPTO utility patents, by cited field, cited author country, and patent sector: 2013–24

(Number)

Field, country, and sector	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Chemistry	53,576	56,011	55,907	54,425	55,013	52,480	57,135	58,153	53,722	49,332	50,660	51,183
Foreign	30,888	32,640	32,981	31,915	32,603	31,596	34,588	35,330	32,691	30,856	31,661	32,514
Unknown country	76	61	36	39	37	42	38	41	32	35	34	28
United States	22,612	23,310	22,890	22,471	22,373	20,843	22,509	22,782	21,000	18,441	18,965	18,641
Academic	16,688	17,229	16,890	16,765	16,649	15,812	17,010	17,237	16,035	13,909	14,294	14,146
Business	3,230	3,406	3,300	3,233	2,979	2,483	2,641	2,602	2,391	2,051	2,046	2,023
Federal government	557	521	501	484	516	515	478	509	442	428	430	401
FFRDCs	757	778	747	734	799	772	974	1,031	895	934	954	910
Nonprofit	711	784	879	672	805	695	790	736	628	553	668	559
State and local government	7	10	7	17	9	7	10	15	8	6	1	4
Joint and unknown sectors	661	582	566	566	616	560	606	652	600	560	571	599
Computer and information sciences	86,603	98,126	94,094	93,854	96,166	98,273	109,119	104,055	95,262	98,451	108,704	105,460
Foreign	41,317	46,802	45,903	46,677	50,793	52,855	60,039	59,949	56,637	60,003	66,070	64,285
Unknown country	690	784	691	658	557	466	430	373	349	302	368	586
United States	44,596	50,540	47,501	46,519	44,816	44,952	48,650	43,733	38,276	38,146	42,266	40,588
Academic	28,495	33,083	31,701	30,993	30,375	30,979	33,120	29,667	25,520	25,049	27,232	25,581
Business	12,623	13,860	12,544	12,400	11,574	11,163	12,377	11,209	10,169	10,515	12,023	11,836
Federal government	343	369	337	356	361	447	426	304	276	332	278	375
FFRDCs	491	519	522	537	457	445	615	570	526	431	524	467
Nonprofit	959	1,013	817	708	544	417	476	416	282	241	213	194
State and local government	2	1	1	1	0	0	0	0	1	1	0	1
Joint and unknown sectors	1,682	1,696	1,579	1,525	1,505	1,500	1,637	1,567	1,502	1,577	1,995	2,134
Engineering	66,556	74,548	71,979	71,811	74,767	68,815	81,767	79,397	75,952	73,108	79,690	82,810
Foreign	33,890	37,854	37,740	38,075	40,040	37,442	45,035	45,086	44,494	44,269	48,577	51,450
Unknown country	286	307	275	271	239	234	210	194	138	113	91	67
United States	32,380	36,387	33,964	33,465	34,489	31,139	36,521	34,117	31,320	28,725	31,021	31,293
Academic	20,662	23,442	22,873	22,937	23,500	21,438	25,843	24,852	22,722	20,781	22,899	23,055
Business	7,669	8,378	6,842	6,285	6,653	5,763	6,142	5,067	4,647	4,308	4,232	4,123
Federal government	802	877	885	804	904	883	991	964	905	845	948	937
FFRDCs	1,221	1,429	1,271	1,427	1,415	1,310	1,613	1,437	1,380	1,310	1,306	1,517
Nonprofit	801	879	754	679	621	515	535	459	361	252	262	274
State and local government	17	26	20	28	15	10	17	16	14	13	6	14
Joint and unknown sectors	1,208	1,357	1,319	1,304	1,379	1,219	1,382	1,321	1,291	1,217	1,367	1,373
Geosciences, atmospheric sciences, and ocean sciences	3,225	3,851	3,431	3,134	3,835	3,536	5,027	4,291	3,934	4,738	4,758	4,405
Foreign	1,469	1,820	1,574	1,440	1,837	1,695	2,417	2,037	2,069	2,384	2,375	2,440
Unknown country	126	138	106	117	103	84	106	69	45	43	44	25
United States	1,629	1,893	1,751	1,577	1,894	1,757	2,503	2,185	1,820	2,311	2,339	1,939
Academic	653	759	745	632	779	644	859	817	712	970	1,056	916
Business	581	691	638	531	697	725	1,069	878	683	897	896	681
Federal government	92	81	68	100	82	64	81	73	79	77	81	57
FFRDCs	76	95	62	82	73	46	62	49	56	76	57	54
Nonprofit	91	101	97	59	86	102	122	96	87	81	50	40
State and local government	2	0	3	0	0	0	1	2	0	0	1	0

Table STRN-4. Citations of S&E articles in USPTO utility patents, by cited field, cited author country, and patent sector: 2013–24

(Number)

Field, country, and sector	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Joint and unknown sectors	133	166	138	174	177	176	309	269	202	211	197	191
Health sciences	156,850	170,513	167,609	162,670	167,161	154,203	174,999	168,002	165,622	155,928	148,090	149,217
Foreign	77,790	84,112	83,162	81,322	83,548	79,068	88,976	86,556	84,706	81,656	77,282	78,686
Unknown country	1,257	1,231	1,185	1,031	1,114	1,025	945	856	782	644	546	539
United States	77,803	85,171	83,262	80,317	82,499	74,110	85,078	80,590	80,134	73,628	70,262	69,993
Academic	50,726	54,965	54,536	53,486	54,636	49,597	57,327	54,688	53,901	49,290	46,933	46,628
Business	9,936	11,709	10,992	10,193	11,217	9,915	10,716	10,059	10,262	9,348	8,976	8,864
Federal government	3,419	3,650	3,519	3,406	3,285	3,154	3,541	3,420	3,588	3,279	3,106	3,138
FFRDCs	247	216	262	242	267	197	218	207	195	194	204	171
Nonprofit	7,244	7,846	7,970	7,429	7,308	6,401	7,613	6,936	6,943	6,654	6,330	6,358
State and local government	181	173	142	160	138	115	147	115	131	93	109	100
Joint and unknown sectors	6,050	6,612	5,840	5,401	5,648	4,730	5,516	5,164	5,113	4,770	4,603	4,734
Materials science	9,454	10,667	10,880	9,885	10,467	9,683	11,267	9,880	10,032	9,388	11,020	11,476
Foreign	5,875	6,877	7,221	6,717	7,056	6,690	7,669	6,810	6,926	6,407	7,472	7,831
Unknown country	21	15	14	18	17	13	13	8	6	8	11	5
United States	3,558	3,775	3,645	3,150	3,394	2,980	3,585	3,061	3,100	2,973	3,537	3,640
Academic	2,273	2,431	2,417	2,139	2,337	2,049	2,550	2,170	2,228	2,115	2,619	2,646
Business	628	591	552	410	466	372	401	326	294	295	306	308
Federal government	185	221	215	179	140	124	154	123	165	121	142	160
FFRDCs	253	353	313	286	315	304	344	317	291	345	371	432
Nonprofit	50	44	45	43	37	26	31	34	30	20	22	22
State and local government	0	0	0	0	1	2	0	0	0	0	0	0
Joint and unknown sectors	169	134	102	93	98	103	104	92	91	76	76	73
Mathematics and statistics	1,068	1,075	927	914	970	1,213	1,418	1,273	1,255	1,223	1,303	1,262
Foreign	521	553	461	469	530	642	727	615	613	632	712	681
Unknown country	4	3	2	2	9	0	1	2	3	2	2	1
United States	543	519	464	443	431	571	691	656	639	589	589	580
Academic	408	403	361	341	348	453	555	522	505	465	457	461
Business	61	56	43	29	28	37	42	59	60	55	50	49
Federal government	13	15	11	18	12	14	10	12	14	8	12	13
FFRDCs	28	23	10	13	20	37	41	34	36	28	26	27
Nonprofit	11	11	10	11	8	19	25	13	11	12	20	13
State and local government	0	0	0	0	0	0	0	0	0	0	0	0
Joint and unknown sectors	21	13	28	31	16	11	18	16	13	21	23	17
Natural resources and conservation	1,204	1,338	1,271	1,346	1,441	1,409	1,500	1,754	1,717	1,552	1,848	2,145
Foreign	711	794	772	854	878	840	929	1,096	1,105	1,050	1,329	1,546
Unknown country	4	6	2	2	4	1	2	4	1	2	3	0
United States	489	538	497	490	560	569	568	654	611	499	516	598
Academic	323	353	332	318	356	324	361	406	425	304	329	410
Business	70	70	65	70	93	88	75	89	45	48	40	53
Federal government	41	55	48	43	56	50	66	74	60	53	70	55
FFRDCs	24	28	24	20	20	64	33	52	52	52	44	45
Nonprofit	5	1	4	4	9	9	9	9	6	8	10	6
State and local government	2	4	2	4	2	2	1	1	1	1	1	2

Table STRN-4. Citations of S&E articles in USPTO utility patents, by cited field, cited author country, and patent sector: 2013–24

(Number)

Field, country, and sector	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Joint and unknown sectors	24	27	23	30	25	31	23	24	22	35	21	28
Physics	70,149	85,748	85,270	83,609	79,331	66,315	69,625	58,787	54,486	49,027	51,239	50,065
Foreign	42,178	55,690	57,568	56,992	54,813	45,742	45,307	37,416	34,525	31,604	33,260	33,397
Unknown country	116	116	109	100	100	80	71	56	52	35	32	35
United States	27,855	29,942	27,593	26,517	24,418	20,493	24,247	21,316	19,909	17,388	17,947	16,632
Academic	16,904	18,006	16,823	16,753	15,322	13,031	16,094	13,988	13,144	11,271	11,762	10,849
Business	7,109	7,592	6,741	6,012	5,397	4,332	4,871	4,474	4,310	3,820	3,892	3,695
Federal government	831	844	759	728	768	687	679	611	612	563	651	526
FFRDCs	1,821	2,209	2,098	1,980	2,027	1,715	1,692	1,384	1,160	1,103	1,023	1,018
Nonprofit	283	289	296	263	214	176	255	241	178	158	145	115
State and local government	2	1	1	2	0	1	1	1	1	1	1	1
Joint and unknown sectors	904	1,001	875	779	690	551	654	617	505	473	472	428
Psychology	4,107	4,745	4,669	5,062	5,212	5,206	6,270	6,645	6,513	6,453	8,218	7,341
Foreign	1,632	1,817	1,901	2,118	2,118	2,147	2,931	3,145	3,140	3,062	3,967	3,456
Unknown country	10	13	15	22	22	18	12	9	10	10	11	61
United States	2,464	2,915	2,754	2,923	3,072	3,042	3,328	3,491	3,363	3,381	4,240	3,824
Academic	1,535	1,732	1,629	1,838	1,984	2,087	2,218	2,361	2,216	2,199	2,647	2,449
Business	762	963	976	895	964	824	977	968	961	978	1,318	1,150
Federal government	31	34	28	38	30	34	32	46	38	35	37	23
FFRDCs	2	0	2	1	4	4	1	5	5	3	3	5
Nonprofit	27	51	10	20	20	23	22	23	24	25	29	16
State and local government	2	0	0	0	0	0	0	1	0	1	0	1
Joint and unknown sectors	105	136	109	130	70	69	77	87	118	141	206	182
Social sciences	645	616	489	586	641	595	822	804	795	781	901	771
Foreign	251	247	201	227	258	247	332	385	392	398	536	483
Unknown country	7	5	2	1	1	1	3	7	6	1	1	1
United States	387	364	286	358	381	347	487	412	397	382	363	287
Academic	287	263	212	273	290	276	344	335	324	336	287	254
Business	26	25	32	33	43	22	30	17	16	13	21	17
Federal government	10	10	3	7	5	6	28	5	5	4	3	4
FFRDCs	1	1	3	2	2	1	0	0	1	2	0	0
Nonprofit	28	37	15	11	10	18	39	19	22	8	35	4
State and local government	0	0	0	0	0	0	0	2	0	0	0	1
Joint and unknown sectors	33	28	22	31	31	25	46	34	29	19	17	8

FFRDC = federally funded research and development center; USPTO = Patent and Trademark Office.

Note(s):
Data are presented by calendar year. Taxonomy of Discipline (TOD) fields are used to classify articles. The TOD is a classification scheme developed by the National Science Foundation to suit its need for a unified scheme. Science-Metrix developed an alignment of its own classification scheme with the TOD. Journals are assigned to a unique TOD except for generalist journals, such as *Science* and *Nature*, for which articles are instead reclassified individually in TOD fields using an automated procedure based on machine-learning techniques. Citation counts are based on an 11-year window with a 5-year lag (e.g., citations for 2022 are references in USPTO patents issued in calendar year 2022 to articles published in 2007–17). Articles are credited on a fractional-count basis (i.e., each participating region, country, or sector receives a fraction of the citation). The sum across regions, countries, and sectors adds up to the totals reported. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025; Scopus abstract and citation database, accessed August 2025.

Table STRN-5. S&E articles with authors at federal agencies cited by granted U.S. patents, by author's affiliated agency: 2013–24

(Number)

Year	USDA	DOC	DOD	DOE	HHS	DHS	DOI	DOT	VA	EPA	NASA
2013	2,267	1,225	5,336	8,644	12,729	53	90	34	6,497	144	1,742
2014	2,285	1,285	5,571	10,077	14,065	53	79	29	6,800	95	1,812
2015	2,217	1,190	5,433	9,773	14,171	50	85	17	6,399	144	1,705
2016	2,271	1,211	5,256	9,801	13,860	43	103	17	6,223	99	1,484
2017	2,132	1,441	5,266	10,687	14,397	34	153	34	6,741	96	1,378
2018	2,221	1,383	5,154	10,295	14,503	50	181	34	6,692	101	1,362
2019	2,466	1,481	5,572	12,773	16,528	42	185	29	7,521	153	1,428
2020	2,391	1,496	4,880	11,966	16,537	57	195	31	6,940	153	1,386
2021	2,150	1,582	4,851	11,365	16,850	50	146	28	6,769	179	1,309
2022	1,685	1,498	4,593	11,059	15,894	61	134	29	5,942	126	1,276
2023	1,516	1,520	4,978	11,735	15,611	54	139	31	5,611	164	1,377
2024	1,435	1,602	4,953	11,919	15,716	61	131	18	5,639	153	1,391

DHS = Department of Homeland Security; DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOI = Department of the Interior; DOT = Department of Transportation; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; USDA = Department of Agriculture; VA = Department of Veterans Affairs.

Note(s):
Data are presented by year of publication. Taxonomy of Discipline (TOD) fields are used to classify articles. The TOD is a classification scheme developed by the National Science Foundation to suit its need for a unified scheme. Science-Metrix developed an alignment of its own classification scheme with the TOD. Journals are assigned to a unique TOD except for generalist journals, such as *Science* and *Nature*, for which articles are instead reclassified individually in TOD fields using an automated procedure based on machine-learning techniques. Citation counts are based on an 11-year window with a 5-year lag (e.g., citations for 2022 are references in Patent and Trademark Office [USPTO] patents issued in calendar year 2022 to articles published in 2007–17). Articles are credited on a whole-count basis (i.e., each participating federal agency receives one count). The sum of the individual federal agencies may exceed the total across all agencies reported in Table STRN-9 because articles may have authors from multiple federal agencies.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025; Scopus abstract and citation database, accessed August 2025.

Science and Engineering Indicators

Table STRN-6. Patents granted to U.S. federal agencies, by inventor's agency of employment: 2013–24

(Number)

Year	USDA	DOC	DOD	DOE	HHS	DHS	DOI	DOT	VA	EPA	NASA
2013	62	14	635	409	169	3	3	1	38	14	117
2014	75	14	592	408	209	4	2	0	39	7	124
2015	66	19	595	418	185	2	4	0	53	4	120
2016	50	20	539	388	175	3	1	1	60	3	122
2017	65	28	569	437	157	2	5	0	45	4	120
2018	55	35	557	490	173	8	3	5	61	3	120
2019	46	41	614	504	193	10	3	2	65	5	146
2020	42	24	521	442	196	19	5	1	61	1	132
2021	39	34	511	446	164	35	1	1	58	6	111
2022	23	37	452	427	147	43	1	1	68	8	73
2023	36	19	461	531	121	36	2	4	64	5	70
2024	27	24	422	445	119	38	1	0	77	2	60

DHS = Department of Homeland Security; DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOI = Department of the Interior; DOT = Department of Transportation; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; USDA = Department of Agriculture; VA = Department of Veterans Affairs.

Note(s):
Data are presented by grant year. Patents are credited on a whole-count basis (i.e., each participating federal agency is credited one count). The sum of the individual federal agencies may exceed the total across all agencies reported in Table STRN-10 because articles may have authors from multiple federal agencies.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, Patent and Trademark Office (USPTO), accessed March 2025.

Science and Engineering Indicators

Table STRN-7. Scholarly publications with authors from U.S. federal agencies, by S&E discipline: 2013–24

(Number)

Scientific field	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	70,950	70,506	71,308	73,540	73,402	74,769	72,699	73,252	75,765	72,357	68,434	68,941
Agricultural sciences	1,291	1,299	1,371	1,280	1,392	1,431	1,360	1,328	1,304	1,284	1,225	1,232
Astronomy and astrophysics	1,982	1,933	2,030	2,136	2,159	2,143	2,253	2,411	2,395	2,525	2,747	2,954
Biological and biomedical sciences	13,909	13,874	13,810	13,774	13,797	13,660	13,279	13,817	14,860	13,321	12,553	11,941
Chemistry	2,839	2,711	2,790	2,982	2,798	3,004	2,778	2,860	2,760	2,526	2,367	2,344
Computer and information sciences	2,490	2,494	2,756	2,808	3,177	3,026	3,035	2,782	2,862	2,994	3,167	3,215
Engineering	9,859	9,914	9,665	10,845	10,499	11,592	10,752	10,427	10,036	10,224	10,338	10,691
Geosciences, atmospheric sciences, and ocean sciences	4,761	4,644	4,684	5,077	5,053	5,072	5,053	5,053	5,199	4,728	4,282	4,275
Health sciences	17,907	18,285	18,802	18,902	19,131	19,406	19,066	19,924	21,722	20,529	19,113	18,754
Materials science	1,647	1,620	1,583	1,596	1,662	1,907	1,934	1,860	1,886	1,769	1,546	1,583
Mathematics and statistics	610	621	537	634	558	562	664	616	627	583	550	581
Natural resources and conservation	1,932	2,012	1,862	2,064	2,033	2,007	2,133	1,926	2,126	1,927	1,967	2,031
Physics	10,126	9,406	9,715	9,743	9,375	9,223	8,645	8,596	8,213	8,092	6,886	7,515
Psychology	969	1,026	1,070	1,055	1,106	1,048	1,077	978	1,022	1,016	909	1,001
Social sciences	628	667	633	644	662	688	670	674	753	839	784	824

Note(s):
Data are presented by year of publication. Taxonomy of Discipline (TOD) fields are used to classify articles. The TOD is a classification scheme developed by the National Science Foundation to suit its need for a unified scheme. Science-Metrix developed an alignment of its own classification scheme with the TOD. Journals are assigned to a unique TOD except for generalist journals, such as *Science* and *Nature*, for which articles are instead reclassified individually in TOD fields using an automated procedure based on machine-learning techniques. Articles are credited on a whole-count basis (i.e., each participating federal agency receives one count).

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Scopus abstract and citation database, accessed August 2025.

Science and Engineering Indicators

Table STRN-8. S&E articles with authors from U.S. federal agencies, by author's affiliated agency: 2013–24

(Number)

Year	USDA	DOC	DOD	DOE	HHS	DHS	DOI	DOT	VA	EPA	NASA
2013	6,534	4,509	9,907	18,600	14,227	163	2,788	250	10,600	974	6,362
2014	6,493	4,455	9,789	18,395	14,273	125	2,820	251	10,906	944	6,224
2015	6,519	4,367	10,216	18,595	14,364	122	2,792	232	11,134	912	6,148
2016	6,592	4,839	10,421	19,362	14,212	177	2,969	245	11,190	969	7,232
2017	6,937	4,821	10,444	19,333	14,222	167	2,881	248	11,367	922	6,639
2018	6,804	4,718	10,395	20,313	14,312	152	2,904	279	11,526	925	7,207
2019	6,808	4,565	10,417	19,414	13,714	131	2,811	217	11,482	810	6,807
2020	6,661	4,573	9,926	20,276	13,852	163	2,875	180	12,310	697	6,717
2021	7,052	4,458	9,883	20,311	15,049	149	3,068	192	13,478	766	6,535
2022	6,344	4,280	9,409	20,079	13,682	162	2,719	199	13,054	673	6,732
2023	6,186	3,922	9,414	19,039	12,476	122	2,607	194	12,049	649	6,410
2024	6,016	3,852	9,396	20,022	12,056	133	2,592	174	11,814	604	6,987

DHS = Department of Homeland Security; DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOI = Department of the Interior; DOT = Department of Transportation; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; USDA = Department of Agriculture; VA = Department of Veterans Affairs.

Note(s):
Data are presented by year of publication. Taxonomy of Discipline (TOD) fields are used to classify articles. The TOD is a classification scheme developed by the National Science Foundation to suit its need for a unified scheme. Science-Metrix developed an alignment of its own classification scheme with the TOD. Journals are assigned to a unique TOD except for generalist journals, such as *Science* and *Nature*, for which articles are instead reclassified individually in TOD fields using an automated procedure based on machine-learning techniques. Articles are credited on a whole-count basis (i.e., each participating federal agency receives one count). The sum of the individual federal agencies may exceed the total across agencies reported in Table STRN-7 because articles may have authors from multiple federal agencies.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Scopus abstract and citation database, accessed August 2025.

Science and Engineering Indicators

Table STRN-9. S&E articles with authors at federal agencies cited by granted U.S. patents, by article field: 2013–24

(Number)

Scientific field	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	36,902	40,337	39,398	38,677	40,399	39,936	45,674	43,705	42,905	40,255	40,611	40,880
Agricultural sciences	321	337	283	302	317	315	343	350	344	252	237	241
Astronomy and astrophysics	14	19	24	27	32	29	39	68	55	71	99	71
Biological and biomedical sciences	12,978	14,227	14,222	13,760	14,309	14,988	17,484	17,449	17,056	16,424	16,350	16,097
Chemistry	2,350	2,319	2,364	2,336	2,561	2,512	2,875	2,854	2,724	2,555	2,633	2,527
Computer and information sciences	1,576	1,777	1,688	1,744	1,692	1,901	2,023	1,794	1,609	1,630	1,711	1,785
Engineering	3,387	3,963	3,748	3,985	4,301	4,082	5,051	4,888	4,720	4,414	4,803	5,229
Geosciences, atmospheric sciences, and ocean sciences	288	292	225	321	279	217	280	258	285	324	280	246
Health sciences	10,511	11,198	11,047	10,785	11,161	10,711	11,974	11,260	11,523	10,305	9,915	10,184
Materials science	689	887	882	783	907	827	999	826	910	819	999	1,077
Mathematics and statistics	68	72	44	49	43	64	73	77	94	79	87	97
Natural resources and conservation	110	140	116	133	132	187	185	219	201	162	206	192
Physics	4,479	4,998	4,679	4,341	4,567	4,001	4,236	3,519	3,264	3,119	3,179	3,041
Psychology	124	100	72	94	85	94	94	134	103	91	107	86
Social sciences	7	8	4	17	13	8	18	9	17	10	5	7

Note(s):
Data are presented by grant year. Taxonomy of Discipline (TOD) fields are used to classify articles. The TOD is a classification scheme developed by the National Science Foundation to suit its need for a unified scheme. Science-Metrix developed an alignment of its own classification scheme with the TOD. Journals are assigned to a unique TOD except for generalist journals, such as *Science* and *Nature*, for which articles are instead reclassified individually in TOD fields using an automated procedure based on machine-learning techniques. Citation counts are based on an 11-year window with a 5-year lag (e.g., citations for 2022 are references in Patent and Trademark Office [USPTO] patents issued in calendar year 2022 to articles published in 2007–17). Citations are credited on a whole-count basis (i.e., each participating federal agency on a publication cited by a patent receives one count). The sum of the individual federal agencies may exceed the total across agencies reported in Table STRN-5 because cited articles may have authors from multiple federal agencies.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025; Scopus abstract and citation database, accessed August 2025.

Science and Engineering Indicators

Table STRN-10. Patents granted to U.S. federal agencies, by technology area: 2013–24

(Number)

Technology area	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	1,463	1,466	1,458	1,360	1,430	1,506	1,621	1,443	1,403	1,274	1,347	1,213
Analysis of biological materials	41	40	42	34	40	40	33	35	27	30	23	22
Audio-visual technology	14	20	25	17	25	23	17	13	19	13	17	14
Basic communication processes	18	11	14	12	15	20	18	18	11	17	16	12
Basic materials chemistry	46	50	46	43	63	49	39	42	42	29	37	29
Biotechnology	121	138	117	115	99	120	121	113	103	91	81	82
Chemical engineering	41	46	47	53	50	42	48	43	45	46	53	32
Civil engineering	8	4	11	10	6	18	14	15	12	13	14	12
Computer technology	97	79	79	89	60	81	101	84	94	81	75	79
Control	19	18	19	14	18	21	23	17	21	14	17	22
Digital communication	19	30	30	26	24	37	36	28	25	25	29	36
Electrical machinery, apparatus, energy	86	88	85	92	90	102	109	107	73	80	100	93
Engines, pumps, turbines	27	27	25	25	28	23	33	24	24	34	33	35
Environmental technology	35	32	31	29	30	27	28	29	31	26	26	26
Food chemistry	4	4	6	3	4	5	6	4	2	3	3	1
Furniture, games	1	4	5	2	6	2	1	3	2	1	5	5
Handling	22	10	13	8	6	9	10	12	11	9	8	9
IT methods for management	9	7	2	4	3	5	8	8	9	7	5	5
Machine tools	16	9	10	9	12	9	17	16	16	16	12	10
Macromolecular chemistry, polymers	17	17	34	21	24	21	21	27	23	21	25	29
Materials, metallurgy	42	44	42	40	51	51	60	57	44	49	54	42
Measurement	189	189	160	144	145	186	195	153	148	131	143	106
Mechanical elements	20	17	13	16	24	14	20	21	25	18	19	14
Medical technology	46	40	45	48	54	61	59	61	57	65	58	61
Micro-structural and nano-technology	30	35	39	26	24	15	20	18	13	20	13	17
Optics	56	44	46	35	53	65	62	57	61	58	69	34
Organic fine chemistry	46	47	50	49	43	43	46	45	48	31	38	27
Other consumer goods	10	7	9	7	10	7	11	5	11	13	13	12
Other special machines	97	94	82	83	98	75	90	81	109	75	84	76
Pharmaceuticals	97	122	119	105	95	104	121	113	103	78	84	79
Semiconductors	48	64	67	55	70	65	75	46	49	53	41	41
Surface technology, coating	32	28	36	30	38	33	46	34	42	31	35	36
Telecommunications	51	39	37	58	60	71	61	45	40	34	34	31
Textile and paper machines	6	8	8	6	8	7	7	3	9	5	9	6
Thermal processes and apparatus	9	8	18	5	10	19	19	15	15	15	22	11
Transport	41	46	46	46	44	36	44	51	38	44	53	66
Unclassified	2	1	0	0	0	0	1	1	2	0	1	0

IT = information technology.

Note(s):
Data are presented by grant year. Patents are credited on a whole-count basis (i.e., each participating federal agency is credited one count). However, fractioning is used at the level of International Patent Classification codes to ensure that the sum of patents across technology areas (World Intellectual Property Organization technology classification) is equal to the total number of patents because each patent can be assigned to more than one technology area. The sum of the individual federal agencies may exceed the total across agencies reported in Table STRN-6 because patents may be co-owned by multiple federal agencies.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, Patent and Trademark Office (USPTO), accessed March 2025.

Science and Engineering Indicators

Table STRN-11. USPTO utility patents granted to owners, by sector: 2000–24

(Number)

Owner and sector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	157,595	166,158	167,400	169,077	164,384	143,891	173,822	157,331	157,788	167,463	219,848	224,871	253,633	278,518	301,643	299,382	304,126	320,003	308,853	355,923	353,701	329,097	324,698	313,708	325,602
Assigned to foreign owner	69,232	75,250	77,832	79,037	78,084	67,615	82,239	76,192	78,216	83,055	109,149	113,068	128,616	139,354	150,216	151,166	152,730	159,565	154,379	177,043	176,567	166,585	170,554	154,281	173,529
Assigned to owner from unknown location	49	45	50	37	23	20	33	48	27	28	33	33	26	35	53	29	40	25	20	25	37	50	38	37	36
Assigned to U.S. owner	88,314	90,863	89,518	90,003	86,277	76,256	91,551	81,091	79,545	84,380	110,667	111,770	124,991	139,130	151,374	148,187	151,356	160,413	154,454	178,854	177,097	162,463	154,106	159,390	152,037
Academic	3,386	3,507	3,498	3,504	3,262	2,876	3,520	3,215	3,024	3,265	4,516	4,414	5,042	5,625	6,086	6,180	6,630	7,005	6,892	7,795	7,841	7,228	6,752	6,612	6,761
Business	67,093	70,497	70,294	71,416	69,389	61,723	74,610	66,550	66,130	70,646	91,856	93,769	105,242	117,539	128,672	125,739	128,858	136,724	131,419	152,821	151,535	138,011	130,558	136,375	129,766
Government	1,057	1,148	1,122	1,078	1,019	844	1,008	946	905	931	1,257	1,195	1,359	1,447	1,430	1,376	1,299	1,342	1,312	1,434	1,244	1,262	1,291	1,364	1,289
Individual	16,122	15,186	14,122	13,548	12,181	10,482	12,006	10,050	9,205	9,210	12,556	11,906	12,810	13,914	14,421	14,078	13,902	14,348	13,760	15,173	14,759	14,229	13,619	13,170	12,262
Other	396	437	406	383	361	292	371	303	262	300	449	446	491	562	565	540	485	612	557	726	693	712	784	742	819
Unclassified	260	89	76	74	64	38	36	28	19	28	33	41	48	43	199	275	181	382	515	906	1,025	1,020	1,104	1,128	1,140

USPTO = Patent and Trademark Office.

Note(s):
Data are presented by grant year. Patents are allocated according to patent ownership information. Patents are credited on a fractional-count basis (i.e., for patents with collaborating institutions, each institution receives fractional credit on the basis of the proportion of institutions). Business covers the for-profit business sector. Government includes federal, state, local, and municipal and federally funded research and development centers. Other includes private nonprofits, such as foundations, associations, nonacademic hospitals, and research-performing institutions.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025.

Science and Engineering Indicators

Table STRN-12. NSF TIP key technology areas and technology foci key terms

(Definition)

No.	Key technology area	Technology foci					
1	Artificial intelligence, machine learning, autonomy, and related advances	Artificial intelligence (excluding machine learning)	Machine learning	Machine learning training data	Autonomy	na	na
2	High-performance computing (HPC); semiconductors, and advanced computer hardware and software	HPC	Advanced computer hardware	Advanced computer software	Semiconductors	na	na
3	Quantum information science and technology	Quantum computing algorithms and software	Quantum computing hardware	Quantum communications and networking	Quantum sensing	Quantum device components and manufacturing methods	na
4	Robotics, automation, and advanced manufacturing	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	Automation	Robotics	na	na	na
5	Natural and anthropogenic disaster prevention or mitigation	Natural disaster prevention and mitigation (excluding climate resilience)	Climate resilience	Anthropogenic disaster prevention and mitigation (excluding pandemics)	Pandemic prevention and response	na	na
6	Advanced communications technology and immersive technology	Wireless communication - terrestrial and space	Wired/ fiber communication	Spectrum management	Communications and network security	Internetworking	Immersive technology and edge devices
7	Biotechnology, medical technology, genomics, and synthetic biology	Genomics and bioinformatics	Medical technology	Synthetic biology	Biotechnology - other than synthetic biology	Biomanufacturing	na
8	Data storage, data management, distributed ledger technologies, and cybersecurity, including bio-metrics	Biometrics	Cybersecurity	Data management/ databases	Data storage	Data privacy	Distributed ledger technologies
9	Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	Advanced batteries and energy storage technologies	Advanced energy generation technologies	Advanced transmission and distribution systems	Data	Advanced nuclear technologies	Industrial efficiency technologies
10	Advanced materials science, including composites 2D materials, other next-	Composites (excluding 2D materials)	2D materials	Other next-generation materials	Related manufacturing technologies	na	na

Table STRN-12. NSF TIP key technology areas and technology foci key terms

(Definition)

No.	Key technology area	Technology foci					
	generation materials, and related manufacturing technologies						

na = not applicable.

NSF TIP = National Science Foundation Directorate for Technology, Innovation and Partnerships.

Note(s):
Key technology focus areas are defined in the CHIPS and Science Act of 2022.

Source(s):
NSF TIP, 2025.

Science and Engineering Indicators

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	A63F2300/ 6072
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G05B2219/ 32091
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G05B2219/ 32333
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G05B2219/ 33002
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G05B2219/ 35041
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G05B23/ 0229

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06F16/ 243
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06F16/ 24522
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06F16/ 3329
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06F16/ 3344
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06F16/ 90332
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06F40/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06N3/ 00
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06N5/ 00
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G06V
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	G10L
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	H04M2201/ 40
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	H04Q2213/ 13378

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-1	Artificial intelligence (excluding machine learning)	computer vision, safe ai, trustworthy ai, responsible ai, secure ai, explainable ai (XAI), knowledge processing, speech/ voice recognition, ai hardware acceleration, evolutionary computation, natural language processing, natural language understanding, agi, artificial narrow intelligence, synthetic intelligence, chatbots, generative ai, neuro-symbolic ai, frontier ai, decision-support systems, reasoning, bio-inspired computing, brain-inspired computing, neuromorphic computing, genetic algorithm, cognitive architecture, cognitive modeling, ai planning, ai algorithms, retrieval augmented generation, knowledge extraction, intelligent system/ platforms, ai analytics, ai-driven, ai-model, disability assistant	H04Q2213/378
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	A61B5/7267
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	B29C66/965
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G01N2201/1296
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/25255

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/32334
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/32335
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/33044
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/34082
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal	G05B2219/39271

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/40499
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B2219/41054
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05B23/0281
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G05D1/0221
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM),	G06F11/1476

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F11/ 2263
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F16/ 337
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F16/ 35
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F16/ 906

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F2207/ 4824
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F30/ 27
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F40/ 16
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06F7/ 023
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal	G06N20/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06N3/ 00
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06N5/ 00
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06T2207/ 20081
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06T2207/ 20084
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM),	G06T3/ 4046

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06V10/ 454
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06V10/ 70
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G06V30/ 194
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G10L15/ 16

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G11B20/ 10518
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G16B40/ 20
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	G16C20/ 70
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H03H2017/ 0208
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal	H03H2222/ 04

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04L2012/ 5686
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04L25/ 03165
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04L41/ 16
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04L45/ 08
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM),	H04N21/ 251

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04N21/ 4662
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04Q2213/ 13343
Artificial intelligence, machine learning, autonomy, and related advances	1-2	Machine learning	machine learning, supervised learning, unsupervised learning, reinforcement learning, multi-task learning, classification and regression trees, support vector machines, neural networks, deep learning, deep neural networks, logical and relational learning, probabilistic graphical models, graphical models, rule learning, instance-based learning, latent representation, transfer learning, model pruning, transformer, large language model (LLM), diffusion model, grading descent, analog machine learning accelerator, optical machine learning accelerator, approximate machine learning, federated learning, foundation model, statistical learning, multimodal models, ml models, ml algorithms, image recognition/ classification, predictive/ forecasting model, representation learning, pattern recognition, behavior/ activity recognition, generative adversarial network (GAN), recommendation system	H04Q2213/ 343
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G01V2210/ 614
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06N3/ 08
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06N5/ 02

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06T2207/ 20081
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06T2219/ 004
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06V10/ 72
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06V10/ 774
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06V10/ 776
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G06V30/ 19147
Artificial intelligence, machine learning, autonomy, and related advances	1-3	Machine learning training data	validation data set, holdout data set, test set, synthetic data, big data pipeline, training data, data labeling, open data repositories, knowledge presentation, knowledge graph, knowledge representation, fine-tuning, knowledge network, dataset generation	G16C20/ 70
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B60Q2800/ 10
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B60W60/ 00
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B62D1/ 283
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B63B2035/ 007
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B63G2007/ 005

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B65H2301/533
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	B66F9/ 063
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G01S13/881
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05B2219/32334
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05B2219/32388
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05B2219/39473
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05B2219/40109
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05B2219/40499
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05D1/0088
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05D1/0221
Artificial intelligence, machine learning, autonomy, and related advances	1-4	Autonomy	autonomous systems, autonomous robotics, autonomous agents, agent-based systems, decision-making, context-awareness, actuation, perception, self-recovery, goal-oriented agents, automated platform/ solution, automated detection, automated classification	G05D2201/0212

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-1	High-performance computing	accelerated strategic computer initiative (ASCI), high-performance computing (HPC), supercomputers, high-end computing (HEC), grid computing, peta-scale computing, exa-scale computing, high-productivity computing, high-throughput computing, hadoop cluster	G06F15/ 8007
High-performance computing; semiconductors, and advanced computer hardware and software	2-1	High-performance computing	accelerated strategic computer initiative (ASCI), high-performance computing (HPC), supercomputers, high-end computing (HEC), grid computing, peta-scale computing, exa-scale computing, high-productivity computing, high-throughput computing, hadoop cluster	G06F9/ 5072
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F1/ 184
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F11/ 3031
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F12/ 0806
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F13/ 38
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F15/ 161
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F15/ 163

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F15/ 7803
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F15/ 80
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	G06F2113/ 02
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	H04L49/ 358
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	H05K7/ 1485
High-performance computing; semiconductors, and advanced computer hardware and software	2-2	Advanced computer hardware	infiniband, flop/ s (floating point operations per second), video graphics card, motherboard, optoelectronic bus, i/ o (input/ output), computer clusters, interconnect, servers, peripheral, ethernet, symmetric multiprocessing, smp, computer architecture, data centers, mobile devices, embedded computing	H05K7/ 20709
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G05B2219/ 23217

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G05B2219/23266
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G05B2219/34019
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F11/0709
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F11/1482

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F11/302
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F11/3404
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F12/0806
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F12/0884

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F15/ 17318
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F15/ 80
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F16/ 1858
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F16/ 24532

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F16/ 2462
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F3/ 048
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F30/ 20
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F30/ 398

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F7/ 53
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F8/ 00
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F9/ 28
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F9/ 38

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F9/ 4405
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F9/ 448
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F9/ 455
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06F9/ 46

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06N10/ 80
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	G06T2210/ 52
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	H03M7/ 6023
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	H04N19/ 436

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-3	Advanced computer software	parallel processing, parallel programming, parallel computing, edge computing, ubiquitous computing, cognitive computing, cloud computing, compiler, operating systems, program language, software engineering, middleware, distributed systems, algorithms (in the context of computing), theory of computing, approximate computing, satisfiability (satisfiability and satisfiability modulo theories solvers), community enterprise operating system, centos, fortran, unix, c, c++, monte carlo simulations, computational fluid dynamics, cfd, finite element method, fem, multiphysics simulation, finite difference method, fdm, open-source software/ ecosystem, graphical interfaces, graphic rendering, data visualization, optimization algorithms, discrete event simulation, sensor fusion algorithms, ui/ ux, video streaming, cloud-based platform, analytic software, software regression test, software tools/ platform/ technology, ci/ cd, computer-aided design, computer simulations, hybrid computing	H04Q3/ 5455
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	B01F2101/ 58

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	B24B7/ 228
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor	B24B9/ 065

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos,	B32B2457/14

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	B81C
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around	C09J2203/326

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics,	C23C14/ 221

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic	C23C16/ 45527

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	C23C16/ 45546
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line	C23C16/ 45551

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			(feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan,	C23C18/ 1642

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	C25D17/001

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	C25D7/ 12
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor	C25F3/ 12

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos,	G01L1/ 2293

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G01N21/ 9501
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around	G01R31/ 26

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics,	G01R31/ 2851

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic	G01R31/ 318511

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G01R31/ 318519
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line	G03F7/ 70433

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			(feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan,	G05B2219/15057

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G05B2219/45031

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G06F11/2236
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor	G06F15/7807

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos,	G06F2015/763

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G06F21/ 76
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around	G06F2213/ 0038

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics,	G06F30/331

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic	G06F30/ 34

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G06T2207/ 30148
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line	G11C11/ 34

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			(feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan,	G11C11/5685

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G11C13/ 0002

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	G11C15/ 04
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor	G11C19/ 28

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos,	H01L

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03B2200/ 0028
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around	H03C1/ 36

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics,	H03C7/ 025

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic	H03F1/ 086

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03F3/ 04
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line	H03F3/ 195

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			(feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan,	H03F3/ 347

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03F3/ 45264

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03G1/ 0029
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor	H03G1/ 007

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos,	H03G3/ 30

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03G9/ 24
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around	H03H2003/ 027

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics,	H03H3/ 0072

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic	H03H9/1057

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03H9/485
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line	H03J1/0008

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			(feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan,	H03K17/ 04163

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03K17/ 56

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03K19/018521
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor	H03K19/018571

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos,	H03K19/0944

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H03K2017/ 6878
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around	H03K3/ 36

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics,	H03K3/ 57

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic	H04Q2213/13106

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	
High-performance computing; semiconductors, and advanced computer hardware and software	2-4	Semiconductors	microelectronics, nanoelectronics, transistors, central processor unit, cpu, graphics processing unit, gpu, tpu, tensor processing unit, dsp, digital signal processor, accelerator, inertial sensors, microphone, microcontroller, microprocessor, fpga, field-programmable gate array, asic, dram, sram, nvram, nram, processing power, risc-v processors, moore's law, risc processors, processing speed, integrated circuits, ic, microchips, integrated device manufacturing, complementary metal oxide semiconductor, cmos, strain engineered transistor, fin field-effect transistor, finfet, gate-all-around field-effect transistor, gaa fet, gaa, gate-all-around transistor, gaas/ algaas, heterostructures chip packaging, heterogeneous 3-d integration, heterogeneous 2.5-d integration, chip assembly and test, chiplets, semiconductor manufacturing, semi manufacturing, wafer processing, substrate processing, lithography, euv, eda, mask-making, front-end of line (feol), back-end of line (beol), analog integrated circuits, mixed-signal, quantum dots, micro-electro-mechanical systems (MEMS), nano-mechanical systems (NEMS), superconducting electronics, josephson junction, atomic layer deposition (ALD), thin-film deposition, physical vapor deposition, pvd, chemical mechanical polishing, cmp, chemical vapor deposition (CVD), epitaxy, wafer bonding, ion beam deposition, electroplating, atomic layer etching, ale, high-k dielectric, yield management, molecular layer deposition (MVD), chip-scale packaging, csp, monolithic microwave ic, mmic, design rules, design ip, process design kit, pdk, gdsii, open artwork system interchange standard, oasis, caltech intermediate form, cif, quilt packaging, metal organic chemical vapor deposition (MOCVD), photonics, molecular-beam epitaxy, mbe, nanoimprinting, inductive plasma etching (ICP), reactive ion etching (RIE), optoelectronics, photonic integrated circuits, system-in-package, sip, system on chip, soc, network on chip, noc, solid-state lighting, led, wafer-scale design, spintronics, photolithography, mosfet, metal-oxide-semiconductor field-effect transistors, analog circuits, mixed-signal circuits, 3d ic stacking, 3d vlsi, a/ d converter, d/ a converter, power soc, power system on chip, gan, ganox, gaas, sic, ferams, thyristor, memristor, inp, hbt, ingass, gaassb, silicon photonics, heterogeneous integration, phase change and resistive memory (pcm, reram), si-ge, soi, perovskites, very large scale integration, vlsi, ultra large scale integration, ulvi, gate length, metal half pitch, international roadmap for devices and systems, irds, beyond cmos, transistor density, transistor gate pitch, process node, critical dimension, cd, semiconductor foundry, flash memory, three dimensional integrated circuits, 3d ics, rf cmos, floating gate memory, logic gates, self-aligned gates, gyrators, through-silicon via, tsv, cmos image sensors, multi-chip module, mcm, wafer-scale packaging, liquid crystal display, lcd, organic light-emitting display, oled, digital micromirror device, dmd, digital light processing, dlp, microfabrication, bipolar transistor, power network design, multi-gate device, solder bump, ball grid array, bga, diode laser, solid-state devices, solid-state circuits	H10
Quantum information science and technology	3-1	Quantum computing algorithms and software	quantum algorithm, shor's algorithm, grover's algorithm, quantum circuit, quantum error detection (QED), quantum error correction (QEC), quantum fourier transform (QFT), quantum software development kits (SDKs), quantum supremacy, quantum information processing, quantum parallelism, quantum-classical hybrid algorithms, post-quantum cryptography, quantum resistance cryptography, quantum commitment, quantum cloning, lattice-based cryptography, quantum annealing, quantum-inspired computing, superposition, entanglement, deutsch-jozsa algorithm, quantum-phase estimation algorithm, simon's algorithm, quantum zeno effect, hhl algorithm, quantum approximate optimization algorithm, qaoa,	B82Y10/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			variational quantum eigen solver, vqe, quantum principal component analysis algorithm, pca, coherence, decoherence, quantum complexity theory, threshold theorem, adiabatic quantum computing (AQC), quantum turing machine, device-independent quantum cryptography, y-oo protocol	
Quantum information science and technology	3-1	Quantum computing algorithms and software	quantum algorithm, shor's algorithm, grover's algorithm, quantum circuit, quantum error detection (QED), quantum error correction (QEC), quantum fourier transform (QFT), quantum software development kits (SDKs), quantum supremacy, quantum information processing, quantum parallelism, quantum-classical hybrid algorithms, post-quantum cryptography, quantum resistance cryptography, quantum commitment, quantum cloning, lattice-based cryptography, quantum annealing, quantum-inspired computing, superposition, entanglement, deutsch-jozsa algorithm, quantum-phase estimation algorithm, simon's algorithm, quantum zeno effect, hhl algorithm, quantum approximate optimization algorithm, qaoa, variational quantum eigen solver, vqe, quantum principal component analysis algorithm, pca, coherence, decoherence, quantum complexity theory, threshold theorem, adiabatic quantum computing (AQC), quantum turing machine, device-independent quantum cryptography, y-oo protocol	G06N10/ 00
Quantum information science and technology	3-2	Quantum computing hardware	quantum computer, qubit, quantum memory, dilution refrigeration, cryogenic cooling, solid-state spin systems, ion trap processors, quantum annealing, quantum entanglement, quantum superposition, quantum interconnects, superconducting quantum computers, photonic quantum computers, photonic chip quantum, neutral-atom quantum computers, quantum dots quantum computers, topological quantum computers, anyons, quantum processing unit, qpu, quantum interference, wave interference, quantum logic gates	B82Y10/ 00
Quantum information science and technology	3-2	Quantum computing hardware	quantum computer, qubit, quantum memory, dilution refrigeration, cryogenic cooling, solid-state spin systems, ion trap processors, quantum annealing, quantum entanglement, quantum superposition, quantum interconnects, superconducting quantum computers, photonic quantum computers, photonic chip quantum, neutral-atom quantum computers, quantum dots quantum computers, topological quantum computers, anyons, quantum processing unit, qpu, quantum interference, wave interference, quantum logic gates	G06F7/ 381
Quantum information science and technology	3-2	Quantum computing hardware	quantum computer, qubit, quantum memory, dilution refrigeration, cryogenic cooling, solid-state spin systems, ion trap processors, quantum annealing, quantum entanglement, quantum superposition, quantum interconnects, superconducting quantum computers, photonic quantum computers, photonic chip quantum, neutral-atom quantum computers, quantum dots quantum computers, topological quantum computers, anyons, quantum processing unit, qpu, quantum interference, wave interference, quantum logic gates	G06N10/ 00
Quantum information science and technology	3-2	Quantum computing hardware	quantum computer, qubit, quantum memory, dilution refrigeration, cryogenic cooling, solid-state spin systems, ion trap processors, quantum annealing, quantum entanglement, quantum superposition, quantum interconnects, superconducting quantum computers, photonic quantum computers, photonic chip quantum, neutral-atom quantum computers, quantum dots quantum computers, topological quantum computers, anyons, quantum processing unit, qpu, quantum interference, wave interference, quantum logic gates	H01L31/ 035209
Quantum information science and technology	3-3	Quantum communications and networking	quantum communication, quantum repeater, quantum teleportation, quantum key distribution (QKD), quantum channels, quantum entanglement, quantum entanglement swapping, quantum secure direct communication, quantum internet, quantum routers, quantum hubs, quantum nodes, quantum network protocols, quantum satellite communication, quantum metropolitan networks, quantum data centers, quantum link security, quantum network synchronization, quantum communication protocols, quantum network architecture, quantum multiuser detection, quantum information theory	H04B10/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Quantum information science and technology	3-3	Quantum communications and networking	quantum communication, quantum repeater, quantum teleportation, quantum key distribution (QKD), quantum channels, quantum entanglement, quantum entanglement swapping, quantum secure direct communication, quantum internet, quantum routers, quantum hubs, quantum nodes, quantum network protocols, quantum satellite communication, quantum metropolitan networks, quantum data centers, quantum link security, quantum network synchronization, quantum communication protocols, quantum network architecture, quantum multiuser detection, quantum information theory	H04L9/ 0852
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	A61K49/ 0067
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	B82Y15/ 00
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	B82Y20/ 00
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G01B2290/ 55
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G01N33/ 588
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G01R33/ 035
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G01R33/ 326
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G02B6/ 0229
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G02F1/ 01716
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G02F1/ 01783

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G02F1/ 01791
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G02F1/ 3556
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G02F2/ 02
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G04F5/ 14
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	G06F11/ 1691
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01L29/ 125
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01L29/ 127
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01L29/ 15
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01L29/ 66977
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01L31/ 035209
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01L31/ 035236
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H01S5/ 2228

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	H04B10/ 00
Quantum information science and technology	3-4	Quantum sensing	quantum sensor, quantum detector, quantum clock, quantum magnetometer, quantum gravitometer, single-photon spectrometer, quantum dot, spin qubits, flux qubits, nanoparticles, quantum metrology, quantum imaging, quantum lithography, quantum gravitational wave detectors, plasmonic sensors, quantum radar	Y10S505/ 845
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	B82Y10/ 00
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	G02B6/ 0229
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	G06N10/ 40
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	G11B2007/ 25301
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01J49/ 424
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L21/ 02381
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L21/ 0245
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L29/ 127
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L29/ 66977
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L2924/ 10253
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L2924/ 10331
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L31/ 035209

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L33/ 06
Quantum information science and technology	3-5	Quantum device components and manufacturing methods	si-based quantum dots, glass substrate and surface ion traps, ion traps, transition metal dichalcogenide, gap photonic platform, electron gas, cryogenic refrigeration technology, qubits, quantum testbeds, quantum gates, rydberg atom	H01L33/ 34
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B01D67/ 00045
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B01D67/ 00415
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B22F10/ 00
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B22F12/ 82

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B28B1/ 001
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B29C64/ 00
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	B33
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	G05B19/ 4099
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing,	G05B2219/ 49016

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	G05B2219/49018
Robotics, automation, and advanced manufacturing	4-1	Advanced manufacturing (excluding biomanufacturing and semiconductor manufacturing)	additive manufacturing, 3d printing, assuring material properties and part quality for additively manufactured parts, qualification and certification of metal additive manufactured hardware, technologies (quality assurance, cost reduction), smart manufacturing, industrial technology, nanomanufacturing, in-space manufacturing, intelligent logistics, industrial iot, solid freeform fabrication, selective laser sintering, fused deposition modeling, laser metal deposition, self-assembling manufacturing, sustainable manufacturing, precision manufacturing, agile manufacturing, decentralized/ distributed manufacturing, personalized manufacturing, high-throughput production, energy-efficient manufacturing, industry 4.0 technologies, precision machining, optical manufacturing, waste recycling, scalable manufacturing, manufacturing sustainability, circular economy, agricultural manufacturing	G06F2113/10
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	B32B2309/70
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	G05B19/418
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	G05B2219/31229
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	G05B2219/31449
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	G06Q10/0633
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	G06V2201/06
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	H04L2012/4026

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Robotics, automation, and advanced manufacturing	4-2	Automation	network automation, factory automation, robotic process automation (RPA), business process automation (BPA), intelligent automation, process mining, workflow automation, digital twin	H05K7/ 1462
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A01D46/ 30
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A47L2201/ 00
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61B34/ 00
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2002/ 6827
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2002/ 704
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/ 00598
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/ 00682

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/00706
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/00724
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/0073
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/00808
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/00826
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/0085
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61F2310/00862
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance	A61F2310/00868

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	A61M25/ 0116
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B25J13/ 025
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B25J13/ 089
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B25J9/ 0006
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B25J9/ 162
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B25J9/ 1664
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B60Q2800/ 10

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B62D1/ 283
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B64C39/ 024
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	B66F9/ 063
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G01S13/ 881
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/ 39146
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/ 40518
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/ 40519
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance	G05B2219/ 40523

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/45063
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/45066
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/45082
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/45083
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G05B2219/45098
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	G08G5/0069
Robotics, automation, and advanced manufacturing	4-3	Robotics	drones, autonomous mobile robots, cps (cyber-physical systems), haptics, pick-and-place, swarm robotics, slam (simultaneous localization and mapping), cobots/ collaborative robots, motion/ path planning, robotics/ robotic, exoskeleton, urban air mobility, cleaning robots, surgical assistance robots, prosthetics, therapeutic robots, autonomous equipment, autonomous tractors, robotic harvesting, autonomous processing, autonomous vehicles, industrial robotics, mobile robotics, human-robot collaboration, self-driving, unmanned vehicles	Y10S901/01

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	A62D1/ 005
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	C04B2111/ 2053
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	E02B3/ 04
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/	E02D27/ 34

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	E04H9/ 00
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	E05B2063/ 0095
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	E06B2009/ 005
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-	F24F2130/ 10

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	G01R29/ 0842
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	G01S13/ 95
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	G01S15/ 885
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency	G01S17/ 95

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	G01V1/ 008
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	G01W1/ 00
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	G01W2203/ 00
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees	G08B21/ 10

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	H04H60/ 71
Natural and anthropogenic disaster prevention or mitigation	5-1	Natural disaster prevention and mitigation (excluding climate resilience)	weather forecasting, weather detection, weather monitoring, environmental sensors/ sensing/ monitoring, earthquake warning systems, earthquake protective actions, seismic detection, disaster shelter, hurricane/ flood warning, hurricane/ flood mitigation, tornado warning, tornado mitigation, fire suppression, controlled/ prescribed fire/ burn, fire retardant, gray infrastructure, stormwater management, flood gates, seawalls, levees modeling and simulation (for natural disaster prevention and mitigation), hazard assessment, land-use planning, structural reinforcement, emergency preparedness, evacuation plans, community resilience, hazard-resistant building codes, nature-based solutions, flood control measures, earthquake-resistant construction, wind-resistant, wind hazard, wildfire prevention, coastal erosion management, landslide prevention, tsunami alerting/ preparedness, drought-resistant agriculture, ecosystem restoration, hazard mapping, risk mapping, multi-hazard decision support tools, modeling compounding hazards, modeling cascading hazards, social vulnerability, disaster damage assessment, disaster management	H04W4/ 90
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	C01B2203/ 86
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	C10J2300/ 1612

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	E04H9/ 00
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	E21B41/ 0064
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02A
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02B
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02C
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon	Y02D

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02E
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02P
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02T
Natural and anthropogenic disaster prevention or mitigation	5-2	Climate resilience	climate simulations, green infrastructure, carbon capture, carbon storage, climate resilient infrastructure, sea-level rise adaptation, climate displacement, climate mobility, climate migration, heatwave preparedness, coastal zone management, afforestation, climate-smart agriculture, urban heat mitigation, climate finance, climate risk assessment, low-carbon transportation, climate adaptation planning, climate policy, climate justice, paris agreement, methane emissions, shoreline protection, climate modeling, climate simulation, mega-fire, mega-droughts, climate resiliency, coastal resiliency, climate-resilient food source	Y02W
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	B01D2257/93

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	B01D2258/06
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	B01D2259/4558
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	B01D53/ 34
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water	B09

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	B63B35/ 32
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	C02F
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	C04B2111/ 00741
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security,	E01H12/ 006

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	E02B3/ 046
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	E02D31/ 00
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	E02F3/ 945
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental	E04H9/ 145

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	F41H11/ 13
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	G06F2219/ 10
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	G08B21/ 12
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration,	Y02A10/ 23

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	Y02A10/ 26
Natural and anthropogenic disaster prevention or mitigation	5-3	Anthropogenic disaster prevention and mitigation (excluding pandemics)	toxicology, toxic/ chemical waste mitigation, unintended consequences, spill cleanup, industrial runoff mitigation, dune/ reef restoration, artificial reefs, environmental restoration/ protection, invasive species mitigation, waterway/ wetlands restoration/ protection, pollution control, waste management/ recycling, environmental regulations, industrial emissions reduction, soil conservation, biodiversity protection, habitat restoration, sustainable resource use, air quality improvement, water pollution prevention, noise pollution control, chemical spill response, environmental impact assessments, circular/ blue economy, conservation easements, wildlife corridors, sustainable urban planning, food & nutrition security, groundwater remediation, hazardous waste, pollution remediation, public health and environmental sustainability, plant diversity, irrigation water management, building monitoring system, water security/ sustainable water/ water treatment, energy resilience, sustainable agriculture, microplastics sensing, terrorism prevention, mass shooting prevention, suicide prevention, landmine detection	Y02A90/ 40
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A41D13/ 11
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A41D31/ 30
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease	A61K2039/ 5252

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61K2039/ 5254
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61K2039/ 53
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61K2039/ 6075
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61K39/ 145
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61K39/ 215
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61K39/ 42
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A61P31/ 14

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A62B15/ 00
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A62B18/ 00
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A62B23/ 00
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	A62B7/ 10
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D2221/ 16
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D2258/ 0225
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D2259/ 4508
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease	B01D2259/ 4533

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D2259/4541
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D2259/4583
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D2279/65
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D46/0028
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	B01D46/0091
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C02F2103/003
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C07K14/165

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C07K16/ 1018
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12M1/ 261
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12N2760/ 16134
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12N2760/ 16234
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12N2770/ 20034
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12N2770/ 24034
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12N2770/ 24134
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease	C12N2795/ 00034

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	C12Q1/ 70
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	E04C2/ 523
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	F24F1/ 0328
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	F24F7/ 003
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	G01N2001/ 022
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	G01N2333/ 005
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	G01N33/ 0057

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	G01N33/ 569
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	G16H50/ 00
Natural and anthropogenic disaster prevention or mitigation	5-4	Pandemic prevention and response	biological/ chemical warfare prevention and mitigation, air filtration and ventilation, infectious disease control, infectious disease forecasting, epidemiology, contact tracing, pandemic planning/ preparedness, viral surveillance, public health/ infrastructure/ wastewater monitoring, disease surveillance, quarantine protocols, vaccination campaigns, personal protective equipment (PPE), isolation facilities, pandemic preparedness plans, infectious disease testing capacity, healthcare system resilience, global health security	Y10T442/ 2516
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL),	G01S13/ 90

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	G01S19/ 32
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space	H01Q

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			(OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H03F2200/451

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H03G2201/206
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-	H03G2201/307

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H03H1/0007
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz	H04B1/0003

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement,	H04B10/ 11

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H04B2201/ 692
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA),	H04B7/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H04H20/74

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H04H60/88
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-	H04J11/0053

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H04L27/2639
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz	H04L27/26532

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement,	H04L5/0007

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H04L5/0023
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA),	H04Q2209/43

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	
Advanced communications technology and immersive technology	6-1	Wireless communication - terrestrial and space	radio-frequency (RF), antennas, reconfigurable antennas, antenna arrays, conformal antennas, deployable antennas, network filters, fpga, asic, dsp, gpu, rf soc, 5g and 6g wireless networks, nextg, satellite-based communications, leos, satellite communications, space communications, space-air-ground integrated networks (SAGIN), space-air-terrestrial integrated networks (SATIN), non-terrestrial networks (NTN), aerial communications, uav communications, advanced aerial mobility, wi-fi, bluetooth, lifi, millimeter wave (mmwave) communications, terahertz communications, citizens broadband radio service (CBRS), optical communications, free-space optical communications (FSO), cellular wireless, multi-band radio, multiband-multimode radios (MBMMR), software-defined radio (SDR), wireless local area network (WLAN), wide area networks (WAN), wireless personal area networks (WPAN), wireless low-power personal area network (WLoPAN), narrow-band iot, lorawan, 5g stand alone (5g sa), 5g non-stand alone (5g nsa), 5g advanced, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), multiple input multiple output (MIMO), massive mimo, reconfigurable intelligent surfaces (RIS), orthogonal frequency division multiplexing (OFDM), orthogonal time frequency space (OTFS) modulation, mobile edge computing (MEC), fog computing, backscatter, radio-frequency identification (RFID), beam steering/ forming, doa estimation, direction finding, localization, 3d beamforming, radar, synthetic aperture radar (SAR), integrated sensing and communications (ISAC), ultra-reliable low latency communication (URLLC), machine-to-machine (M3M) communications, wireless sensing, low latency communication, open network automation platform (ONAP), radio access network, centralized radio access network (C-RAN), open ran, advanced wireless services-3 (AWS-3), wireless sensor networks, wireless systems, channel coding, joint source channel coding, semantic communications, white space, coding theory, information theory, cognitive radio, finite impulse response (FIR) filter, channel matrix, channel estimation, channel sounding, channel model, channel propagation, channel measurement, vehicle-to-infrastructure (V2I), wireless gigabit (WiGig), vehicle-to-vehicle (V2V), vehicle-to-everything (V2X), dedicated short range communication (DSRC), visible light communications (VLC), digital subscriber line (DSL), direct-to-cell communications, supplemental coverage from space (SCS), full-duplex communications, sidelink communications, global positioning system (GPS), position navigation and timing (PNT), global navigation satellite system (GNSS), satellite navigation	H04W

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G02B6/ 02
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G02B6/ 29317
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G02B6/ 29361
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G02B6/ 2938
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G02B6/ 4401
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G02F1/ 3131
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	G08C23/ 06
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04B10/ 25
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04B2210/ 00
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04J14/ 00
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04J2014/ 0253
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04J2203/ 0032

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04J2203/0085
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04L2012/445
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04Q11/0067
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04Q2213/13295
Advanced communications technology and immersive technology	6-2	Wired/ fiber communication	fiber technologies, optical links, ethernet, optical fiber, electromagnetic interference, terrestrial/ undersea cables, wdm, optical cdma, pon	H04Q2213/295
Advanced communications technology and immersive technology	6-3	Spectrum management	radio spectrum, frequency allocation, master international frequency register, itu-r (international telecommunication union - radio), fcc, ntia, spectrum management technologies, spectrum observatory, shared spectrum, dynamic spectrum sharing, dynamic spectrum leasing, spectral efficiency, spectrum utilization, spectrum coexistence	H04B2201/71638
Advanced communications technology and immersive technology	6-3	Spectrum management	radio spectrum, frequency allocation, master international frequency register, itu-r (international telecommunication union - radio), fcc, ntia, spectrum management technologies, spectrum observatory, shared spectrum, dynamic spectrum sharing, dynamic spectrum leasing, spectral efficiency, spectrum utilization, spectrum coexistence	H04Q3/0066
Advanced communications technology and immersive technology	6-3	Spectrum management	radio spectrum, frequency allocation, master international frequency register, itu-r (international telecommunication union - radio), fcc, ntia, spectrum management technologies, spectrum observatory, shared spectrum, dynamic spectrum sharing, dynamic spectrum leasing, spectral efficiency, spectrum utilization, spectrum coexistence	H04W16/14
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G01S19/015
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G01S7/ 36
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G01S7/ 38
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G01S7/ 537

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G06F12/ 1408
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G06F21/ 00
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G06F2211/ 007
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	G09C
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04H60/ 23
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04K
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L12/ 22
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L12/ 40104
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L2012/ 5687
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L2209/ 00
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L47/ 135
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L63/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04L9/ 00
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04Q2213/ 13095
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04Q2213/ 13339
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04Q2213/ 339
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04T2001/ 221
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04W12/ 00
Advanced communications technology and immersive technology	6-4	Communications and network security	cryptography, public key system (PKS), authentication, tls, physical layer security (PLS), jamming, misinformation/ disinformation detection/ correction	H04W36/ 0038
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	G06F2212/ 154
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	G06F3/ 1287
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04H60/ 82
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L12/ 00
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L2012/ 4629

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L2012/ 6472
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L41/ 00
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L43/ 20
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L45/ 00
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L47/ 193
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L47/ 196
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L49/ 00
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L61/ 2503
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L61/ 5007
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L67/ 00
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L69/ 085
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04L69/ 16

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04Q11/ 0005
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04Q2213/ 1301
Advanced communications technology and immersive technology	6-5	Internetworking	internet, routers, optical switches, packet switches, tcp/ ip, network virtualization, software-defined network (SDN), core networks	H04Q2213/ 296
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	A63F13/ 428
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	A63F2300/ 8082
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G02B27/ 017
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G03H1/ 00
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G03H2227/ 02
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G03H5/ 00
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G05B2219/ 35482

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G06F11/ 0742
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G06F2111/ 18
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G06F3/ 011
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G06T19/ 006
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	G10H2220/ 376
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	H04M1/ 724097
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	H04M2203/ 359
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	H04N13/ 332
Advanced communications technology and immersive technology	6-6	Immersive technology and edge devices	motion/ proximity/ 3d sensors, wearables, headsets, virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR), electrical brain signal, consumer iot, handheld devices, head-mounted display (HMD), brain-computer interfaces, holo-portation, telepresence, holographic communication, tactile internet, tactile interfaces, acoustic interfaces, immersive learning	H04N21/ 42201
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular	C08G2261/ 94

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	C12N15/ 115
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	C12N15/ 63
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	C12N15/ 902
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	C12N2310/ 16
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design,	C12P21/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	C12Q2525/205
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	G01N27/4145
Biotechnology, medical technology, genomics, and synthetic biology	7-1	Synthetic biology	synthesis/ engineering/ design of proteins and peptides, cell-free, biobricks, dna synthesis, biosensor, biosensing, aptamers, molecular recognition, mechanical proteins, biomachines, artificial photosynthesis, genetic engineering, metabolic modeling, metabolic pathway engineering, genetic circuits, tissue regeneration, dna assembly methods, synthetic protocell biology, chromosome design, synthetic chromosomes, igem, biomolecule engineering, macromolecular engineering, enzyme design, biomolecular parts, unnatural amino acids, de-novo cell design, denovo protein design, genetic design tools, ai-assisted synthetic biology, engineered biology, minimal cell, synthetic cell, artificial genome, artificial chromosome, synthetic chromosome, bioprinting, dna origami, ribosome engineering, synthetic nucleic acids, synthetic regulatory circuits, genetic switches	Y10S977/914
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2035/122

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2035/124
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2039/51
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy,	A61K2039/55516

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2039/55555
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2039/645
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria	A61K2800/413

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2800/654
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K2800/86
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular	A61K31/712

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K31/ 7125
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K35/ 12
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering,	A61K35/ 66

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K36/ 06
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K38/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis,	A61K39/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K45/ 05
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/ 42
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular	A61K47/ 549

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/ 555
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/ 593
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology,	A61K47/ 62

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/6801
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/6835
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna	A61K47/6889

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/6891
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/6901
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet,	A61K47/6909

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/ 6925
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K47/ 6929
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant	A61K48/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K49/0056
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K49/0065
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants,	A61K49/0093

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K49/0097
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K49/0423
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide	A61K49/049

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K49/ 14
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K49/ 1821
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering,	A61K51/ 0482

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K51/ 0491
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K51/ 06

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K51/ 08
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K51/ 1244
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy,	A61K8/ 606

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K8/ 64
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	A61K9/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria	A61P37/ 04

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	B01J2219/ 00729
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	B82Y5/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular	C07K1/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	C07K14/ 003
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	C07K16/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering,	C07K2319/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	C12N
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	C12P21/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis,	C12P7/ 649

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	C12Q
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	F02D19/0652
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular	G01N2030/8813

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N21/6486
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N21/763
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology,	G01N2223/612

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N2333/003
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N24/087
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna	G01N24/088

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N27/3275
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N27/4145
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet,	G01N33/5008

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N33/ 53
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N33/ 587
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant	G01N33/ 6803

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	
Biotechnology, medical technology, genomics, and synthetic biology	7-2	Biotechnology - other than synthetic biology	biologics biosimilars, biotherapeutics, biodistribution, immune toxicities, nanobiotechnology, nanoformulations, nanoparticulate drug delivery systems, bioavailability, nanocarrier, nanotherapeutics, biomedical research, bioresearch imaging, biobank, dna/ rna sequencing/ amplification, single-cell sequencing, protein sequencing, cell and tissue culture and engineering, agricultural biotechnology, genetic engineering, bioengineering, herbicide tolerance, genetically engineered microbial plant-incorporated protectants, food biotechnology, soil ecology, soil biodiversity, soil microbiome, plant microbiome, water ecology, biofuel fermentation, ethanol, biodiesel, biojet, directed evolution, crispr, genome editing, peptide nucleic acids (PNAs), rna interference, system biology, comparative genomics, astrobiology, homology, molecular dynamics simulation, molecular genetics, molecular docking, protein-ligand interaction, receptor binding, polygenetic analysis, drug delivery mechanisms, cell-based manufacturing, tissue engineering, engineered tissue, chromatin engineering, epigenetic engineering, cellular engineering, recombinant, bio-based microelectronics, phage-bacteria interaction, virus-host interaction, virome, microbiome, phage therapy, immuno-therapy, biological extraction, biological purification, biocontainment, biosafety, biosecurity, recombinant proteins, bioremediation, biobased indigo, bio-derived indigo, therapeutic target, biomass feedstock, chemical sensing	G01N33/ 6863
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	A61K36/ 06
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	B33Y10/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	B33Y70/ 10
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C08G2101/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C12M

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C12N1/ 165
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C12N15/ 81
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C12N5/ 06
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C12P
Biotechnology, medical technology, genomics, and synthetic biology	7-3	Biomanufacturing	cell-based biomanufacturing, cell-free biomanufacturing, tissue manufacturing, pharmaceutical manufacturing, yeast-based manufacturing, biopharmaceuticals, fermentation technology, 3d bioprinting	C12R2001/ 91
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	A61K51/ 0491
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	B01J2219/ 00608
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12N15/ 1072
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12N15/ 67

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12N15/8257
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12N2310/141
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12N2320/12
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Q
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01009
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/0101
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	C12Y201/01012

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01017
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01035
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01037
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01042
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01049
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01056

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01057
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01062
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01063
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01067
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01069
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/0107
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	C12Y201/01072

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01076
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01077
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01085
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01094
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01096
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01101

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01102
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01108
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01116
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01125
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01126
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01127
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	C12Y201/01146

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01147
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01149
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01153
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01155
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01156
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01158

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01159
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01162
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01163
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01167
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01168
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01169
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	C12Y201/01173

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01174
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01176
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01178
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01181
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01184
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01185

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01186
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01187
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01193
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01199
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01202
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01203
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	C12Y201/01212

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01215
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01216
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01217
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01219
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01221
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01223

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01225
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01226
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01229
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01232
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01236
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01237
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	C12Y201/01238

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01243
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01244
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01248
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01256
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01257
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01258

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01259
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01263
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y201/01264
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	C12Y205/01022
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G01N2030/8827
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G01N2035/00158
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic	G01N21/6486

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G01N24/ 087
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G01N2570/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G01N27/ 3275
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G01N33/ 5023
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G06F16/ 2474
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G06N3/ 12

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G06T2207/ 30072
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G06V2201/ 04
Biotechnology, medical technology, genomics, and synthetic biology	7-4	Genomics and bioinformatics (as technologies in their own rights)	pharmacogenomics, gene probes, gene expression profiling, human genome project, structural genomics, x-ray crystallography, plant innate immunity, protein structure, pdb (protein data bank), methyltransferase, spermine, acetyltransferase, functional genomics, gene inheritance, proteomics, metabolomics, comparative genomics, polymorphism, genetic interaction mapping, single nucleotide polymorphism, gene regulation, microarray data analysis, serial analysis of gene expression, mutations, mirnas/ transposons, epigenomics, bioinformatics, computational biology, biotherapeutics, genome reference, personalized medicine	G16B
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	A61B
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	A61F
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	A61K49/ 06
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	A61K49/ 22

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	A61M
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	A61N
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	B01D61/ 24
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	B29L2012/ 005
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	F16C2316/ 10
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	F17C2270/ 0536
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G01N2223/ 1016
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology,	G01N2223/ 419

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G01N29/ 0645
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G01R33/ 28
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G01R33/ 48
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G01T1/ 161
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G01T1/ 249
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G02C
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G06G7/ 60

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G06T2207/10088
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G06T2207/10104
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G06T2207/10116
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G06T2207/30004
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G06V2201/03
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	G21G4/ 08
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	H01J2229/8638
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology,	H01J2231/50036

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	H01J2235/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	H01J35/ 00
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	H04N2201/ 0079
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	H05G
Biotechnology, medical technology, genomics, and synthetic biology	7-5	Medical technology	medical imaging, x-ray, mri, cat, pet, ultrasound, medical devices, medical implants, artificial joints, reusable medical devices, single-use disposable devices, defibrillators, electrosurgical units, physiological monitors, clinical engineering, radio/ radiation medicine, radio/ radiation pharmacology, point-of-care diagnostics, point-of-use diagnostics, diagnostic and therapeutic equipment, nuclear medicine, emr technologies (electronic medical record technologies for emergency responses), surgery-related devices, dialysis, eyeglasses, contact lenses, ehr (electronic health records)	H05H2277/ 10
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	F41A17/ 066

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G01N27/ 4145
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G06F16/ 636
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G06F21/ 32
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G06K19/ 0718
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage,	G06K19/ 07354

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G06Q20/ 40145
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G06T2207/ 30201
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G06V40/ 00
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G07B2017/ 00838

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G07C2209/12
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G07C9/00563
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G07C9/ 25
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G07C9/ 37
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage,	G07F17/3206

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G08C2201/ 61
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G10H2220/ 386
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G10L17/ 00
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G11C13/ 0019

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	G16Y20/ 40
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04L63/ 0861
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04L9/ 0866
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04L9/ 3231
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage,	H04M2201/ 41

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04M2203/6054
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04N1/00336
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04N1/442
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-1	Biometrics	biomolecular biometrics, dna biometrics, dna profiling, hand bacteria identification, morphological biometrics, facial recognition, fingerprint recognition, palmprint recognition, footprint recognition, fingerknuckle-print recognition, iris recognition, hand geometry recognition, vascular pattern recognition, retina recognition, sclera/ episclera recognition, physiological biometrics, dental biometrics, tongue print recognition, ear print recognition, periocular recognition, skin texture recognition, behavioral biometrics, keystroke recognition, gait recognition, speaker recognition, complex eye movement patterns, oculomotor plant characteristics, biometrics storage, biometrics authentication, biometrics security, voiceprint authentication, multimodal biometrics, biometric databases, biometric sensors, signature dynamics, keystroke dynamics, biometric encryption, biometric privacy, biometric standards	H04N21/4415

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	B60W60/00188
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G01R31/318588

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G05B2219/ 31246
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F12/ 14

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F2009/45587
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F21/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F2207/7219
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F2211/007

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F2212/1052
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F2212/402

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F2221/00
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G06F3/ 062

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G16Y30/ 10
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	G16Y40/ 50

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04H60/ 23
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L12/ 22

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L12/40104
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2012/5687

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2209/127
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2463/082

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2463/141
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2463/142

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2463/143
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2463/144

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L2463/ 146
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L63/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04L9/ 00
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04Q2213/ 13339

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04Q2213/339
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04W12/03

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04W12/088
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04W12/121

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04W12/128
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-2	Cybersecurity	cyber threat, cyber-attack, encryption, decryption, public key infrastructure, digital signature, digital certificates, cyber threat analysis, cyber threat modeling, cyber operations, digital forensics, cyber defense, cyber hack, identity theft, spyware, malware, infected machine, digital perimeter, denial of service (DoS), distributed denial of service (DDoS), phishing, spam, hardware trojan, tamper-resistant hardware, trusted computing base, hardware watermarking, hardware obfuscation, code obfuscation, firewall, side channel attack, covert channel, cryptographic algorithm, cryptographic primitive, trusted platform module, trusted execution environment, sql injection, code injection, cross-site scripting, privilege escalation, secure coding practice, software vulnerability, security vulnerability, cyber honeypot, access control policy, access control mechanism, buffer overflow, stack smashing attack, memory safe programming, authentication protocol, two-factor authentication (2FA), hardware enclave, secure enclave, intrusion detection system (IDS), antivirus software, vulnerability assessment, penetration testing, zero-day exploits, advanced persistent threat, ransomware, security patches, network segmentation, security incident response, computer emergency response team (CERT), security information and event management (SIEM), threat intelligence, security policies, cyber risk assessment, cybersecurity risk management, identity-based encryption, attribute-based encryption, functional encryption, post-quantum cryptography (PQC), code-based cryptography, multivariate polynomial cryptography, cryptographic hash, isogeny-based cryptography, supersingular isogeny diffie-hellman (SIDH), quantum-safe encryption, quantum-resistant signatures, quantum-safe key exchange, trust negotiation, information trust, secure interoperation, social engineering attacks, phishing attacks, semi-honest attacker, malicious attacker, inference attacks, membership inference, property inference, attribute inference, model inversion attack, data reconstruction attack	H04W36/0038

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F11/ 1453
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F16/ 00
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F21/ 6218
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F2201/ 80
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F2212/ 163

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F2212/ 465
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F2212/ 466
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	G06F3/ 0641
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-3	Data management/ databases	database, distributed database, relational database, graph database, database management system (DBMS), big data, data pipeline, data cleaning, data cleansing, etl, data integrity, database schema, structured query language (SQL), nosql, mapreduce, hadoop, data warehouse, data lake, data lakehouse, data repository, document-oriented database, data deduplication, relational storage, non-relational storage, database shard, database partition, key-value pair, metadata, data catalog, file systems, object storage, tiered storage, data archiving, data retention policies, data modeling, data indexing, data governance, data quality, data backup, data disaster recovery, data migration, document databases, in-memory databases, database security, open knowledge network/ graph, dataset collection	H03M7/ 3091
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G01N21/ 9506
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F1/ 187

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F11/0727
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F11/1076
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F12/0866
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F16/1824
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F16/1847
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F21/ 78
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2211/1076
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/211

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/213
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/214
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/217
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/224
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/261
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F2212/263
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06F3/0601
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G06K2019/0629

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G11B
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G11C11/ 02
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	G11C29/ 765
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	H04L49/ 356
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	H04L67/ 1097
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-4	Data storage	cloud storage, block storage, optical storage, optical disc, magnetic storage, magnetic disc, holographic storage, storage arrays, storage volumes, read-write head, storage density, hard disk drive (HDD), solid-state drive (SSD), magnetic tape storage, network-attached storage (NAS), storage area network (SAN), storage encryption, storage performance	H04N21/ 42661
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-5	Data privacy	data privacy, data subject, data controller, data curator, multi-party computation (MPC), fully homomorphic encryption, functional encryption, statistical data privacy, differential privacy, privacy budget, statistical disclosure limitation, anonymization, k-anonymity, l-diversity, t-closeness, zero-knowledge proof, private set intersection, privacy-preserving, confidential computing, privacy-aware access control, consent and notification, purpose-based access control, private information retrieval, data use limitation and control, synthetic data, differentially private synthetic data, privacy policy, location privacy, spatiotemporal privacy, privacy enhanced technologies (PETs), privacy auditing, privacy labels, access pattern privacy, oblivious random access memory (ORAM), differential obliviousness, unlinkability, searchable encryption, de-identification, re-identification, gdpr, ccpa, hipaa	G06F21/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-5	Data privacy	data privacy, data subject, data controller, data curator, multi-party computation (MPC), fully homomorphic encryption, functional encryption, statistical data privacy, differential privacy, privacy budget, statistical disclosure limitation, anonymization, k-anonymity, l-diversity, t-closeness, zero-knowledge proof, private set intersection, privacy-preserving, confidential computing, privacy-aware access control, consent and notification, purpose-based access control, private information retrieval, data use limitation and control, synthetic data, differentially private synthetic data, privacy policy, location privacy, spatiotemporal privacy, privacy enhanced technologies (PETs), privacy auditing, privacy labels, access pattern privacy, oblivious random access memory (ORAM), differential obliviousness, unlinkability, searchable encryption, de-identification, re-identification, gdpr, ccpa, hipaa	H04L61/2539
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-5	Data privacy	data privacy, data subject, data controller, data curator, multi-party computation (MPC), fully homomorphic encryption, functional encryption, statistical data privacy, differential privacy, privacy budget, statistical disclosure limitation, anonymization, k-anonymity, l-diversity, t-closeness, zero-knowledge proof, private set intersection, privacy-preserving, confidential computing, privacy-aware access control, consent and notification, purpose-based access control, private information retrieval, data use limitation and control, synthetic data, differentially private synthetic data, privacy policy, location privacy, spatiotemporal privacy, privacy enhanced technologies (PETs), privacy auditing, privacy labels, access pattern privacy, oblivious random access memory (ORAM), differential obliviousness, unlinkability, searchable encryption, de-identification, re-identification, gdpr, ccpa, hipaa	H04L63/0421
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-5	Data privacy	data privacy, data subject, data controller, data curator, multi-party computation (MPC), fully homomorphic encryption, functional encryption, statistical data privacy, differential privacy, privacy budget, statistical disclosure limitation, anonymization, k-anonymity, l-diversity, t-closeness, zero-knowledge proof, private set intersection, privacy-preserving, confidential computing, privacy-aware access control, consent and notification, purpose-based access control, private information retrieval, data use limitation and control, synthetic data, differentially private synthetic data, privacy policy, location privacy, spatiotemporal privacy, privacy enhanced technologies (PETs), privacy auditing, privacy labels, access pattern privacy, oblivious random access memory (ORAM), differential obliviousness, unlinkability, searchable encryption, de-identification, re-identification, gdpr, ccpa, hipaa	H04L9/ 008
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-5	Data privacy	data privacy, data subject, data controller, data curator, multi-party computation (MPC), fully homomorphic encryption, functional encryption, statistical data privacy, differential privacy, privacy budget, statistical disclosure limitation, anonymization, k-anonymity, l-diversity, t-closeness, zero-knowledge proof, private set intersection, privacy-preserving, confidential computing, privacy-aware access control, consent and notification, purpose-based access control, private information retrieval, data use limitation and control, synthetic data, differentially private synthetic data, privacy policy, location privacy, spatiotemporal privacy, privacy enhanced technologies (PETs), privacy auditing, privacy labels, access pattern privacy, oblivious random access memory (ORAM), differential obliviousness, unlinkability, searchable encryption, de-identification, re-identification, gdpr, ccpa, hipaa	H04W12/02
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-6	Distributed ledger technologies	blockchain, bitcoin, consensus mechanism, consensus protocol, consensus layer, proof-of-stake, proof-of-work, proof-of-authority, byzantine fault tolerance, hyperledger, ethereum, decentralized trust, distributed ledger, decentralized ledger, cryptocurrency, smart contracts, immutable ledger, permissioned blockchains, permissionless blockchains, crypto token, decentralized finance (DeFi), non-fungible tokens (NFTs), digital assets, crypto assets, web3, inter-blockchain, stablecoin	H04L67/1074

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	8-6	Distributed ledger technologies	blockchain, bitcoin, consensus mechanism, consensus protocol, consensus layer, proof-of-stake, proof-of-work, proof-of-authority, byzantine fault tolerance, hyperledger, ethereum, decentralized trust, distributed ledger, decentralized ledger, cryptocurrency, smart contracts, immutable ledger, permissioned blockchains, permissionless blockchains, crypto token, decentralized finance (DeFi), non-fungible tokens (NFTs), digital assets, crypto assets, web3, inter-blockchain, stablecoin	H04L9/ 50
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-1	Advanced batteries and energy storage technologies	battery storage, energy storage, lithium-ion batteries, nickel-metal hydride batteries, advanced high-power lead-acid batteries, ultracapacitors, organic liquid batteries, solid-state batteries, lithium-air batteries, magnesium-ion batteries, time shifting energy storage system technologies (hourly, daily, seasonal), pumped-storage hydropower, flywheel energy storage, thermal energy storage, compressed air energy storage, grid-scale energy storage, grid-scale batteries, superconducting magnets, hydrogen storage, molten salt storage, sodium-based battery technologies, supercapacitors, rechargeable zinc batteries, redox flow batteries (RFBs), earth-abundant materials, rare earth material avoidance, rare earth free technologies	G01R31/ 36
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-1	Advanced batteries and energy storage technologies	battery storage, energy storage, lithium-ion batteries, nickel-metal hydride batteries, advanced high-power lead-acid batteries, ultracapacitors, organic liquid batteries, solid-state batteries, lithium-air batteries, magnesium-ion batteries, time shifting energy storage system technologies (hourly, daily, seasonal), pumped-storage hydropower, flywheel energy storage, thermal energy storage, compressed air energy storage, grid-scale energy storage, grid-scale batteries, superconducting magnets, hydrogen storage, molten salt storage, sodium-based battery technologies, supercapacitors, rechargeable zinc batteries, redox flow batteries (RFBs), earth-abundant materials, rare earth material avoidance, rare earth free technologies	H01M
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-1	Advanced batteries and energy storage technologies	battery storage, energy storage, lithium-ion batteries, nickel-metal hydride batteries, advanced high-power lead-acid batteries, ultracapacitors, organic liquid batteries, solid-state batteries, lithium-air batteries, magnesium-ion batteries, time shifting energy storage system technologies (hourly, daily, seasonal), pumped-storage hydropower, flywheel energy storage, thermal energy storage, compressed air energy storage, grid-scale energy storage, grid-scale batteries, superconducting magnets, hydrogen storage, molten salt storage, sodium-based battery technologies, supercapacitors, rechargeable zinc batteries, redox flow batteries (RFBs), earth-abundant materials, rare earth material avoidance, rare earth free technologies	H01R11/ 281
Advanced energy and industrial efficiency technologies, such	9-1	Advanced batteries and energy storage technologies	battery storage, energy storage, lithium-ion batteries, nickel-metal hydride batteries, advanced high-power lead-acid batteries, ultracapacitors, organic liquid batteries, solid-state batteries, lithium-air batteries, magnesium-ion batteries, time shifting energy storage system technologies (hourly, daily,	H02J15/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			seasonal), pumped-storage hydropower, flywheel energy storage, thermal energy storage, compressed air energy storage, grid-scale energy storage, grid-scale batteries, superconducting magnets, hydrogen storage, molten salt storage, sodium-based battery technologies, supercapacitors, rechargeable zinc batteries, redox flow batteries (RFBs), earth-abundant materials, rare earth material avoidance, rare earth free technologies	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	B01J19/127
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	B29L2031/085
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal	B63B2035/4466

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
National Science Foundation Act of 1950 [42 U.S.C. § 1874])			and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	B65H2801/87
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	C08G2261/91
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	C08L2203/204

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	C10J2300/0916
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	C10J2300/1284
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	C12P7/649
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid	D03D1/0076

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F02D19/0652
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03B13/ 14
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and	F03B13/264

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
National Science Foundation Act of 1950 [42 U.S.C. § 1874])			distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03D1/ 06
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03D17/ 00
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03D3/ 005
Advanced energy and industrial efficiency technologies, such	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting,	F03D7/ 028

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03D7/ 042
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03D9/ 25
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing	F03G6/ 001

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(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03G6/ 071
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F03G7/ 05
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F05B2240/ 95

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F05B2270/32
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F16H2057/02078
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F17C11/005
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid	F24S20/ 20

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	F24T50/ 00
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	G05B2219/ 2619
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and	G05F1/ 67

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
National Science Foundation Act of 1950 [42 U.S.C. § 1874])			distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	G06F2113/06
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H01L27/142
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H01L31/02008
Advanced energy and industrial efficiency technologies, such	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting,	H01L31/02021

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H01L31/02167
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H01L31/022425
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing	H01L31/ 04

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H02J15/008
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H02J2300/20
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H02K7/ 183

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H02P2101/15
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H02S
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	H05K2201/10143
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid	Y02A20/138

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	Y02E10/ 10
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	Y02E10/ 50
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and	Y02E10/ 727

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
National Science Foundation Act of 1950 [42 U.S.C. § 1874])			distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-2	Advanced energy generation technologies	renewable energy generation technologies (other than nuclear), solar photovoltaics, photovoltaic cells, solar inverters, energy conversion, wind energy, on-shore and off-shore (wind energy), wind turbines, hydropower systems, geothermal power, tidal energy systems, ocean energy harvesting, biomass energy systems, algae biofuels, algal systems, bioenergy conversion, bioenergy feedstock, crop waste, cellulosic biofuel, bioalcohol, bioethanol, ethanol, biodiesel, advanced biofuel, enabling power electronics, hydrogen blending, liquid organic hydrogen carriers, electric and hybrid engines, bi-directional smart grid integration, cold-climate heat pumps, low/no global warming potential refrigerants, water desalination, clean fossil generation technologies, advanced combustion technologies, gas turbine technologies, full-authority digital engine control, hot-section manufacturing and associated technologies, advanced materials, coatings, aerothermal and cooling technologies, hydrogen-based generation, storage, and distribution technologies, electrolysers, h2 combustion, supercritical carbon dioxide (sCO2) turbines, clean coal technologies, fuel cells, renewable and sustainable fuels, saf (sustainable aviation fuels), renewable generation, distributed generation	Y02E10/728
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-3	Advanced transmission and distribution systems	smart grids, demand response, variable power generation, grid reinforcement, grid stabilization, thermal efficiency monitoring and optimization systems, advanced metering, smart meters, smart distribution boards, load control switches, microgrids, grid integration technologies, dynamic line rating, transmission topology optimization, power flow controllers, advanced conductors and cables, high-voltage direct current (HVDC) transmission, distributed energy resources, bidirectional grid, grid cybersecurity, advanced grid resilience and balancing technologies, flexible ac transmission systems (FACTS), frequency stabilization	G06F2113/04
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-3	Advanced transmission and distribution systems	smart grids, demand response, variable power generation, grid reinforcement, grid stabilization, thermal efficiency monitoring and optimization systems, advanced metering, smart meters, smart distribution boards, load control switches, microgrids, grid integration technologies, dynamic line rating, transmission topology optimization, power flow controllers, advanced conductors and cables, high-voltage direct current (HVDC) transmission, distributed energy resources, bidirectional grid, grid cybersecurity, advanced grid resilience and balancing technologies, flexible ac transmission systems (FACTS), frequency stabilization	H02J2203/10
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear	9-3	Advanced transmission and distribution systems	smart grids, demand response, variable power generation, grid reinforcement, grid stabilization, thermal efficiency monitoring and optimization systems, advanced metering, smart meters, smart distribution boards, load control switches, microgrids, grid integration technologies, dynamic line rating, transmission topology optimization, power flow	H02J3/ 144

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			controllers, advanced conductors and cables, high-voltage direct current (HVDC) transmission, distributed energy resources, bidirectional grid, grid cybersecurity, advanced grid resilience and balancing technologies, flexible ac transmission systems (FACTS), frequency stabilization	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-3	Advanced transmission and distribution systems	smart grids, demand response, variable power generation, grid reinforcement, grid stabilization, thermal efficiency monitoring and optimization systems, advanced metering, smart meters, smart distribution boards, load control switches, microgrids, grid integration technologies, dynamic line rating, transmission topology optimization, power flow controllers, advanced conductors and cables, high-voltage direct current (HVDC) transmission, distributed energy resources, bidirectional grid, grid cybersecurity, advanced grid resilience and balancing technologies, flexible ac transmission systems (FACTS), frequency stabilization	H02J3/ 36
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-3	Advanced transmission and distribution systems	smart grids, demand response, variable power generation, grid reinforcement, grid stabilization, thermal efficiency monitoring and optimization systems, advanced metering, smart meters, smart distribution boards, load control switches, microgrids, grid integration technologies, dynamic line rating, transmission topology optimization, power flow controllers, advanced conductors and cables, high-voltage direct current (HVDC) transmission, distributed energy resources, bidirectional grid, grid cybersecurity, advanced grid resilience and balancing technologies, flexible ac transmission systems (FACTS), frequency stabilization	Y02E40/ 10
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-3	Advanced transmission and distribution systems	smart grids, demand response, variable power generation, grid reinforcement, grid stabilization, thermal efficiency monitoring and optimization systems, advanced metering, smart meters, smart distribution boards, load control switches, microgrids, grid integration technologies, dynamic line rating, transmission topology optimization, power flow controllers, advanced conductors and cables, high-voltage direct current (HVDC) transmission, distributed energy resources, bidirectional grid, grid cybersecurity, advanced grid resilience and balancing technologies, flexible ac transmission systems (FACTS), frequency stabilization	Y04S

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	B01D53/ 1475
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	B01D53/ 62
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	C01B2203/ 86
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	C08G64/ 32

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
(consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	C10J2300/ 1612
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	C21B2100/ 282
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	C25B3/ 26
Advanced energy and industrial efficiency technologies, such as batteries and	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	E21B41/ 0064

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	F23J2215/50
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	F25J2260/80
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	Y02C

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	Y02P10/ 122
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-4	Carbon management technologies	post-combustion capture, pre-combustion capture, carbon utilization in products, carbon sequestration, carbon-negative technologies, co2 capture and utilization, co2 transport and storage, carbon capture and storage (CCS), direct air capture (DAC), bioenergy with carbon capture and storage (BECCS)	Y02P40/ 18
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	B64G1/ 408
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies,	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water	B64G1/ 422

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	C22B60/ 02
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B1/ 063
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B1/ 143

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B1/1823
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B35/004
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B37/268
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B37/286

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
(consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B37/306
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F22B37/327
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	F28D2021/0054
Advanced energy and industrial efficiency technologies, such as batteries and	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water	G21B

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])			reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	G21C
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	G21D3/ 04
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	G21D7/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-5	Advanced nuclear technologies	advanced nuclear energy technologies, nuclear energy systems, fusion energy, space nuclear power and propulsion systems, high-temperature gas-cooled reactor (HTGR), advanced nuclear fission reactors, liquid metal-cooled fast reactors, advanced small modular reactor, advanced light water reactors, gas-cooled fast reactors, sodium fast reactors, micro-reactors, fast neutron reactors, thorium-based reactors, nuclear fuel safety technologies, accident tolerant nuclear fuels, nuclear fuel recycling, waste minimization	G21H
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	B01D2259/65
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	B65H2403/82
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies,	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	C10J3/ 86

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	C21B2400/ 08
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	C21B9/ 14
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F02C6/ 18

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F02G5/ 02
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F22B35/ 007
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F23D14/ 66
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F23N2221/ 08

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
(consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24D10/ 00
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24D11/ 001
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24D18/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24D2103/ 00
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24D2200/ 13
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24D2200/ 16
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24F12/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
(consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F24H
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F25B
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F25J1/0242

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F25J2240/82
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F25J2260/02
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F27D17/ 00
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F28D

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
(consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])				
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	F28F
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	H01M2250/ 405
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	Y02E20/ 14

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies, including but not limited to for the purposes of electric generation (consistent with section 15 of the National Science Foundation Act of 1950 [42 U.S.C. § 1874])	9-6	Industrial efficiency technologies	energy-efficiency technologies, waste heat recovery, cogeneration, combined heat and power, industrial heat pumps, heat exchanger network, pinch technology, flue gas heat recovery, combustion air preheating, variable speed drives, micro-combined heat and power (micro-chp), advanced boilers, advanced furnaces, district heating, power quality analyzers, microturbines, energy-efficient hvac systems	Y02P80/ 15
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	A43B13/ 026
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B23B2226/ 275
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B23C2226/ 27
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B23K2103/ 16
Advanced materials science, including composites 2D materials, other	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B26D2001/ 0026

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B29B11/ 16
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B29C66/ 721
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B29C70/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B60G2206/ 7101
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B64C2001/ 0072
Advanced materials science, including composites 2D materials, other next-generation	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	B64C2027/ 4736

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B2111/ 00379
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B2237/ 38
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B2237/ 584
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B26/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B28/ 02
Advanced materials science, including composites 2D materials, other next-generation	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B30/ 02

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B32/ 02
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B35/ 117
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B35/ 71
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C04B41/ 4596
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C08J5/ 04
Advanced materials science, including composites 2D materials, other next-generation	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C08J5/ 243

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C08K3/ 042
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	C08K7/ 02
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	D02G3/ 047
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	D03D15/ 275
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	D07B1/ 005
Advanced materials science, including composites 2D materials, other next-generation	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	D07B2205/ 205

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	E01B3/ 36
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	E02D5/ 03
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	E04C2/ 22
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	E04C3/ 29
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	E04H17/ 1602
Advanced materials science, including composites 2D materials, other next-generation	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	F16C2208/ 82

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	F28F2255/06
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-1	Composites (excluding 2D materials)	polymer composites, cementitious composites, sustainable composites, aramid fiber, carbon fiber, composite materials, graphene-based composites, mxene-based composites, composite material properties, biocompatible composites, composite ceramics, automated orientated fiber placement, automated tape layering, multilayer manufacturing	H01B17/ 60
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	B01D2323/21819
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	B01D71/0211
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	B01J21/185
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	B65H2701/314

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C01B2202/00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C01B2204/00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C01B32/ 15
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C01P2002/20
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C01P2004/13
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C01P2004/24

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C04B2235/386
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C04B2235/5288
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C04B2237/361
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C04B35/522
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C08J5/ 005
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C08J5/ 042

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C08J5/ 243
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C08K3/ 041
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C08K3/ 042
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C08K3/ 046
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C09K2200/ 0282
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C22C2026/ 002

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C22C26/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C23C16/ 342
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	C25B11/ 043
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	D03D15/ 275
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	D10B2101/ 122
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	G11C2213/ 35

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01B1/ 124
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01F1/ 42
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01F10/ 005
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01G11/ 36
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01J2201/ 30453
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01J2329/ 0431

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01J2329/0444
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05193
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05393
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05493
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05693
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05793

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05893
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/05993
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/13193
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/13393
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/13693
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/29693

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/37193
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/37693
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/45193
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/45693
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/80493
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/80593

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/80693
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/80793
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/81693
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/83493
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/83793
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/84493

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/85693
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2224/85793
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L23/53276
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L28/ 26
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L29/1606
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L29/66015

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2924/10325
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2924/13088
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2924/15793
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2924/16178
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2924/16593
Advanced materials science, including composites 2D materials, other next-generation	10-2	2D materials	graphene, carbon fiber, nanocoatings, thin films, carbon nanotubes, artificial spider silk, skrilk (silk-like material from spider genes), mxenes, boron nitride (hexagonal boron nitride, h-bn), transition metal dichalcogenides, xenes, metal oxides, phosphorene, metal dichalcogenides, metal tri-chalcogenide, 2-d polymers, conducting polymers	H01L2924/16793

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
materials, and related manufacturing technologies				
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	A41D31/ 08
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B01D2239/ 0275
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B01D2239/ 0457

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B01D2253/204
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B01J13/0091
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B29C70/882
Advanced materials science, including composites 2D materials, other	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers,	B29K2995/0011

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies			fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B29K2995/0016
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B32B2266/126
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers,	B32B2307/212

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B32B2307/306
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B32B2307/762
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites,	B60B2360/149

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B82B1/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	B82Y30/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01B2202/ 24

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01B2204/24
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01B32/ 15
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01B32/956
Advanced materials science, including composites 2D materials, other	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers,	C01B33/1585

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies			fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01P2002/34
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01P2004/64
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers,	C01P2006/13

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C01P2006/32
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B14/302
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites,	C04B2111/28

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B2235/5244
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B2235/768
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B2235/781

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B2235/79
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B2237/083
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B2237/365
Advanced materials science, including composites 2D materials, other	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers,	C04B35/5611

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies			fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B35/5626
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C04B35/565
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers,	C08G2110/0091

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08G2230/00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08G2261/592
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites,	C08G73/1071

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08J2205/026
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08J2300/16
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08J2400/16

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08J5/ 005
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08J7/ 05
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08K2201/ 011
Advanced materials science, including composites 2D materials, other	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers,	C08K2201/ 018

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies			fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08K3/ 016
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08K3/ 041
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers,	C08K3/ 042

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08K3/ 046
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08K3/ 14
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites,	C08K5/ 0066

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L101/16
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L2201/02
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L2201/06

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L2201/ 08
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L27/ 16
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L27/ 20
Advanced materials science, including composites 2D materials, other	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers,	C08L81/ 06

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies			fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C08L83/ 10
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C09D5/ 18
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers,	C09K2003/ 1078

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C09K21/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C22C1/ 08
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites,	C22C14/ 00

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C22C26/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C22C27/ 02
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	C22C29/ 08

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	D01F1/ 07
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	D06N2209/ 048
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	D07B2205/ 3017
Advanced materials science, including composites 2D materials, other	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers,	D07B2205/ 40

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
next-generation materials, and related manufacturing technologies			fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	D10B2101/ 16
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	F17C2203/ 0325
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers,	G02B1/ 002

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	G11B2007/ 25308
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	H01B7/ 295
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites,	H01L2224/ 29198

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
			electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	H01L2224/29698
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-3	Other next-generation materials	thermal resistant materials, degradation resistant materials, highly functional materials, high-performance materials, hybrid materials, engineered polymers, low-density/ high strength metals, nanomaterials, smart materials, biomaterials, metamaterials, aerogels, metal foams, auxetics (materials with negative poisson's ratio), self-healing polymers, fire-resistant materials, thermally resistant materials, emi shielding materials, bioplastics, superconductors niobium-titanium, niobium-tin, yttrium-barium-copper oxide (YBCO), alloys, advanced ceramics, silicon carbide, tungsten carbide, glass ceramics, alumina, zirconia, carbides, nitrides, synthetic polymers, linear polymers, branched chain polymers, crosslinked polymers, network polymers, homopolymers, copolymers, addition polymerization, condensation polymerization, elastomers, thermoplastics, thermosets, organic polymers, inorganic polymers (silicones), biodegradable polymers, high-temperature polymers, sustainable materials, critical minerals, solar cell materials – perovskites, electrolysis materials, photosynthetic materials, catalysts, mof (metal-organic frameworks), smart/ functional or adaptable materials, energetic materials and precursors, biomimetic materials, sustainable fertilizers, value-added chemicals	H01L2224/45698
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	B22F
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C01B32/184

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C01B32/198
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C01B32/225
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C01B32/372
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C01P2006/37
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C08K3/ 041
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C08K3/ 042

Table STRN-13. Mapping of critical technologies to CPC codes

(Critical technology, critical technology foci, critical technology label, critical technology keywords, CPC code)

Critical technology	Critical technology foci	Critical technology foci label	Critical technology foci keywords	CPC code
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C08K9/ 10
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C22C1/ 04
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C22C33/ 02
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	C23C14/ 00
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	10-4	Related manufacturing technologies	mechanical exfoliation, liquid exfoliation, solution-based chemical synthesis, wet chemical techniques, wet-chemical synthesis, interface-mediated growth, bottom-up self-assembly, sputtering, advanced coating techniques, surfactants, powder metallurgy, spark plasma sintering, advanced recycling, material recovery facility (MRF), spectral signature, chemical recycling, circular economy, thermal decomposition, nanoencapsulation, material property characterization, non-destructive testing (NDT)	H01C17/ 2404

CPC = Cooperative Patent Classification.

Note(s):
Patents are linked to critical technologies through CPC codes. The CPC-to–critical technologies mapping was developed by Science-Metrix (Elsevier) following definitions established by the National Science Foundation Directorate for Technology, Innovation and Partnerships. Codes are presented at the parent level. To reproduce findings, all codes falling below the codes in the CPC hierarchical tree must be included.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, Patent and Trademark Office (USPTO), accessed March 2025.

Table STRN-14. Patent citation index of international patent families granted in critical technology categories, by selected region, country, or economy of patent inventor: 2021

(Index)

Category	Patent citation index for the United States	Patent citation index for China	Patent citation index for the EU-27
Artificial intelligence, machine learning, autonomy, and related advances	1.73	1.36	0.84
Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies	2.23	1.15	1.45
High-performance computing, semiconductors, and advanced computer hardware and software	1.56	1.32	1.07
Quantum information science and technology	1.84	1.27	1.40
Robotics, automation, and advanced manufacturing	2.61	1.17	0.83
Natural and anthropogenic disaster prevention or mitigation	3.73	1.14	1.01
Advanced communications technology and immersive technology	1.96	1.23	0.90
Biotechnology, medical technology, genomics, and synthetic biology	3.07	1.18	1.22
Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics	1.29	1.38	0.86
Advanced energy and industrial efficiency technologies, including (but not limited to) the purposes of electric generation	2.77	1.15	1.08

EU-27 = European Union.

Note(s):
Highly cited patents refer to priority patents cited in subsequent priority patent documents. This table shows an index number for citations in patent documents during all the years available following the reference year, including the reference year itself. Citation data are based on all citations made to a patent family across all years and are normalized by critical technologies and earliest grant year to allow for comparisons across critical technologies and over time, resulting in the world-level standing at 1.00 for each critical technology and year. The latest available data year is 2021 because a minimum 3-year citation window is needed for a highly cited patent family (HCPF) score to be computed. The share of patent families in the top 1% is computed as follows: S*x* = HCPF*x* / PF*x*, where S*x* is the share of output from country *x* in the top 1% most-cited patent families; HCPF*x* is the number of patent families from country *x* that are among the top 1% of most-cited patent families (using full counting); and PF*x* is the total number of patent families from country *x* with a relative citation score, which excludes unclassified patent families. The world average is 1.00. The index number has been normalized for patent age, technology area, and patent office through the length of reference list from the citing priority patents (more details about the normalization are available at Section 2.5 of the technical documentation: https://science-metrix.com/wp-content/uploads/2024/02/Technical-Documentation-Patent-and-Trademarks-indicators-SEI2024.pdf). These categories are based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, Patent and Trademark Office (USPTO), accessed March 2025.

Science and Engineering Indicators

Table STRN-15. Priority patent families granted in artificial intelligence, machine learning, autonomy, and related advances for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	7,026	8,073	9,622	10,602	11,451	11,808	13,958	16,006	17,427	23,813	33,898	47,273	73,522	91,811	109,682
China	689	1,085	1,367	1,517	1,543	1,870	2,535	3,423	4,034	6,410	12,857	22,608	45,829	63,614	82,708
United States	1,940	2,025	2,663	2,983	3,422	3,814	4,209	4,384	4,509	6,268	7,283	7,863	8,368	8,234	7,584
South Korea	325	558	661	957	1,214	1,083	1,322	1,815	2,038	2,691	3,957	5,554	6,481	6,959	6,377
Japan	2,482	2,678	2,803	2,832	2,626	2,150	2,557	2,708	2,984	3,665	4,253	4,403	5,831	5,809	5,778
Germany	387	411	501	530	521	610	701	770	775	1,045	1,071	1,142	1,375	1,481	1,668
India	42	44	66	109	150	169	219	249	304	430	681	1,145	1,055	967	959
Taiwan	146	157	215	255	262	288	372	390	319	422	525	663	831	949	826
France	167	186	264	243	289	287	334	319	365	404	416	653	518	490	559
United Kingdom	133	144	165	191	233	219	256	275	280	370	473	511	504	496	526
Canada	95	101	119	140	159	181	178	181	177	275	283	355	417	456	412
Israel	53	66	106	105	146	163	189	217	246	304	330	387	413	433	386
Sweden	47	84	96	106	114	142	143	191	148	150	192	149	174	210	244
Netherlands	49	61	51	60	74	64	95	98	100	105	131	140	155	193	196
Switzerland	21	30	31	42	53	68	66	71	84	109	116	140	150	176	168
Australia	56	41	37	48	56	61	69	68	75	104	99	156	111	109	126
Italy	61	49	55	53	60	42	41	111	132	110	136	168	148	150	119
Singapore	12	14	18	12	15	18	26	30	32	51	50	57	97	115	111
Finland	51	30	36	47	64	47	69	65	67	65	87	71	106	97	99
Ireland	10	7	12	17	16	14	26	24	39	53	83	103	99	108	86
Denmark	11	14	15	22	25	30	26	31	33	40	32	49	57	56	64

Note(s):
Priority patents are International Patent Documentation (INPADOC) patent families granted across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT). Locations are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families and patents counted according to the year of the first granted patent in the patent family. This category is based on the 2024 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. INPADOC patent families are counted according to the year of the first granted patent in the patent family. Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Because of data coverage issues for some patent offices in PATSTAT, statistics for a limited set of countries may be over- or underestimated partially for some years or across the whole trend. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PATSTAT, spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-16. USPTO utility patents granted in artificial intelligence, machine learning, autonomy, and related advances for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	3,542	3,875	5,209	5,895	6,293	7,022	8,435	9,391	9,752	13,854	17,185	19,058	22,246	24,054	24,147
United States	1,992	2,132	2,661	3,158	3,580	3,962	4,758	5,175	5,295	7,526	9,268	9,899	10,929	12,671	11,994
Japan	602	704	952	980	880	939	1,008	1,144	1,155	1,577	1,984	2,160	2,589	2,298	2,708
China	82	89	147	173	178	214	312	397	463	749	1,145	1,502	2,035	1,768	1,998
South Korea	147	130	233	249	243	297	412	482	477	635	846	978	1,337	1,390	1,393
India	36	54	65	109	137	162	230	258	293	469	652	872	1,023	1,107	1,075
Germany	114	132	209	208	220	261	298	371	380	578	601	609	789	791	890
Canada	116	118	157	198	177	196	187	185	196	291	313	398	492	574	586
Israel	41	51	95	100	140	160	199	215	256	351	385	424	488	595	548
United Kingdom	75	69	105	120	152	133	174	191	189	293	370	410	423	497	535
Taiwan	42	69	121	108	90	107	116	133	153	209	300	289	402	352	333
France	76	56	115	118	117	128	129	122	133	177	174	206	229	250	267
Switzerland	11	16	17	26	36	42	62	59	65	116	117	131	158	219	229
Sweden	22	39	54	58	55	78	101	161	141	150	131	130	147	217	218
Australia	53	65	38	40	40	47	61	71	64	101	95	99	100	115	124
Singapore	10	10	24	20	14	14	19	18	25	39	50	52	101	120	116
Netherlands	30	25	24	30	34	19	36	40	52	46	53	69	75	81	109
Italy	10	13	23	28	9	21	40	31	37	48	58	72	80	81	106
Ireland	9	16	20	20	14	18	25	31	36	51	87	122	114	112	99
Finland	24	19	19	26	30	32	38	38	41	41	63	46	74	86	94
Russia	13	12	25	24	29	39	42	55	58	61	81	75	81	82	86

USPTO = Patent and Trademark Office.

Note(s):
Utility patents are allocated to location based on the residence of the inventor. This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025.

Science and Engineering Indicators

Table STRN-17. Highly cited patents in artificial intelligence, machine learning, autonomy, and related advances for the top 20 most-patenting regions, countries, or economies: 2010–21

(Index number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
China	1.36	1.01	1.25	1.60	1.74	1.95	2.01	1.54	1.65	1.62	1.58	1.36
United States	2.74	2.91	2.67	2.41	2.21	1.98	1.97	2.11	1.92	1.85	1.67	1.73
South Korea	0.32	0.77	0.27	0.72	0.65	0.53	0.46	0.43	0.61	0.51	0.61	0.26
Japan	0.65	0.46	0.58	0.71	0.99	1.27	1.40	1.07	1.26	1.29	1.35	1.44
Germany	0.44	0.56	0.45	0.54	1.04	0.92	0.80	0.38	0.21	0.60	0.56	0.87
India	2.00	1.61	1.60	1.75	1.56	1.13	0.65	0.82	0.73	0.77	0.24	0.41
Taiwan	0.37	0.00	0.59	0.48	0.41	0.34	0.50	0.62	0.44	0.35	0.21	0.17
France	0.70	0.63	0.00	0.00	0.21	0.81	0.69	0.53	0.16	0.83	0.88	0.71
United Kingdom	3.81	2.23	0.54	2.62	1.71	2.23	1.94	1.74	1.75	1.10	1.26	2.05
Canada	3.35	2.55	4.33	2.55	2.43	2.81	2.07	2.43	3.68	2.68	1.32	2.59
Israel	1.64	4.58	1.73	3.76	0.84	0.89	0.74	1.57	2.10	2.27	2.49	2.06
Sweden	0.00	1.39	0.00	0.53	0.44	0.00	0.74	0.29	0.36	0.00	0.00	0.64
Netherlands	0.00	0.00	0.55	0.54	2.86	0.97	0.62	0.00	0.29	1.00	0.68	0.00
Switzerland	1.52	2.67	2.86	2.54	0.67	1.67	1.58	1.88	0.88	1.41	1.59	2.23
Australia	1.53	3.13	1.04	1.92	1.54	1.95	1.84	0.61	4.00	0.87	1.65	1.30
Italy	0.00	0.00	2.00	0.94	0.00	2.80	0.00	0.89	0.36	0.41	0.99	0.00
Singapore	3.13	0.00	0.00	0.00	9.76	1.64	1.23	1.33	2.22	1.37	2.40	1.11
Finland	0.00	0.00	0.00	0.00	0.80	1.06	0.00	0.78	0.00	0.76	0.56	0.72
Ireland	0.00	4.00	5.88	0.00	3.39	0.00	3.75	2.63	2.70	2.16	2.24	1.55
Denmark	0.00	0.00	0.00	1.79	1.92	1.56	0.00	1.37	0.00	0.00	2.70	2.40

Note(s):
This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Highly cited patents refer to priority patents cited in subsequent patent documents. The index number for citations within patent documents is calculated including all the years available following the reference year, including the reference year itself. For example, for 2010, citations in priority patents between 2010 and 2021, the last year with fully available data, are used in the calculation. The index number has been normalized for patent age, technology area, and patent office through the length of reference list from the citing priority patents. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Worldwide Patent Statistical Database (PATSTAT), spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-18. Priority patent families granted in biotechnology, medical technology, genomics, and synthetic biology for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	37,884	43,101	50,363	54,491	56,607	54,747	56,535	57,251	58,868	64,427	70,058	81,314	85,646	89,555	89,060
China	7,344	10,454	13,675	15,270	15,856	17,173	17,855	16,944	20,015	23,930	30,023	41,931	49,754	56,302	57,146
United States	8,649	8,825	10,234	11,039	11,540	11,070	10,679	10,895	10,283	11,074	10,793	10,080	9,736	8,979	8,891
Japan	9,064	9,761	9,912	10,494	10,686	8,344	9,619	8,887	8,543	8,353	8,304	8,175	8,873	7,990	7,369
South Korea	1,922	3,060	4,069	4,669	5,227	4,671	5,397	6,362	6,232	6,372	7,228	7,473	5,914	6,175	5,513
Germany	1,987	1,968	2,250	2,381	2,458	2,382	2,434	2,286	2,293	2,469	2,124	2,016	1,915	1,984	2,037
Taiwan	378	425	566	876	905	972	1,163	1,222	1,000	1,063	963	1,059	1,113	1,127	1,050
United Kingdom	686	722	762	807	847	830	861	825	820	927	937	918	920	880	989
France	893	994	1,323	1,185	1,093	1,114	1,073	965	946	1,048	1,139	1,111	1,036	897	982
Netherlands	318	351	346	424	481	446	514	569	481	569	508	531	525	501	470
Switzerland	368	336	411	437	453	474	460	406	424	478	456	423	428	423	435
Canada	358	369	415	484	497	500	446	499	488	503	468	473	423	415	373
Israel	245	270	324	354	367	357	373	376	401	388	442	428	395	316	367
Australia	440	328	292	325	315	280	238	221	217	263	245	322	232	256	343
Italy	509	514	532	483	504	350	241	833	779	657	494	566	551	492	330
Poland	77	113	158	170	223	212	297	242	297	284	244	436	261	247	290
India	116	100	160	177	177	190	232	250	233	257	305	445	369	233	257
Sweden	294	284	314	312	291	261	255	265	259	265	296	238	235	241	242
Spain	361	385	318	406	365	394	324	289	310	269	217	214	217	228	223
Denmark	146	194	189	198	221	188	206	187	200	219	205	215	176	162	209
Belgium	100	118	127	168	159	205	236	208	189	179	206	164	164	170	204

Note(s):
Priority patents are International Patent Documentation (INPADOC) patent families granted across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT). Locations are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families and patents counted according to the year of the first granted patent in the patent family. This category is based on the 2024 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. INPADOC patent families are counted according to the year of the first granted patent in the patent family. Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Because of data coverage issues for some patent offices in PATSTAT, statistics for a limited set of countries may be over- or underestimated partially for some years or across the whole trend. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PATSTAT, spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-19. USPTO utility patents granted in biotechnology, medical technology, genomics, and synthetic biology for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	20,808	22,152	25,622	29,162	31,802	31,835	32,735	35,425	34,685	40,225	40,191	37,526	36,567	34,501	36,411
United States	13,329	14,270	16,234	18,234	19,557	19,297	19,920	21,514	20,398	23,570	23,255	21,938	20,866	20,601	21,554
Japan	1,854	1,984	2,311	2,557	2,714	2,781	2,604	2,668	2,738	3,170	3,196	2,850	2,800	2,169	2,394
Germany	1,325	1,214	1,522	1,729	1,832	1,861	1,851	1,968	1,992	2,313	2,288	2,031	1,854	1,684	1,785
China	183	169	231	282	338	371	511	604	752	1,033	1,237	1,287	1,536	1,450	1,680
South Korea	254	273	307	383	496	619	712	887	974	1,181	1,120	1,002	1,102	984	1,056
United Kingdom	524	504	661	781	847	938	990	1,001	975	1,186	1,164	1,048	1,050	999	1,024
Israel	353	422	456	595	655	652	684	780	750	862	973	903	817	811	891
France	452	478	594	656	796	775	764	844	798	894	916	822	800	677	722
Canada	415	455	468	559	543	616	567	702	671	764	766	714	686	679	645
Switzerland	239	282	339	403	493	505	485	512	520	619	601	559	565	510	549
Taiwan	162	190	286	306	336	354	366	417	468	509	506	461	479	454	415
Australia	197	277	254	356	378	356	322	347	363	408	392	400	456	356	357
Netherlands	200	230	258	299	386	381	407	515	476	622	551	486	473	401	356
India	59	62	104	127	161	172	200	229	255	265	318	300	325	277	334
Sweden	177	215	280	269	344	304	293	334	335	328	375	382	343	288	299
Italy	200	175	213	279	312	290	339	284	327	363	351	331	324	271	295
Denmark	161	195	213	266	322	268	300	286	322	331	318	342	320	309	292
Ireland	66	74	74	83	102	95	133	123	146	180	196	163	207	210	236
Belgium	118	117	126	158	180	159	184	205	195	194	207	181	191	153	186
New Zealand	33	38	41	47	53	55	65	86	92	112	142	128	132	118	153

USPTO = Patent and Trademark Office.

Note(s):
Utility patents are allocated to location based on the residence of the inventor. This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025.

Science and Engineering Indicators

Table STRN-20. Highly cited patents in biotechnology, medical technology, genomics, and synthetic biology for the top 20 most-patenting regions, countries, or economies: 2010–21

(Index number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
China	1.05	1.01	1.04	1.15	1.38	1.33	1.50	1.58	1.44	1.41	1.26	1.18
United States	2.61	2.66	2.67	2.60	2.50	2.41	2.55	2.47	2.57	2.63	2.57	3.07
Japan	0.99	1.03	1.10	1.11	1.40	1.76	1.69	1.83	1.75	1.87	1.94	2.21
South Korea	0.69	0.30	0.40	0.50	0.41	0.65	0.55	0.57	0.54	0.62	0.50	0.43
Germany	1.00	0.93	0.74	1.04	1.16	0.87	1.05	0.94	0.89	0.80	1.04	1.44
Taiwan	0.23	0.82	0.31	0.20	0.29	0.26	0.57	0.60	0.31	0.21	0.24	0.29
United Kingdom	1.83	2.27	2.25	2.29	2.58	2.07	2.16	2.57	1.83	2.71	2.92	2.89
France	0.33	0.53	0.75	0.68	1.58	1.99	1.42	1.11	1.24	0.68	0.58	1.13
Netherlands	1.44	1.54	1.16	0.73	1.70	0.65	1.23	0.64	0.72	1.01	1.28	1.07
Switzerland	1.95	2.26	1.99	1.75	2.66	2.18	3.42	2.60	2.89	3.14	3.83	4.28
Canada	3.76	3.88	3.37	2.76	3.12	3.51	2.41	3.41	2.91	2.33	1.89	2.77
Israel	4.61	2.84	4.04	3.57	2.18	2.87	2.90	4.11	3.52	2.44	3.52	4.02
Australia	1.64	1.42	1.96	2.43	1.58	2.28	3.86	3.90	4.65	2.23	3.22	2.24
Italy	0.63	1.09	0.87	0.46	0.98	1.30	1.20	0.57	0.40	0.45	1.09	0.39
Poland	0.00	0.00	0.54	0.00	0.38	0.00	0.28	0.00	0.29	0.32	0.35	0.39
India	3.47	3.14	0.64	4.42	2.82	3.42	3.66	0.99	2.20	1.40	1.56	0.50
Sweden	0.49	1.19	1.05	1.48	0.43	1.16	1.78	0.89	1.67	1.46	0.61	2.40
Spain	0.00	0.43	0.25	0.98	1.23	0.97	0.69	2.03	0.71	0.75	1.10	1.73
Denmark	1.64	0.93	2.56	1.17	2.88	2.48	1.97	2.35	2.86	1.26	1.53	2.69
Belgium	3.08	1.58	1.40	1.99	2.51	2.54	1.31	1.05	1.11	1.13	1.26	1.59

Note(s):
This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Highly cited patents refer to priority patents cited in subsequent patent documents. The index number for citations within patent documents is calculated including all the years available following the reference year, including the reference year itself. For example, for 2010, citations in priority patents between 2010 and 2021, the last year with fully available data, are used in the calculation. The index number has been normalized for patent age, technology area, and patent office through the length of reference list from the citing priority patents. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Worldwide Patent Statistical Database (PATSTAT), spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-21. Priority patent families granted in semiconductors for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	27,155	29,279	29,840	30,004	31,293	29,188	31,913	31,383	29,100	31,101	32,107	32,883	35,356	40,566	43,770
China	2,690	3,149	3,848	3,513	3,624	5,091	6,306	7,034	6,937	8,170	9,220	10,500	12,850	18,242	21,329
South Korea	3,773	5,159	4,639	4,159	4,674	4,054	4,489	4,543	4,497	5,324	5,888	6,070	5,491	6,273	7,192
Japan	12,284	12,871	13,040	13,245	12,686	9,349	9,825	9,154	8,370	7,869	7,463	7,028	7,837	7,631	7,040
Taiwan	1,433	1,582	1,789	2,232	2,865	2,931	3,210	2,903	2,374	2,479	2,573	2,850	3,203	3,056	3,108
United States	4,028	3,605	3,461	3,799	4,180	4,404	4,726	4,366	3,620	3,964	3,867	3,461	3,288	2,899	2,709
Germany	1,075	1,003	1,071	1,077	1,128	1,205	1,175	1,125	1,126	1,115	998	932	831	753	799
France	299	349	340	355	335	355	351	368	402	347	360	417	313	282	285
Netherlands	210	204	245	232	189	145	149	137	122	152	143	129	139	151	143
United Kingdom	156	170	166	173	196	203	226	157	173	170	206	144	149	149	141
India	37	26	34	69	77	91	121	112	94	130	137	137	118	125	131
Italy	113	116	105	126	118	88	65	174	183	137	141	147	135	136	112
Singapore	177	187	187	181	199	191	181	174	138	139	124	108	145	140	111
Austria	67	103	95	85	129	159	178	208	179	162	150	135	121	95	110
Switzerland	54	63	60	88	72	80	91	100	86	96	87	80	74	84	81
Canada	97	88	91	78	102	93	98	87	80	100	85	64	67	76	70
Israel	58	49	58	49	82	83	83	81	56	70	68	92	83	61	62
Belgium	66	50	58	60	62	73	88	69	79	82	84	83	67	85	61
Malaysia	49	60	50	46	67	98	69	87	64	60	72	80	87	77	41
Finland	31	29	34	38	38	43	52	38	35	45	41	39	65	51	34
Poland	10	14	13	23	37	33	38	34	31	17	17	28	17	13	29

Note(s):
Priority patents are International Patent Documentation (INPADOC) patent families granted across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT). Locations are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families and patents counted according to the year of the first granted patent in the patent family. This category is based on the 2024 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. INPADOC patent families are counted according to the year of the first granted patent in the patent family. Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Because of data coverage issues for some patent offices in PATSTAT, statistics for a limited set of countries may be over- or underestimated partially for some years or across the whole trend. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PATSTAT, spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-22. USPTO utility patents granted in semiconductors for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	19,914	19,844	19,278	21,698	24,394	25,561	26,739	27,199	25,044	27,756	27,967	25,117	24,568	24,034	25,910
United States	6,624	6,252	6,067	6,834	7,684	7,911	8,275	8,268	7,447	8,101	8,005	6,691	5,826	5,870	5,481
Japan	6,374	6,491	6,279	6,851	7,269	7,160	6,748	6,701	6,078	6,701	6,480	5,583	5,217	4,544	5,090
South Korea	2,873	2,988	2,560	2,732	3,133	3,491	3,713	3,645	3,332	3,562	3,971	3,722	3,838	4,492	4,666
Taiwan	1,589	1,643	1,779	2,160	2,605	2,937	3,447	3,517	3,465	3,564	3,953	3,731	3,932	4,381	4,604
China	240	256	300	456	631	865	1,186	1,631	1,647	2,453	2,396	2,414	3,054	2,270	3,446
Germany	820	763	790	855	1,012	1,066	1,027	1,027	925	944	851	814	687	578	615
France	253	255	290	320	365	387	369	384	340	356	330	354	296	249	308
Italy	67	80	76	120	147	178	173	161	167	185	207	179	169	191	196
Singapore	222	263	267	295	314	283	287	275	245	243	194	174	206	187	173
Netherlands	94	105	105	118	128	119	164	160	135	141	128	143	121	117	142
India	27	26	40	66	77	74	114	112	119	156	164	129	131	138	141
Canada	113	125	114	144	163	143	154	154	127	176	155	115	104	125	135
Israel	73	46	73	73	101	92	104	136	102	116	121	134	144	123	133
United Kingdom	141	132	127	165	152	182	169	186	176	197	192	174	142	138	129
Austria	62	67	76	100	136	158	225	246	201	202	176	171	135	111	109
Belgium	75	67	71	89	91	99	121	123	108	130	119	114	112	104	93
Switzerland	42	52	52	85	95	88	113	112	108	128	103	93	65	77	74
Finland	33	28	27	28	35	41	53	60	48	62	68	62	70	62	70
Malaysia	69	65	58	50	78	99	71	81	68	72	83	91	89	74	66
Sweden	20	22	30	31	38	35	43	30	24	33	24	22	27	21	39

USPTO = Patent and Trademark Office.

Note(s):
Utility patents are allocated to location based on the residence of the inventor. This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025.

Science and Engineering Indicators

Table STRN-23. Highly cited patents in semiconductors for the top 20 most-patenting regions, countries, or economies: 2010–21

(Index number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
China	2.09	1.84	1.70	2.40	1.68	1.51	1.39	1.61	1.59	1.54	1.54	1.48
South Korea	0.58	0.55	0.68	1.15	0.86	1.11	1.48	1.47	1.60	1.66	1.44	1.26
Japan	1.12	0.93	0.88	0.93	0.72	0.90	0.90	0.85	0.74	0.88	0.94	0.92
Taiwan	0.55	1.05	1.32	0.78	1.88	1.15	0.95	0.93	0.65	0.64	0.61	0.47
United States	2.70	3.21	3.24	2.68	2.76	2.24	2.06	1.73	1.79	1.71	1.59	1.70
Germany	0.80	1.37	1.23	1.25	1.05	0.98	1.20	1.21	1.13	0.56	1.05	0.77
France	0.46	1.30	0.77	1.28	0.19	0.90	0.72	0.85	0.33	0.19	0.18	0.47
Netherlands	0.29	0.89	1.83	2.43	2.74	1.50	0.66	2.63	1.14	2.08	0.98	1.11
United Kingdom	2.75	3.26	1.35	3.12	2.53	1.91	3.74	1.37	2.70	2.57	2.42	3.92
India	3.33	2.78	4.90	4.44	3.24	3.04	1.71	1.95	1.41	1.69	0.98	0.72
Italy	1.35	1.24	0.70	2.09	0.00	1.28	3.08	0.41	0.39	0.90	1.34	0.00
Singapore	4.33	1.59	2.63	3.09	2.78	2.43	3.57	2.51	2.99	2.12	1.40	1.00
Austria	0.00	2.44	0.66	0.72	0.51	0.42	1.73	1.24	0.36	0.00	0.00	0.48
Switzerland	3.16	2.83	0.82	4.57	2.14	3.11	2.22	2.15	2.31	2.19	1.18	1.32
Canada	4.94	3.13	6.63	5.95	3.27	5.73	3.83	3.09	4.57	2.99	2.44	5.19
Israel	7.00	5.81	7.07	2.13	5.00	0.64	1.92	2.40	3.94	2.72	3.23	3.50
Belgium	1.44	0.83	0.80	1.40	3.05	1.95	1.73	0.74	0.60	1.14	1.14	4.35
Malaysia	1.47	0.00	1.25	1.37	0.87	0.74	0.00	3.03	0.00	0.00	0.00	0.00
Finland	0.00	0.00	4.08	1.82	1.54	1.39	2.86	3.28	1.56	0.00	0.00	5.56
Poland	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note(s):
This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Highly cited patents refer to priority patents cited in subsequent patent documents. The index number for citations within patent documents is calculated including all the years available following the reference year, including the reference year itself. For example, for 2010, citations in priority patents between 2010 and 2021, the last year with fully available data, are used in the calculation. The index number has been normalized for patent age, technology area, and patent office through the length of reference list from the citing priority patents. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Worldwide Patent Statistical Database (PATSTAT), spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-24. Priority patent families granted in quantum information science and technology for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	2,993	3,432	3,640	4,248	4,931	5,094	5,692	5,826	5,527	6,352	6,561	7,120	7,462	7,367	7,528
China	344	439	651	707	846	1,087	1,296	1,464	1,537	1,961	2,488	3,194	3,868	4,107	4,319
Japan	1,158	1,304	1,280	1,377	1,482	1,181	1,394	1,281	1,167	1,195	1,099	999	996	946	940
United States	661	656	702	907	1,043	1,255	1,306	1,237	1,079	1,247	1,182	1,097	1,008	877	812
South Korea	292	496	364	474	572	533	592	734	696	808	731	726	578	522	524
Taiwan	51	61	86	131	217	264	299	279	227	250	260	266	263	217	183
Germany	117	112	149	161	209	181	179	177	144	187	170	160	139	126	161
France	66	88	91	94	95	102	109	109	122	127	101	124	98	94	113
United Kingdom	66	59	60	71	79	74	77	74	84	77	83	88	87	60	84
Canada	36	31	40	38	58	66	75	86	73	87	78	75	75	68	74
Netherlands	17	21	26	26	31	30	32	33	25	28	26	29	33	38	34
India	6	6	7	12	16	22	22	28	30	32	38	42	39	37	34
Israel	14	18	17	28	33	28	28	36	27	37	28	30	30	32	32
Switzerland	13	7	11	15	21	18	21	20	24	32	28	23	17	31	25
Italy	26	22	24	34	32	37	33	37	38	31	28	23	28	29	22
Austria	5	7	11	11	15	17	29	31	29	15	15	14	16	11	18
Belgium	10	4	10	8	14	21	27	18	27	30	26	28	23	22	17
Australia	13	7	9	9	10	8	12	13	12	12	12	10	11	14	16
Finland	10	5	5	8	11	13	9	7	9	12	15	16	13	14	14
Sweden	11	9	9	15	13	24	16	19	14	14	19	15	13	10	13
Singapore	13	13	21	12	14	24	17	13	20	15	13	13	17	14	13

Note(s):
Priority patents are International Patent Documentation (INPADOC) patent families granted across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT). Locations are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families and patents counted according to the year of the first granted patent in the patent family. This category is based on the 2024 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. INPADOC patent families are counted according to the year of the first granted patent in the patent family. Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Because of data coverage issues for some patent offices in PATSTAT, statistics for a limited set of countries may be over- or underestimated partially for some years or across the whole trend. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PATSTAT, spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-25. USPTO utility patents granted in quantum information science and technology for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	2,219	2,165	2,143	2,212	2,444	2,269	2,268	2,224	2,022	2,359	2,159	2,013	2,026	2,162	2,376
United States	978	975	904	971	1,051	1,039	1,036	1,053	1,006	1,159	1,132	1,005	909	969	962
Taiwan	50	52	75	73	84	86	90	79	76	92	97	125	225	267	353
Japan	658	655	625	601	639	491	445	374	273	339	289	231	243	230	275
China	25	27	48	57	105	98	106	130	138	177	140	130	140	122	187
South Korea	166	151	142	136	146	144	121	117	117	129	95	117	123	149	176
Canada	38	33	44	38	57	55	80	87	67	79	84	89	78	89	73
Germany	78	75	80	79	106	83	88	75	72	70	56	58	48	48	52
Israel	9	12	15	30	27	24	26	43	26	47	29	32	36	45	48
United Kingdom	38	26	30	38	37	41	35	40	38	41	42	36	41	30	43
France	43	38	28	34	32	50	47	44	37	44	35	40	43	45	39
Netherlands	32	25	34	38	42	34	51	38	30	25	22	18	15	15	19
India	1	1	0	3	2	7	9	15	19	15	16	13	10	16	18
Switzerland	19	18	9	8	13	9	17	12	6	16	15	15	8	24	17
Belgium	7	10	11	13	11	10	15	13	17	19	23	18	17	17	15
Italy	17	16	14	24	23	25	24	34	22	26	13	16	14	15	13
Ireland	0	1	3	5	5	2	3	1	1	2	3	5	10	9	12
Saudi Arabia	0	0	0	0	0	3	2	2	3	4	6	5	9	7	9
Sweden	12	10	18	11	12	16	11	16	14	8	8	7	11	7	8
Austria	9	3	15	9	8	8	9	5	5	7	6	7	5	4	7
Finland	2	5	3	3	2	3	3	2	4	2	4	3	3	4	7

USPTO = Patent and Trademark Office.

Note(s):
Utility patents are allocated to location based on the residence of the inventor. This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025.

Science and Engineering Indicators

Table STRN-26. Highly cited patents in quantum information science and technology for the top 20 most-patenting regions, countries, or economies: 2010–21

(Index number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
China	1.52	1.62	0.82	1.67	1.19	1.45	1.49	1.80	1.75	1.62	1.47	1.27
Japan	0.80	0.72	0.61	0.91	0.64	0.99	1.03	1.31	1.46	1.26	1.28	1.39
United States	2.88	3.39	3.16	2.72	2.78	2.09	2.25	2.18	2.54	2.19	1.91	1.84
South Korea	0.34	0.43	0.54	0.51	0.17	0.55	0.92	0.88	0.46	0.46	0.31	0.48
Taiwan	0.94	1.54	2.25	0.37	3.17	1.34	1.13	0.92	0.43	0.75	0.70	0.50
Germany	0.69	1.94	0.90	1.30	0.42	0.48	1.15	0.89	0.55	0.44	0.45	0.68
France	0.00	1.46	0.00	0.88	0.82	0.41	0.78	0.00	0.34	0.00	2.17	0.31
United Kingdom	2.52	2.68	0.67	2.20	2.10	0.93	2.78	4.39	2.42	1.42	3.36	5.12
Canada	2.15	4.65	1.85	3.10	2.20	4.04	1.02	2.93	1.69	1.75	2.02	3.45
Netherlands	0.00	2.74	0.00	0.00	0.84	0.00	0.00	3.60	0.00	3.77	0.91	1.89
India	7.14	2.70	2.22	2.90	4.21	2.15	2.46	0.85	2.42	2.31	0.63	2.52
Israel	2.50	6.98	4.65	1.35	2.33	1.09	2.33	0.00	3.66	0.97	1.92	0.85
Switzerland	0.00	3.85	0.00	1.54	1.33	0.00	4.00	2.50	5.71	1.15	1.12	2.41
Italy	0.00	0.00	0.00	0.00	0.00	2.22	0.00	1.19	0.00	0.00	3.61	1.39
Austria	0.00	0.00	0.00	0.00	0.00	0.00	2.63	2.33	1.32	0.00	1.96	0.00
Belgium	2.63	4.35	0.00	0.00	1.75	3.23	0.00	1.59	0.00	1.18	0.00	5.00
Australia	0.00	5.88	0.00	2.44	5.71	0.00	4.44	6.25	8.82	2.38	5.26	2.38
Finland	0.00	0.00	0.00	0.00	0.00	0.00	3.03	0.00	0.00	2.17	0.00	8.00
Sweden	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	1.67
Singapore	3.85	0.00	2.22	2.70	0.00	0.00	2.04	2.27	3.45	0.00	4.26	6.13

Note(s):
This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Highly cited patents refer to priority patents cited in subsequent patent documents. The index number for citations within patent documents is calculated including all the years available following the reference year, including the reference year itself. For example, for 2010, citations in priority patents between 2010 and 2021, the last year with fully available data, are used in the calculation. The index number has been normalized for patent age, technology area, and patent office through the length of reference list from the citing priority patents. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Worldwide Patent Statistical Database (PATSTAT), spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-27. Priority patent families granted in advanced nuclear technologies for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	997	1,015	1,230	1,167	1,402	1,497	1,671	1,922	1,574	1,783	1,668	1,677	1,916	1,955	2,433
China	58	136	204	197	212	311	533	715	555	618	623	693	1,084	1,081	1,653
South Korea	170	181	251	204	287	279	249	249	186	231	280	251	214	279	241
Japan	378	337	350	277	391	341	327	334	257	309	228	207	223	215	194
United States	111	113	118	169	175	188	181	219	193	230	208	198	165	154	141
France	55	54	77	60	87	82	82	99	81	93	78	58	53	60	48
Germany	37	43	50	50	43	55	67	50	52	62	42	42	42	34	46
United Kingdom	4	8	7	9	11	11	13	15	13	12	18	23	23	15	24
Canada	9	4	5	7	8	15	29	19	29	13	14	16	13	18	12
Taiwan	4	14	10	13	17	8	3	6	9	7	3	10	7	9	10
Sweden	4	11	7	8	4	3	3	14	10	9	8	7	3	10	6
Czechia	2	2	1	3	4	3	7	9	6	5	10	8	5	6	6
Spain	4	4	4	3	13	9	7	14	8	12	3	5	5	3	5
Italy	5	3	10	10	8	5	4	15	16	14	7	10	7	9	5
Denmark	0	2	1	0	2	1	1	1	0	2	2	1	3	4	4
India	0	1	2	2	5	1	2	2	1	2	2	3	3	3	4
Switzerland	3	2	4	7	4	8	4	2	4	3	3	5	4	3	4
Australia	3	2	2	2	2	3	3	5	3	5	2	2	3	3	3
Netherlands	2	4	3	1	3	2	7	3	7	6	4	4	3	5	3
Belgium	0	0	1	4	2	3	5	5	4	3	4	3	1	8	3
Poland	0	0	1	1	2	4	2	3	7	4	5	1	4	6	2

Note(s):
Priority patents are International Patent Documentation (INPADOC) patent families granted across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT). Locations are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families and patents counted according to the year of the first granted patent in the patent family. This category is based on the 2024 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. INPADOC patent families are counted according to the year of the first granted patent in the patent family. Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Because of data coverage issues for some patent offices in PATSTAT, statistics for a limited set of countries may be over- or underestimated partially for some years or across the whole trend. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PATSTAT, spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-28. USPTO utility patents granted in advanced nuclear technologies for the top 20 most-patenting regions, countries, or economies: 2010–24

(Number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	58	71	76	118	160	131	146	172	146	175	176	143	157	133	140
United States	27	37	37	60	77	71	77	90	84	108	107	85	94	82	90
China	0	0	0	1	0	3	2	2	2	6	10	2	5	8	11
South Korea	5	4	7	13	9	10	6	19	11	10	10	10	15	10	8
France	6	7	6	8	18	10	16	9	15	12	10	6	6	7	7
Canada	0	1	0	2	2	2	6	6	6	6	4	6	5	6	5
United Kingdom	0	1	1	0	1	2	2	3	4	3	4	4	6	5	5
Japan	11	14	13	23	32	20	23	26	11	15	11	13	6	4	4
Germany	4	2	4	6	7	6	5	8	6	5	4	5	4	0	3
Russia	1	1	1	0	0	1	1	2	2	4	9	4	7	5	3
Switzerland	0	0	0	1	1	0	2	0	2	0	0	0	0	1	2
Sweden	2	2	2	1	2	3	3	1	1	3	2	1	2	1	1
Denmark	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Australia	1	0	1	0	3	1	2	2	1	0	1	1	1	0	1
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	1	1	0	1	0	1	0	0	0	1	0	0	1	0
Poland	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Bahamas, The	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Algeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

USPTO = Patent and Trademark Office.

Note(s):
Utility patents are allocated to location based on the residence of the inventor. This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Fractional counts of patents were assigned to each technology field to assign the proper weight of a patent to the corresponding technological fields under the classification. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); PatentsView, USPTO, accessed March 2025.

Science and Engineering Indicators

Table STRN-29. Highly cited patents in advanced nuclear technologies for the top 20 most-patenting regions, countries, or economies: 2010–21

(Index number)

Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
China	2.33	2.20	2.27	2.62	2.72	2.41	1.95	2.00	1.39	1.84	1.70	1.10
South Korea	0.00	0.00	0.37	0.00	0.00	0.98	0.00	0.63	0.41	0.67	0.00	0.30
Japan	1.27	0.72	1.28	1.06	1.17	1.32	1.94	0.42	1.49	1.29	1.40	1.49
United States	4.89	4.91	4.86	3.17	2.74	2.53	4.03	0.89	3.23	2.70	2.30	2.86
France	0.00	0.00	1.01	0.00	1.83	0.00	0.91	0.00	0.86	0.00	0.00	0.00
Germany	0.00	1.47	0.00	1.32	1.47	1.01	0.93	1.03	0.99	1.92	1.16	1.25
United Kingdom	12.50	6.67	0.00	11.76	0.00	0.00	0.00	8.70	0.00	0.00	0.00	5.88
Canada	16.63	12.50	0.00	6.67	23.08	10.34	3.92	3.57	4.44	8.00	0.00	0.00
Taiwan	14.29	0.00	0.00	0.00	0.00	0.00	0.00	6.67	0.00	11.11	0.00	4.35
Sweden	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.38
Czechia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Italy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Denmark	0.00	0.00	25.00	na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.33
India	na	20.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Switzerland	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Australia	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.11	0.00	0.00
Netherlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Belgium	0.00	na	0.00	0.00	16.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Poland	0.00	na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

na = not applicable.

Note(s):
This category is based on the 2025 classification of key technology areas developed by the National Science Foundation Directorate for Technology, Innovation and Partnerships program and shown in Table STRN-12. Highly cited patents refer to priority patents cited in subsequent patent documents. The index number for citations within patent documents is calculated including all the years available following the reference year, including the reference year itself. For example, for 2010, citations in priority patents between 2010 and 2021, the last year with fully available data, are used in the calculation. The index number has been normalized for patent age, technology area, and patent office through the length of reference list from the citing priority patents. For information on the patent methodology, see https://www.science-metrix.com/patent-and-trademark-indicators-for-the-science-and-engineering-indicators-2026-technical-documentation/.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); Worldwide Patent Statistical Database (PATSTAT), spring 2025, accessed September 2025.

Science and Engineering Indicators

Table STRN-30. Registered USPTO trademarks, by region, country, or economy: 2000–24

(Number)

Region, country, or economy	Income status	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World	na	110,363	106,685	146,833	130,930	113,689	121,568	153,331	170,786	194,477	177,388	165,236	180,087	187,615	194,343	204,715	213,807	232,569	255,104	273,192	312,216	283,489	368,134	333,243	318,415	378,151
North America	na	97,796	94,574	127,356	110,130	95,461	102,848	128,679	143,111	162,958	147,603	137,791	151,684	157,570	162,103	170,977	175,745	182,529	189,955	192,594	218,109	190,889	184,570	178,139	185,586	218,695
Canada	High income	2,342	2,200	3,197	3,141	2,881	2,980	3,523	3,461	3,970	3,819	3,593	4,022	3,706	3,848	3,930	4,146	4,280	4,722	4,844	5,430	5,260	4,876	4,755	5,079	5,588
Mexico	Upper middle income	289	206	357	405	386	480	476	626	799	696	693	850	805	892	915	940	951	973	982	1,076	988	900	969	1,118	1,511
United States	High income	95,166	92,168	123,803	106,585	92,195	99,388	124,680	139,024	158,188	143,089	133,505	146,812	153,059	157,363	166,132	170,658	177,298	184,260	186,769	211,603	184,641	178,795	172,414	179,389	211,597
Central America and Caribbean	na	133	137	241	276	260	269	306	394	404	369	349	336	324	366	310	366	378	393	354	427	352	370	331	321	468
Antigua and Barbuda	High income	3	5	10	14	10	19	14	17	5	6	6	4	4	4	3	7	2	5	4	1	0	3	0	0	9
Bahamas, The	High income	16	16	56	61	57	36	39	43	53	32	36	51	43	55	41	44	27	39	29	53	41	21	19	22	28
Barbados	High income	35	48	61	67	72	84	72	96	98	79	61	80	61	44	45	53	53	45	38	37	19	36	39	31	45
Belize	Upper middle income	2	3	5	19	3	3	13	12	7	4	24	12	11	16	11	15	11	22	9	7	22	24	14	21	22
Costa Rica	Upper middle income	10	7	10	9	11	18	17	20	29	36	31	29	29	45	17	30	21	20	35	25	38	34	21	35	34
Cuba	Upper middle income	1	1	0	1	1	2	5	5	2	6	4	4	13	5	5	1	14	10	5	5	1	6	2	0	1
Dominica	Upper middle income	0	0	0	1	0	1	0	9	5	2	3	3	1	1	3	1	3	1	1	3	1	1	1	0	1
Dominican Republic	Upper middle income	20	20	13	12	24	20	23	24	27	27	31	42	24	37	22	34	45	63	52	57	53	37	45	46	69
El Salvador	Lower middle income	4	2	7	18	16	17	25	18	55	40	29	13	25	19	22	23	26	30	38	38	23	16	20	18	39
Grenada	Upper middle income	0	0	0	2	0	0	0	1	0	0	0	0	0	1	1	1	1	0	0	0	4	0	0	0	1
Guatemala	Upper middle income	7	7	11	18	8	3	20	21	20	24	12	8	11	20	12	24	17	19	19	36	25	36	21	26	35
Haiti	Lower middle income	0	1	0	3	0	1	2	0	2	0	2	1	1	1	1	2	2	0	0	2	5	1	0	0	6
Honduras	Lower middle income	3	1	1	1	0	1	0	4	5	11	5	4	4	2	2	5	3	4	3	11	13	10	11	9	12
Jamaica	Upper middle income	9	9	15	8	9	13	20	24	24	7	20	10	12	19	13	11	26	21	15	12	13	8	30	11	24
Nicaragua	Lower middle income	2	0	3	2	1	3	2	3	5	3	4	5	9	10	8	3	5	16	9	13	0	2	1	7	3
Panama	High income	10	6	37	26	21	32	33	62	45	51	57	53	54	69	81	87	89	66	65	86	67	83	81	68	94
Saint Kitts and Nevis	High income	0	0	2	1	1	3	9	12	9	21	10	6	14	7	8	11	15	7	15	18	13	28	19	9	18
Saint Lucia	Upper middle income	9	5	5	4	7	4	4	12	6	18	8	11	7	5	8	8	12	15	6	11	6	7	2	10	9
Saint Vincent and the Grenadines	Upper middle income	0	0	3	1	0	2	1	5	2	0	0	0	1	1	3	1	2	1	4	2	5	1	0	1	1
Trinidad and Tobago	High income	2	6	2	9	19	7	7	6	5	2	7	0	1	5	4	5	4	10	7	10	3	16	5	8	17
South America	na	186	182	377	508	481	459	574	583	692	594	589	564	640	640	658	712	755	826	863	963	842	790	790	904	1,224
Argentina	Upper middle income	42	33	76	112	108	89	122	142	158	127	142	141	127	149	107	108	125	112	142	127	112	119	134	154	166
Bolivia	Lower middle income	0	0	0	2	0	2	1	1	2	4	6	1	2	2	3	1	2	1	3	8	4	0	5	3	3
Brazil	Upper middle income	66	51	130	150	151	149	184	184	204	196	179	151	204	206	253	284	276	325	328	372	332	303	250	283	434
Chile	High income	29	39	72	112	84	101	106	94	112	94	88	106	107	93	108	93	127	124	120	131	113	151	142	146	196
Colombia	Upper middle income	20	33	38	56	60	63	85	82	113	82	97	68	105	112	103	111	130	144	143	172	160	102	144	206	268
Ecuador	Upper middle income	16	5	11	15	10	4	13	15	19	11	16	18	19	19	16	13	17	30	24	38	28	32	21	34	41
Guyana	Upper middle income	1	0	1	5	1	1	2	3	2	4	0	0	1	2	4	4	2	1	3	0	1	0	1	3	2
Paraguay	Upper middle income	1	2	0	1	1	4	5	3	4	2	5	5	2	3	2	3	4	1	7	3	3	2	3	2	1
Peru	Upper middle income	1	4	6	19	17	11	15	28	41	34	16	30	33	26	24	37	26	40	33	62	41	44	62	43	49
Suriname	Upper middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	4
Uruguay	High income	0	2	13	8	15	26	22	16	17	21	20	24	14	14	23	22	20	22	31	25	25	22	24	24	42

Table STRN-30. Registered USPTO trademarks, by region, country, or economy: 2000–24

(Number)

Region, country, or economy	Income status	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Venezuela	Not classified	10	13	31	28	34	10	19	15	21	20	20	22	26	14	16	36	28	27	29	26	23	15	5	6	19
Europe	na	7,919	7,838	13,188	13,881	11,756	12,161	16,457	18,218	20,468	19,635	17,736	18,035	18,692	19,623	19,985	20,939	23,317	23,433	25,246	26,947	24,748	22,137	20,724	23,205	29,696
EU-27 + United Kingdom	na	6,960	6,973	11,633	12,162	10,306	10,544	14,233	15,696	17,687	17,049	15,478	15,594	16,139	16,994	17,194	17,898	20,115	20,439	21,828	22,960	20,928	18,716	17,554	19,773	25,501
United Kingdom	High income	1,474	1,487	2,326	2,521	2,309	2,224	2,741	2,984	3,509	3,590	3,500	3,337	3,435	3,833	4,044	4,344	4,861	5,127	5,227	5,419	4,999	4,845	4,755	5,245	6,560
EU-27[a]	na	5,486	5,486	9,307	9,641	7,998	8,320	11,492	12,712	14,177	13,460	11,978	12,257	12,704	13,160	13,151	13,554	15,254	15,312	16,601	17,541	15,929	13,872	12,799	14,528	18,941
Austria	High income	131	97	224	265	188	205	289	313	367	357	316	328	353	365	376	394	460	449	432	526	448	429	352	419	460
Belgium	High income	125	133	278	246	195	213	308	346	368	354	343	322	333	393	400	322	423	450	564	548	448	406	373	475	639
Bulgaria	Upper middle income	2	3	5	3	4	17	28	53	31	30	24	24	25	39	56	77	73	67	96	98	133	116	122	125	201
Croatia	High income	1	0	2	3	2	6	9	11	16	9	7	12	7	14	10	16	17	16	27	20	23	34	35	22	54
Cyprus	High income	14	10	22	30	25	19	41	35	73	76	64	97	130	134	138	153	121	169	182	164	182	187	185	217	307
Czechia	High income	14	19	24	23	24	14	38	55	66	76	67	79	109	119	105	100	131	148	154	147	157	120	85	99	166
Denmark	High income	135	156	219	265	217	240	348	362	404	420	402	350	375	391	399	432	541	506	503	565	490	450	494	502	648
Estonia	High income	0	1	3	5	5	4	9	9	16	9	10	19	24	23	41	33	51	45	67	77	89	87	87	135	134
Finland	High income	93	102	191	189	135	162	158	221	213	211	203	225	219	235	238	238	332	320	395	358	365	346	291	300	376
France	High income	1,169	1,124	1,775	1,875	1,478	1,457	2,035	2,209	2,403	2,257	2,174	2,212	2,168	2,365	2,306	2,241	2,409	2,543	2,706	2,670	2,468	2,003	1,861	2,162	2,920
Germany	High income	1,780	1,768	3,147	3,304	2,821	2,862	3,821	3,996	4,474	4,384	3,700	3,631	3,646	3,702	3,548	3,599	3,957	4,072	4,191	4,573	4,067	3,615	3,244	3,594	4,488
Greece	High income	12	4	16	18	18	14	32	38	58	54	38	38	73	55	53	61	75	68	76	88	72	59	59	67	91
Hungary	High income	6	16	16	16	10	16	27	21	32	26	38	27	39	49	40	46	36	46	60	62	63	30	44	51	92
Ireland	High income	108	148	203	191	198	170	223	255	329	287	260	308	303	333	319	440	476	434	515	496	472	451	473	495	483
Italy	High income	772	674	1,158	1,142	951	1,051	1,640	1,955	2,155	1,826	1,536	1,723	1,726	1,810	1,860	1,899	2,035	2,067	2,247	2,504	2,157	1,861	1,617	1,812	2,511
Latvia	High income	2	1	2	2	3	3	7	15	13	8	11	20	8	18	16	24	19	30	48	53	37	48	35	38	49
Lithuania	High income	0	0	2	4	2	3	2	6	6	11	5	10	18	16	27	24	26	47	46	82	63	56	82	82	154
Luxembourg	High income	74	75	111	121	99	129	168	256	243	238	266	251	291	256	277	244	306	282	264	235	221	168	168	173	213
Malta	High income	1	4	9	4	11	7	19	17	27	22	31	24	47	54	67	174	131	127	155	140	180	116	140	191	310
Netherlands	High income	421	441	755	764	585	675	850	949	978	1,040	868	902	955	845	952	924	1,126	1,033	1,228	1,272	1,152	1,016	861	1,092	1,340
Poland	High income	12	13	23	26	33	43	64	76	98	96	73	77	102	102	135	153	189	164	219	200	186	182	198	227	316
Portugal	High income	43	29	56	60	48	57	69	92	154	131	119	121	96	112	147	187	209	164	194	188	174	114	116	157	227
Romania	High income	0	2	1	9	2	6	24	11	11	22	10	16	16	27	29	36	57	57	205	193	132	139	118	132	118
Slovakia	High income	2	2	2	3	12	4	14	14	13	23	15	8	20	19	32	33	31	46	46	43	41	41	38	32	66
Slovenia	High income	3	6	5	7	6	3	13	14	20	27	14	27	36	27	22	26	36	35	56	57	59	52	43	45	56
Spain	High income	277	308	543	548	478	514	762	846	962	840	785	820	910	961	931	1,005	1,196	1,117	1,066	1,211	1,187	975	933	985	1,457
Sweden	High income	290	350	517	520	450	428	496	540	650	630	601	588	679	698	631	674	795	813	861	975	868	774	744	904	1,067
Other Europe	na	959	865	1,556	1,719	1,450	1,617	2,224	2,523	2,781	2,586	2,258	2,441	2,553	2,629	2,791	3,041	3,202	2,994	3,418	3,987	3,820	3,421	3,170	3,432	4,195
Other Europe-2020[a]	na	2,433	2,352	3,881	4,240	3,758	3,841	4,965	5,506	6,290	6,176	5,758	5,778	5,987	6,463	6,835	7,386	8,063	8,121	8,645	9,406	8,819	8,265	7,925	8,677	10,755
Albania	Upper middle income	1	0	0	0	0	1	1	2	1	0	0	0	1	0	1	4	1	2	2	6	7	4	7	1	3
Andorra	High income	2	0	1	0	2	3	0	3	1	0	4	5	3	8	0	3	1	7	6	5	8	2	5	21	9
Belarus	Upper middle income	0	0	0	0	0	3	1	2	6	9	4	15	10	18	11	9	15	12	19	30	45	38	39	30	26
Bosnia and Herzegovina	Upper middle income	0	0	0	0	0	0	0	1	2	1	0	0	0	0	1	2	1	2	1	1	0	3	9	13	2

Table STRN-30. Registered USPTO trademarks, by region, country, or economy: 2000–24

(Number)

Region, country, or economy	Income status	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Holy See (Vatican City)	Not classified	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0
Iceland	High income	9	12	18	19	23	20	27	32	45	29	26	18	25	28	25	23	43	29	30	35	48	32	25	36	46
Liechtenstein	High income	23	26	36	36	38	49	55	51	83	76	48	40	46	57	60	47	70	44	51	55	41	46	36	34	48
Moldova	Upper middle income	0	0	1	0	0	4	14	3	9	1	4	1	4	1	7	8	4	9	6	16	10	16	10	16	16
Monaco	High income	19	18	27	27	24	23	30	29	31	28	27	34	38	35	34	45	43	34	38	44	39	38	37	44	38
Montenegro	Upper middle income	0	0	0	0	0	0	1	0	0	1	0	1	1	2	0	0	1	0	4	0	2	0	0	1	0
North Macedonia	Upper middle income	0	0	1	0	1	0	0	2	5	1	0	3	2	6	6	6	1	5	5	6	10	2	2	5	14
Norway	High income	70	56	125	113	73	64	112	163	185	179	197	182	169	187	189	183	204	199	247	302	229	232	198	245	308
Russia	Upper middle income	16	14	25	51	41	49	121	114	135	135	126	188	245	228	258	240	215	228	318	386	384	372	270	164	135
San Marino	High income	2	1	1	1	0	2	1	3	3	4	2	4	3	3	6	2	12	10	4	10	2	5	3	6	5
Serbia	Upper middle income	0	1	0	0	0	1	2	4	3	4	7	4	7	7	9	15	12	10	22	27	14	16	11	20	25
Serbia and Montenegro	Not classified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Switzerland	High income	808	716	1,275	1,414	1,201	1,321	1,682	1,913	2,060	1,936	1,636	1,759	1,756	1,768	1,825	2,133	2,134	1,983	2,092	2,258	2,222	1,856	1,782	1,944	2,287
Turkey	Upper middle income	9	20	41	55	44	71	158	174	193	163	152	158	209	258	301	275	375	337	383	544	478	501	466	608	960
Ukraine	Lower middle income	0	1	5	3	3	6	20	26	21	19	25	29	34	24	59	46	71	85	191	262	280	258	271	245	275
Asia	na	2,550	2,596	3,740	4,255	4,024	4,326	5,401	6,371	7,395	6,783	6,529	7,131	7,913	9,027	9,931	12,934	21,865	36,653	49,618	60,364	61,432	155,431	128,628	103,610	122,555
Afghanistan	Low income	0	0	0	0	0	0	0	1	2	1	0	3	1	2	3	3	1	0	0	1	0	0	1	0	1
Bangladesh	Lower middle income	2	1	2	2	1	0	0	0	2	1	1	0	2	1	3	2	0	2	16	11	9	7	11	7	22
Brunei	High income	4	1	0	0	0	0	1	1	5	5	4	4	1	5	1	3	0	6	5	1	0	0	0	1	1
Burma	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cambodia	Lower middle income	0	1	0	0	0	1	0	3	0	3	2	2	0	0	2	2	0	1	1	4	3	5	9	2	2
China	Upper middle income	445	423	685	822	731	819	1,302	1,817	2,208	2,051	1,969	2,478	2,815	3,326	4,044	6,467	15,033	29,195	41,699	51,034	52,126	146,232	119,622	93,865	109,971
India	Lower middle income	47	72	62	91	95	88	116	134	163	181	186	194	219	227	246	310	338	412	479	659	644	562	579	594	835
Indonesia	Lower middle income	10	16	13	26	16	11	20	22	23	27	28	30	31	39	37	35	33	26	27	45	36	52	37	38	55
Japan	High income	1,192	1,236	1,729	1,973	1,862	2,001	2,358	2,487	2,731	2,523	2,341	2,215	2,286	2,790	2,687	2,776	2,903	2,844	2,960	3,376	3,256	3,042	2,702	2,937	3,593
Kazakhstan	Upper middle income	0	0	0	0	0	1	1	0	1	0	0	0	1	0	1	6	2	6	5	16	9	8	6	10	14
Kyrgyzstan	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	1	1	1	1	0	2	17
Laos	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	0	0	0
Malaysia	Upper middle income	19	18	21	28	29	21	47	49	57	48	76	63	54	51	48	55	58	60	112	81	91	88	129	87	130
Nepal	Lower middle income	0	0	0	3	1	0	0	0	0	0	0	2	1	0	3	1	0	2	0	1	0	1	1	3	3
North Korea	Low income	2	1	2	8	5	2	1	5	3	6	3	6	7	6	1	4	1	1	0	2	1	2	0	0	0
Pakistan	Lower middle income	0	1	3	2	5	5	4	12	11	11	10	10	6	9	14	28	20	20	21	22	31	22	35	69	90
Papua New Guinea	Lower middle income	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philippines	Lower middle income	9	4	6	23	16	11	32	28	29	34	32	44	24	35	50	49	48	39	69	67	31	38	59	44	55
Singapore	High income	85	97	138	125	148	125	160	213	265	227	262	260	331	376	343	386	469	520	598	671	695	837	797	888	1,324
South Korea	High income	176	203	277	399	387	386	427	590	747	736	740	904	1,116	1,134	1,378	1,705	1,838	2,426	2,340	2,881	3,003	3,142	3,202	3,239	4,238
Sri Lanka	Lower middle income	2	3	7	5	3	5	11	8	9	16	16	16	10	9	13	16	15	10	29	19	15	14	15	19	11
Taiwan	High income	523	495	739	669	633	751	823	896	1,037	810	758	830	876	908	912	966	969	921	1,027	1,163	1,042	1,008	892	1,045	1,271

Table STRN-30. Registered USPTO trademarks, by region, country, or economy: 2000–24

(Number)

Region, country, or economy	Income status	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Tajikistan	Lower middle income	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Thailand	Upper middle income	28	25	51	51	61	54	61	75	60	75	62	43	87	66	101	66	76	83	112	173	199	137	146	154	187
Uzbekistan	Lower middle income	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	4
Vietnam	Lower middle income	6	0	5	27	32	46	38	32	43	28	41	28	46	44	46	53	59	81	118	136	239	235	387	606	731
Middle East	na	185	218	362	355	275	279	310	359	445	429	459	519	616	604	655	811	938	964	1,225	1,363	1,322	1,184	1,045	1,148	1,510
Armenia	Upper middle income	0	1	8	4	1	2	3	5	8	1	2	18	10	13	13	9	10	13	23	15	20	36	23	24	42
Azerbaijan	Upper middle income	0	0	0	0	0	0	0	0	1	0	0	0	2	2	0	1	2	3	1	6	7	3	6	4	13
Bahrain	High income	1	1	2	1	6	4	1	2	2	4	8	15	7	7	6	7	7	4	3	9	10	5	6	11	17
Georgia	Upper middle income	3	1	2	5	2	0	6	1	6	4	9	11	9	10	13	8	13	8	14	15	20	9	10	11	30
Iran	Lower middle income	2	1	0	1	0	1	2	2	3	1	3	2	4	5	2	6	13	15	12	8	0	3	3	3	0
Iraq	Upper middle income	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	3	0	4	0	0	2	0	1	1
Israel	High income	162	191	313	312	225	214	245	283	344	306	332	328	434	412	422	532	585	623	897	1,021	953	850	735	771	900
Jordan	Upper middle income	1	4	6	1	5	9	2	2	2	14	7	20	11	9	17	22	25	22	26	16	26	25	22	31	23
Kuwait	High income	2	1	3	0	3	1	0	2	6	5	5	5	8	9	12	10	9	9	13	15	23	19	17	10	9
Lebanon	Lower middle income	4	1	5	2	10	4	8	6	7	5	12	17	15	15	29	22	35	30	27	29	20	8	7	9	18
Oman	High income	0	0	0	0	1	1	1	1	1	1	1	5	2	0	0	1	1	1	7	5	5	6	9	6	11
Qatar	High income	0	0	0	0	1	0	2	0	9	6	8	5	2	7	13	23	18	19	13	12	19	9	8	13	17
Saudi Arabia	High income	2	5	5	10	2	10	9	15	9	16	12	18	31	34	25	34	52	35	38	46	39	29	30	40	84
Syria	Low income	0	0	1	0	0	2	1	2	1	1	2	5	1	0	1	2	2	5	6	4	1	6	3	3	6
United Arab Emirates	High income	8	12	17	19	19	31	30	37	44	64	58	68	79	80	102	132	163	177	141	159	175	172	165	208	338
Yemen	Low income	0	0	0	0	0	0	1	1	2	1	1	1	1	1	1	0	0	0	1	4	5	2	2	4	2
Africa	na	52	59	98	161	104	110	120	127	161	160	163	169	151	193	218	229	188	171	250	268	205	199	193	207	225
Algeria	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	1	1	1	2	2	1	1
Angola	Lower middle income	1	3	1	0	0	0	1	0	0	0	0	5	1	1	0	2	0	0	0	1	0	0	1	0	2
Benin	Lower middle income	0	2	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1
Burkina Faso	Low income	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Cameroon	Lower middle income	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	3	1	0	0	0	0	3
Chad	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
Congo, Democratic Republic of the	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Congo, Republic of the	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Côte d'Ivoire	Lower middle income	0	0	1	0	1	1	0	0	1	1	0	0	0	2	0	4	2	2	0	0	0	2	2	0	0
Djibouti	Lower middle income	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egypt	Lower middle income	2	1	2	4	1	4	7	7	3	10	2	8	14	8	12	17	14	3	6	14	10	14	6	14	20
Eritrea	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eswatini	Lower middle income	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1	1	0	2	0	1	0	1	0	0
Ethiopia	Low income	0	0	0	1	0	0	1	0	3	0	1	1	0	0	1	0	0	1	1	1	1	0	1	2	0
Gabon	Upper middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gambia, The	Low income	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Table STRN-30. Registered USPTO trademarks, by region, country, or economy: 2000–24

(Number)

Region, country, or economy	Income status	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ghana	Lower middle income	0	0	1	0	0	0	0	0	2	0	0	1	0	1	3	5	0	0	1	2	2	3	1	2	2
Guinea	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Kenya	Lower middle income	1	0	4	3	6	0	2	5	5	2	4	1	2	5	3	3	5	7	0	6	4	7	1	4	1
Liberia	Low income	3	0	1	1	0	0	1	0	0	2	0	0	1	1	1	0	5	0	0	0	1	0	3	6	2
Libya	Upper middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Madagascar	Low income	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0
Mali	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Mauritius	Upper middle income	3	4	10	15	9	17	8	13	14	20	13	9	23	15	27	16	22	18	11	19	24	16	24	21	15
Morocco	Lower middle income	2	2	1	0	1	0	2	3	1	8	10	9	3	10	11	15	13	13	45	25	25	17	21	27	26
Namibia	Upper middle income	0	1	0	2	0	0	0	0	1	2	1	0	1	3	0	1	0	0	0	3	1	0	8	1	0
Niger	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Nigeria	Lower middle income	0	0	2	1	0	0	1	0	2	0	1	3	1	2	5	1	3	4	8	6	1	6	7	8	5
Rwanda	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1
Senegal	Lower middle income	0	0	0	1	0	0	0	0	1	1	1	2	2	0	0	1	0	0	0	1	0	1	0	0	0
Seychelles	High income	3	1	1	5	5	1	4	7	21	7	12	12	9	14	10	20	17	27	15	27	33	15	17	13	20
Sierra Leone	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
South Africa	Upper middle income	37	44	72	124	69	84	90	91	105	97	113	109	88	123	126	131	99	90	105	120	99	106	92	100	100
Tanzania	Lower middle income	0	0	0	0	0	0	0	0	0	1	0	1	1	0	3	0	0	0	0	5	0	0	1	0	3
Togo	Low income	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0
Tunisia	Lower middle income	0	1	0	1	10	2	1	1	1	4	2	5	3	2	13	8	3	6	47	32	2	5	2	5	17
Uganda	Low income	0	0	0	0	1	0	0	0	0	3	1	0	1	1	0	2	0	0	2	2	0	1	0	1	3
Zambia	Low income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Zimbabwe	Lower middle income	0	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2	0	0	1	0	0	0
Australia and Oceania	na	491	487	839	955	825	891	1,250	1,389	1,734	1,621	1,476	1,472	1,531	1,605	1,791	1,892	2,341	2,429	2,763	3,391	3,372	3,072	2,758	2,846	3,259
Australia	High income	391	403	722	768	655	744	1,044	1,166	1,434	1,359	1,209	1,218	1,307	1,382	1,463	1,573	1,959	2,054	2,345	2,864	2,850	2,547	2,367	2,375	2,738
Cook Islands	Not classified	1	0	0	8	13	2	2	1	2	5	1	0	5	0	1	0	1	0	1	0	0	4	1	1	0
Fiji	Upper middle income	1	0	0	4	1	0	2	3	1	1	0	5	2	0	7	2	4	0	4	2	1	3	3	0	3
Kiribati	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marshall Islands	Upper middle income	0	0	2	2	0	2	2	2	1	5	10	0	3	9	13	4	13	10	16	13	18	5	2	10	10
Nauru	High income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Zealand	High income	97	81	114	172	154	141	196	210	285	240	246	242	209	206	298	309	353	363	392	503	492	505	382	437	500
Palau	Upper middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Samoa	Lower middle income	1	1	0	1	1	2	3	7	7	12	10	8	5	9	9	4	9	3	5	10	11	7	2	23	7
Solomon Islands	Lower middle income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	Lower middle income	0	2	1	0	1	0	1	0	3	0	0	0	0	0	1	0	1	0	1	0	0	2	1	0	0
Unclassified	na	1,052	597	633	410	504	225	235	234	222	194	145	177	180	183	191	181	258	281	279	384	327	382	636	589	520

na = not applicable; metric not calculated at this level.

EU-27 = European Union; USPTO = Patent and Trademark Office.

[a] Beginning in 2020, the United Kingdom was no longer a member of the EU.

Note(s):
Trademarks are allocated according to holder information. Trademarks are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named holders. China includes Hong Kong. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); USPTO data hosted by Reed Tech (LexisNexis), accessed March 2025.

Science and Engineering Indicators

Table STRN-31. Nice Classifications in trademark data, by business sector: 2000–24

(Classification number and description)

Business sector	Abbreviation (if applicable)	Nice Classification number	Class description
Agricultural products and services	Agriculture		
		29	Meat, fish, poultry, and game; meat extracts; preserved, frozen, dried, and cooked fruits and vegetables; jellies, jams, compotes; eggs; milk, cheese, butter, yogurt, and other milk products; oils and fats for food.
		30	Coffee, tea, cocoa, and artificial coffee; rice, pasta, and noodles; tapioca and sago; flour and preparations made from cereals; bread, pastries, and confectionery; chocolate; ice cream, sorbets, and other edible ices; sugar, honey, treacle; yeast, baking powder; salt, seasonings, spices, preserved herbs; vinegar, sauces, and other condiments; ice (frozen water).
		31	Raw and unprocessed agricultural, aquacultural, horticultural, and forestry products; raw and unprocessed grains and seeds; fresh fruits and vegetables, fresh herbs; natural plants and flowers; bulbs, seedlings, and seeds for planting; live animals; foodstuffs and beverages for animals; malt.
		32	Beers; non-alcoholic beverages; mineral and aerated waters; fruit beverages and fruit juices; syrups and other non-alcoholic preparations for making beverages.
		33	Alcoholic beverages, except beers; alcoholic preparations for making beverages.
		43	Services for providing food and drink; temporary accommodation.
Chemicals	na		
		1	Chemicals for use in industry, science, and photography, as well as in agriculture, horticulture, and forestry; unprocessed artificial resins, unprocessed plastics; fire extinguishing and fire prevention compositions; tempering and soldering preparations; substances for tanning animal skins and hides; adhesives for use in industry; putties and other paste fillers; compost, manures, fertilizers; biological preparations for use in industry and science.
		2	Paints, varnishes, lacquers; preservatives against rust and against deterioration of wood; colorants, dyes; inks for printing, marking, and engraving; raw natural resins; metals in foil and powder form for use in painting, decorating, printing, and art.
		4	Industrial oils and greases, wax; lubricants; dust-absorbing, wetting, and binding compositions; fuels and illuminants; candles and wicks for lighting.
Construction and infrastructure	Construction		
		6	Common metals and their alloys, ores; metal materials for building and construction; transportable buildings of metal; non-electric cables and wires of common metal; small items of metal hardware; metal containers for storage or transport; safes.
		17	Unprocessed and semi-processed rubber, gutta-percha, gum, asbestos, mica, and substitutes for all these materials; plastics and resins in extruded form for use in manufacture; packing, stopping, and insulating materials; flexible pipes, tubes, and hoses, not of metal.
		19	Materials, not of metal, for building and construction; rigid pipes, not of metal, for building; asphalt, pitch, tar, and bitumen; transportable buildings, not of metal; monuments, not of metal.
		37	Building construction; repair; installation services.
		40	Treatment of materials.
Household equipment	na		
		8	Hand tools and implements, hand-operated; cutlery; side arms, except firearms; razors.
		11	Apparatus and installations for lighting, heating, cooling, steam generating, cooking, drying, ventilating, water supply, and sanitary purposes.
		20	Furniture, mirrors, picture frames; containers, not of metal, for storage or transport; unworked or semi-worked bone, horn, whalebone, or mother-of-pearl; shells; meerschaum; yellow amber.
		21	Household or kitchen utensils and containers; cookware and tableware, except forks, knives, and spoons; combs and sponges; brushes, except paintbrushes; brush-making materials; articles for cleaning purposes; unworked or semi-worked glass, except building glass; glassware, porcelain, and earthenware.
Leisure, education, and training	Leisure and education		

Table STRN-31. Nice Classifications in trademark data, by business sector: 2000–24

(Classification number and description)

Business sector	Abbreviation (if applicable)	Nice Classification number	Class description
		13	Firearms; ammunition and projectiles; explosives; fireworks.
		15	Musical instruments; music stands and stands for musical instruments; conductors' batons.
		16	Paper and cardboard; printed matter; bookbinding material; photographs; stationery and office requisites, except furniture; adhesives for stationery or household purposes; drawing materials and materials for artists; paintbrushes; instructional and teaching materials; plastic sheets, films, and bags for wrapping and packaging; printers' type, printing blocks.
		28	Games, toys, and playthings; video game apparatus; gymnastic and sporting articles; decorations for Christmas trees.
		41	Education; providing of training; entertainment; sporting and cultural activities.
Management, communications, real estate, and financial services	Business services		
		35	Advertising; business management; business administration; office functions.
		36	Insurance; financial affairs; monetary affairs; real estate affairs.
Pharmaceuticals, health, and cosmetics	Health		
		3	Non-medicated cosmetics and toiletry preparations; non-medicated dentifrices; perfumery, essential oils; bleaching preparations and other substances for laundry use; cleaning, polishing, scouring, and abrasive preparations.
		5	Pharmaceuticals, medical, and veterinary preparations; sanitary preparations for medical purposes; dietetic food and substances adapted for medical or veterinary use, food for babies; dietary supplements for human beings and animals; plasters, materials for dressings; material for stopping teeth, dental wax; disinfectants; preparations for destroying vermin; fungicides, herbicides.
		10	Surgical, medical, dental, and veterinary apparatus and instruments; artificial limbs, eyes, and teeth; orthopedic articles; suture materials; therapeutic and assistive devices adapted for the disabled; massage apparatus; apparatus, devices, and articles for nursing infants; sexual activity apparatus, devices, and articles.
		44	Medical services; veterinary services; hygienic and beauty care for human beings or animals; agriculture, horticulture, and forestry services.
Scientific research, information, and communication technology	Research and technology		
		9	Scientific, research, navigation, surveying, photographic, cinematographic, audiovisual, optical, weighing, measuring, signaling, detecting, testing, inspecting, life-saving, and teaching apparatus and instruments; apparatus and instruments for conducting, switching, transforming, accumulating, regulating, or controlling the distribution or use of electricity; apparatus and instruments for recording, transmitting, reproducing, or processing sound, images, or data; recorded and downloadable media, computer software, blank digital or analogue recording and storage media; mechanisms for coin-operated apparatus; cash registers, calculating devices; computers and computer peripheral devices; diving suits, divers' masks, ear plugs for divers, nose clips for divers and swimmers, gloves for divers, breathing apparatus for underwater swimming; fire-extinguishing apparatus.
		38	Telecommunications.
		42	Scientific and technological services and research and design relating thereto; industrial analysis and industrial research services; design and development of computer hardware and software.
		45	Legal services; security services for the physical protection of tangible property and individuals; personal and social services rendered by others to meet the needs of individuals.
Textiles – clothing and accessories	Clothing		

Table STRN-31. Nice Classifications in trademark data, by business sector: 2000–24

(Classification number and description)

Business sector	Abbreviation (if applicable)	Nice Classification number	Class description
		14	Precious metals and their alloys; jewelry, precious and semi-precious stones; horological and chronometric instruments.
		18	Leather and imitations of leather; animal skins and hides; luggage and carrying bags; umbrellas and parasols; walking sticks; whips, harnesses, and saddlery; collars, leashes, and clothing for animals.
		22	Ropes and string; nets; tents and tarpaulins; awnings of textile or synthetic materials; sails; sacks for the transport and storage of materials in bulk; padding, cushioning, and stuffing materials, except of paper, cardboard, rubber, or plastics; raw fibrous textile materials and substitutes therefor.
		23	Yarns and threads for textile use.
		24	Textiles and substitutes for textiles; household linen; curtains of textile or plastic.
		25	Clothing, footwear, headwear.
		26	Lace, braid and embroidery, and haberdashery ribbons and bows; buttons, hooks and eyes, pins and needles; artificial flowers; hair decorations; false hair.
		27	Carpets, rugs, mats and matting, linoleum, and other materials for covering existing floors; wall hangings, not of textile.
		34	Tobacco and tobacco substitutes; cigarettes and cigars; electronic cigarettes and oral vaporizers for smokers; smokers' articles; matches.
Transportation and logistics	Transportation		

na = not applicable.

Note(s):
Trademarks are classified under the 11th edition of the Nice Classification (NCL) of goods and services, which classifies trademarks under 34 categories of goods and 11 categories of services. Business sectors based on class groups are those defined by Edital.

Source(s):
World Intellectual Property Organization, NCL, https://www.wipo.int/classifications/nice/en/.

Science and Engineering Indicators

Table STRN-32. U.S.-registered USPTO trademarks, by Nice Classification: 2000–24

(Number)

Nice class	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
All classifications	95,166	92,168	123,803	106,585	92,195	99,388	124,680	139,024	158,188	143,089	133,505	146,812	153,059	157,363	166,132	170,658	177,298	184,260	186,769	211,603	184,641	178,795	172,414	179,389	211,597
1	1,276	1,259	1,709	1,529	1,295	1,338	1,500	1,600	1,749	1,550	1,521	1,741	1,666	1,714	1,783	1,920	1,729	1,775	1,825	1,847	1,700	1,562	1,628	1,523	1,773
2	395	425	520	488	391	512	587	571	549	513	453	520	482	479	488	586	520	503	468	555	466	442	424	438	458
3	2,445	2,438	3,111	3,025	2,691	2,903	3,966	4,110	4,544	4,278	3,672	4,344	4,278	4,572	4,808	5,081	5,268	5,548	6,242	7,330	6,876	7,371	6,639	6,257	6,782
4	377	375	506	450	329	467	464	527	487	513	501	605	569	537	561	563	617	661	655	728	763	946	1,028	960	992
5	2,841	3,121	3,584	3,411	3,073	3,155	3,989	4,247	4,791	4,217	4,185	4,420	4,677	4,590	5,019	4,932	5,078	5,288	6,016	6,963	6,400	6,535	5,557	5,485	6,165
6	1,015	901	1,231	1,034	961	934	1,104	1,311	1,371	1,161	1,180	1,211	1,174	1,082	1,226	1,216	1,210	1,264	1,248	1,444	1,246	1,123	1,055	1,069	1,379
7	1,889	1,745	2,228	1,757	1,531	1,610	1,812	2,045	2,244	2,111	1,755	1,842	1,759	1,856	1,927	1,840	1,993	2,071	2,062	2,282	1,890	1,779	1,653	1,653	2,065
8	513	548	628	597	496	627	704	810	778	698	598	718	731	700	829	799	917	1,062	1,113	1,227	1,036	1,096	975	1,034	1,155
9	12,452	11,765	15,759	13,711	11,079	11,518	13,281	13,954	15,581	13,521	12,679	13,916	14,605	14,850	15,812	15,959	16,087	15,910	15,362	16,532	13,924	13,090	11,911	12,295	13,929
10	1,313	1,629	2,047	1,903	1,640	1,772	1,970	2,160	2,403	2,235	2,154	2,331	2,469	2,391	2,513	2,452	2,451	2,693	2,863	3,240	3,030	3,394	2,727	2,631	2,837
11	1,480	1,443	2,004	1,771	1,489	1,618	1,975	2,241	2,369	2,165	1,974	2,068	2,153	2,095	2,253	2,459	2,556	2,747	2,870	3,265	2,601	2,747	2,408	2,338	2,705
12	1,189	1,223	1,537	1,283	1,230	1,327	1,634	1,700	1,783	1,553	1,427	1,558	1,418	1,516	1,580	1,626	1,853	1,899	1,972	1,996	1,789	1,623	1,587	1,610	1,954
13	163	209	223	183	192	231	336	337	407	384	417	398	426	427	512	579	644	623	766	676	597	491	447	554	697
14	927	819	1,068	978	916	1,073	1,389	1,570	1,717	1,583	1,543	1,791	1,902	1,965	2,080	2,012	2,075	2,086	2,039	2,364	1,917	1,743	1,687	1,737	2,104
15	215	181	260	211	164	206	271	302	292	256	286	307	269	318	367	315	293	318	283	308	272	239	252	232	269
16	6,386	5,653	6,926	6,049	5,205	5,614	6,670	6,973	7,634	6,306	5,230	5,626	5,258	5,118	4,799	4,676	4,736	4,669	4,768	5,548	4,638	4,449	4,123	4,310	4,974
17	572	483	662	662	538	524	590	647	739	673	627	656	602	607	628	630	649	686	685	761	547	605	471	493	654
18	624	550	821	743	701	825	1,055	1,174	1,474	1,378	1,265	1,352	1,432	1,458	1,418	1,589	1,596	1,764	1,961	2,229	1,822	1,690	1,533	1,772	2,001
19	825	853	1,164	1,024	926	991	1,293	1,386	1,539	1,291	1,133	1,095	1,106	1,082	1,023	1,078	1,132	1,137	1,128	1,312	1,089	1,027	902	989	1,183
20	1,637	1,389	1,834	1,761	1,582	1,633	1,794	1,993	2,289	1,856	1,752	1,969	1,998	2,069	1,991	2,129	2,125	2,478	2,838	3,264	2,720	2,700	2,382	2,296	2,950
21	1,256	1,025	1,452	1,339	1,224	1,390	1,435	1,588	1,771	1,701	1,589	1,879	1,847	2,098	2,160	2,412	2,626	3,048	3,454	3,916	3,368	3,597	3,532	3,514	4,133
22	146	156	174	204	177	209	220	235	249	226	216	230	262	248	239	263	300	377	383	384	399	374	342	296	354
23	30	29	32	37	44	32	88	66	55	51	44	54	64	76	75	75	78	84	84	98	46	52	47	42	68
24	515	418	634	609	550	593	668	730	921	771	725	767	783	836	917	930	950	1,117	1,386	1,439	1,267	1,245	1,194	1,125	1,243
25	4,921	3,989	5,223	4,733	4,666	5,579	6,966	8,115	9,334	8,897	8,738	9,884	10,433	11,265	12,342	12,830	13,301	14,187	14,756	16,458	14,940	15,859	14,734	14,434	15,605
26	231	169	212	228	196	201	274	310	343	331	354	392	439	454	463	431	524	500	631	729	616	629	597	585	685
27	305	263	291	293	231	241	254	290	368	308	246	260	239	282	310	298	320	365	498	565	425	448	381	411	413
28	3,316	3,309	3,997	3,506	3,411	3,367	4,276	4,039	4,377	3,791	3,593	3,842	3,894	4,038	4,532	4,446	4,490	4,704	5,043	5,726	4,758	4,849	4,602	4,830	5,584
29	1,229	1,114	1,744	1,563	1,486	1,643	1,949	2,088	2,394	2,060	1,974	2,098	2,099	2,241	2,409	2,424	2,644	2,721	2,754	3,011	2,557	2,325	2,188	2,064	2,364
30	2,015	1,912	2,978	2,616	2,396	2,797	3,395	3,636	3,843	3,548	3,448	3,984	4,053	4,216	5,028	4,858	4,829	5,127	5,221	5,898	5,145	4,835	4,819	4,720	5,842
31	738	685	1,030	1,006	915	954	1,190	1,250	1,320	1,204	1,114	1,330	1,279	1,230	1,261	1,345	1,375	1,592	1,671	1,814	1,676	1,419	1,503	1,577	1,620
32	603	531	830	795	654	860	1,057	1,079	1,417	1,275	1,329	1,530	1,712	2,187	2,859	3,259	3,640	3,783	3,537	3,576	2,779	2,342	2,128	2,040	2,202
33	375	423	679	717	698	918	1,359	1,602	2,002	1,764	1,722	1,920	2,054	2,161	2,588	2,952	2,771	2,969	2,936	3,330	2,980	2,973	2,926	2,781	2,965
34	206	180	276	283	289	294	326	315	479	550	482	526	659	791	985	1,150	1,383	1,161	853	850	800	810	825	916	1,070
35	9,985	10,598	14,536	12,066	9,812	10,590	14,142	16,534	19,300	17,800	16,754	18,300	19,283	19,275	19,746	20,035	20,219	20,198	19,889	22,385	19,373	18,665	19,000	20,179	24,376
36	5,713	5,877	7,868	6,585	5,867	6,028	8,189	9,037	9,989	8,275	7,248	7,571	7,842	7,821	8,384	8,305	8,962	8,956	8,731	10,227	9,116	7,692	7,730	8,693	10,299
37	1,750	1,526	2,352	1,904	1,695	1,934	2,727	3,099	3,583	3,102	2,738	2,786	2,930	2,914	3,053	3,198	3,383	3,491	3,627	4,094	3,642	3,391	3,417	4,076	5,483

Table STRN-32. U.S.-registered USPTO trademarks, by Nice Classification: 2000–24

(Number)

Nice class	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
38	1,717	1,896	2,314	1,642	1,366	1,346	1,676	2,003	2,299	1,948	1,720	1,726	1,718	1,653	1,582	1,510	1,475	1,349	1,250	1,335	1,182	1,186	1,126	1,123	1,156
39	1,423	1,333	1,725	1,371	1,105	1,153	1,495	1,755	1,986	1,767	1,606	1,769	1,868	1,903	1,873	1,930	1,975	2,162	1,995	2,308	2,018	1,784	1,831	2,186	2,580
40	759	684	1,002	967	842	884	1,156	1,301	1,561	1,557	1,252	1,350	1,410	1,399	1,337	1,447	1,411	1,515	1,456	1,790	1,478	1,402	1,344	1,462	1,822
41	7,548	7,202	10,212	9,267	8,432	9,147	12,196	14,470	17,143	15,721	14,938	16,535	17,746	18,431	18,864	19,611	21,213	22,157	21,867	25,839	22,845	22,256	22,266	23,740	29,637
42	11,567	11,591	15,689	9,040	5,321	4,959	5,738	6,632	7,456	7,347	6,974	7,936	8,822	9,276	9,839	10,368	10,628	11,320	11,528	13,265	11,870	11,270	11,397	12,255	15,171
43	10	12	173	1,334	1,789	2,204	3,113	3,577	3,972	3,660	3,311	3,919	4,216	4,360	4,675	5,192	5,570	6,036	6,030	6,887	5,583	4,844	5,304	5,967	6,906
44	2	2	122	1,199	1,715	2,147	2,861	3,494	4,163	3,947	3,836	4,234	4,521	4,896	5,066	5,075	5,699	6,092	6,119	7,346	6,410	6,073	6,003	6,724	8,057
45	13	7	49	411	609	772	1,151	1,688	2,699	2,782	2,761	3,140	3,521	3,517	3,543	3,503	3,668	3,686	3,544	4,082	3,669	3,488	3,476	3,652	4,589
Unclassified	256	227	386	298	280	269	397	433	423	463	437	381	389	370	384	374	333	381	361	380	374	333	314	321	344

USPTO = Patent and Trademark Office.

Note(s):
Trademarks are allocated according to holder information. Trademarks are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named holders. Trademarks are classified under the 11th edition of the Nice Classification of goods and services, which classifies trademarks under 34 categories of goods and 11 categories of services. Fractional counts of trademarks were assigned to each category to assign the proper weight of a trademark to the corresponding category under the classification. The United States includes Puerto Rico and all other U.S. territories.

Source(s):
National Center for Science and Engineering Statistics; Science-Metrix (Elsevier); USPTO data hosted by Reed Tech (LexisNexis), accessed March 2025.

Science and Engineering Indicators

Table STRN-33. New GitHub repositories contributed to, by selected region, country, or economy: 2009–24

(Number)

Region, country, or economy	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total repositories	28,874	34,398	47,624	86,858	238,018	504,878	740,234	998,565	1,305,639	2,255,993	1,627,279	2,028,339	2,342,419	2,694,663	3,199,901	3,748,991
Total (any country)	9,745	14,108	22,798	42,674	121,334	261,042	363,220	473,855	600,191	720,490	723,108	922,096	999,853	1,102,316	1,209,586	1,345,364
United States	3,794	5,305	7,704	13,807	36,511	81,136	96,285	116,358	137,293	168,258	158,836	182,032	168,959	184,811	186,389	194,349
India	51	119	250	540	2,568	6,285	9,836	17,745	27,165	37,328	42,239	75,136	89,622	85,355	105,846	136,097
Brazil	124	208	406	644	2,412	5,637	9,891	15,186	19,239	24,258	29,713	55,224	77,287	98,776	105,284	118,344
China	87	175	307	815	5,044	13,174	22,591	37,386	49,210	56,037	53,911	55,074	55,756	61,923	66,923	68,098
Germany	840	1,254	2,024	3,672	9,104	17,243	25,833	31,891	46,730	46,666	46,138	55,964	58,163	59,574	63,962	76,438
United Kingdom	657	1,027	1,797	3,138	8,987	17,756	23,802	29,053	36,628	58,495	38,667	50,488	47,489	50,067	53,297	60,767
Canada	462	687	1,024	2,030	5,572	11,063	15,480	19,324	23,324	27,099	27,062	34,996	36,275	34,909	39,226	45,606
France	324	504	877	1,755	5,100	10,764	15,281	18,825	21,591	24,049	28,067	31,448	30,270	32,499	35,304	40,664
Japan	322	468	867	2,090	4,560	9,950	13,134	15,906	19,181	21,923	23,138	26,350	28,221	28,919	29,411	31,911
Russia	103	184	319	773	2,272	4,588	7,312	11,339	14,514	16,459	17,403	20,930	22,755	25,746	28,895	33,162
All other countries	2,981	4,179	7,222	13,410	39,204	83,446	123,775	160,842	205,316	239,919	257,934	334,454	385,057	439,736	495,049	539,928
Total (missing country)	19,129	20,290	24,826	44,184	116,684	243,836	377,014	524,710	705,448	1,535,503	904,171	1,106,243	1,342,566	1,592,347	1,990,315	2,403,627

Note(s):
This table reports the total number of new GitHub repositories contributed to by each country per year using the fractional-counting method. The top 10 contributing countries are shown. Each repository's credit is divided equally across its developers, and each developer's share is further divided across their associated countries. Repositories are attributed to the year of the earliest commit, and only developers who contributed in that earliest year receive credit, ensuring each repository is only counted once in time, even if contributions span multiple years. The Total (any country) row reflects the sum of all identified country-level contributions, while the Total (missing country) row captures contributions from users without a valid country; together, these two rows sum to Total repositories each year. Additionally, the values for the top 10 countries combined with All other countries equal the Total (any country) row.

Source(s):
Westat and National Center for Science and Engineering Statistics, tabulations of GitHub data, December 2025.

Science and Engineering Indicators

Table STRN-34. Total GitHub repositories contributed to by selected entities: 2009–24

(Number)

Institution	Number of repositories
Top 10 businesses (global)	
Business total	3,711,592
GitHub (United States)	873,083
Snyk (United States)	658,475
NetEase (China)	218,519
Google (United States)	162,530
Microsoft (United States)	121,836
Red Hat (United States)	73,990
Yandex (Russia)	64,895
IBM (United States)	58,881
VK (Russia)	53,591
Apple (United States)	37,789
All other business	1,388,003
Top 10 universities (global)	
Academic total	930,619
Massachusetts Institute of Technology (United States)	12,530
Stanford University (United States)	9,649
Carnegie Mellon University (United States)	9,172
University of Washington-Seattle Campus (United States)	8,201
Ecole pour l'Informatique et les Nouvelles Technologies (France)	8,037
University of Toronto (Canada)	7,571
University of California-Berkeley (United States)	7,515
Tsinghua University (China)	7,387
Technische Universität München (Germany)	7,329
ETH Zurich (Switzerland)	7,053
All other academic	846,175

Note(s):
This table reports the top 10 business and top 10 academic institutions worldwide contributing to GitHub repositories from 2009 to 2024, using a whole-counting method. Each repository is counted once for every institution that contributed to it, determined by the organization affiliations of the developers. The business total and academic total rows represent the total number of repository-organization combinations involving business and academic institutions, respectively, including those from the top 10. Each institution is counted once per repository where it had at least one developer, based on the earliest year of involvement. The All other business and All other academic rows capture contributions from institutions not listed in the respective top 10 lists.

Source(s):
Westat and National Center for Science and Engineering Statistics, tabulations of GitHub data, December 2025.

Science and Engineering Indicators

Table STRN-35. Open-source software collaboration networks in GitHub, by region, country, or economy: 2024

(Number)

Country 1	Country 2	Co-developed repositories
Germany	United States	9,753
Canada	United States	7,943
United Kingdom	United States	7,873
Netherlands	United States	6,246
France	United States	5,270
China	United States	5,111
Germany	United Kingdom	4,816
India	United States	4,590
France	Germany	3,760
Canada	Germany	3,214
Switzerland	United States	3,169
Brazil	United States	3,126
Germany	Netherlands	3,120
Australia	United States	2,903
Spain	United States	2,888
Japan	United States	2,829
France	United Kingdom	2,743
Germany	Switzerland	2,697
Canada	United Kingdom	2,649
China	Germany	2,391
Canada	France	2,369
Italy	United States	2,234
Canada	Netherlands	2,105
Poland	United States	1,965
Germany	India	1,915
Netherlands	United Kingdom	1,865
France	Netherlands	1,858
Sweden	United States	1,824
Germany	Italy	1,749
France	Switzerland	1,737
Russia	United States	1,681
Germany	Spain	1,675
Switzerland	United Kingdom	1,595
Canada	China	1,563
Germany	Sweden	1,560
India	United Kingdom	1,549
Australia	United Kingdom	1,546
Germany	Poland	1,436
China	United Kingdom	1,431
Austria	United States	1,429
Brazil	Canada	1,379
China	France	1,361
Austria	Germany	1,358
Germany	Japan	1,352
Australia	Germany	1,351
Spain	United Kingdom	1,343
Canada	India	1,290
Canada	Switzerland	1,266
Brazil	Germany	1,265
Netherlands	Switzerland	1,187
Ukraine	United States	1,176
Poland	United Kingdom	1,158
Italy	United Kingdom	1,138

Table STRN-35. Open-source software collaboration networks in GitHub, by region, country, or economy: 2024

(Number)

Country 1	Country 2	Co-developed repositories
Singapore	United States	1,134
Germany	Russia	1,133
China	Japan	1,126
Belgium	United States	1,122
Czechia	United States	1,115
France	Spain	1,092
Belgium	Germany	1,059
Australia	Netherlands	1,055
South Korea	United States	1,045
Japan	United Kingdom	1,040
China	India	1,017
China	Netherlands	1,011
Turkey	United States	1,010

Note(s):
This figure is based on the top country-to-country open-source software collaborations on GitHub in 2024, measured by the number of co-developed repositories that have more than 1,000 collaborations. A repository is counted as co-developed between two countries if it includes developers from both countries and has at least two distinct developers overall. All eligible country pairs are credited using a whole-counting method, meaning each country pair receives full credit for each shared repository.

Source(s):
Westat and National Center for Science and Engineering Statistics, tabulations of GitHub data, December 2025.

Science and Engineering Indicators

Table STRN-36. Open-source software repositories contributed to in GitHub, by country of contributor: 2024

(Number)

Country	Total repositories contributed to by each location
Total repositories	3,976,591
Total (missing country)	2,528,574
Total (any country)	1,448,017
United States	216,690
India	139,229
Brazil	121,263
Germany	84,353
China	74,338
United Kingdom	64,350
Canada	50,188
France	46,149
Japan	35,676
Russia	35,351
Spain	27,559
Indonesia	24,607
Netherlands	24,245
Australia	23,557
Italy	23,536
Poland	21,496
Turkey	20,268
South Korea	17,883
Switzerland	16,885
Bangladesh	16,349
Pakistan	14,441
Colombia	14,311
Sweden	14,147
Vietnam	12,323
Mexico	12,285
Ukraine	11,688
Nigeria	11,143
Argentina	10,687
Kenya	10,657
Portugal	10,585
Czechia	9,276
Norway	8,856
Austria	8,600
Iran	8,575
Taiwan	8,479
Philippines	8,353
Belgium	8,102
Finland	7,993
Denmark	7,782
Sri Lanka	7,391
Egypt	7,302
Singapore	7,138
South Africa	6,124
Bulgaria	6,040
Romania	5,729
Chile	5,282
Ireland	5,235
New Zealand	5,225
Peru	5,155
Thailand	5,044

Table STRN-36. Open-source software repositories contributed to in GitHub, by country of contributor: 2024

(Number)

Country	Total repositories contributed to by each location
Greece	5,027
Israel	4,442
Hungary	4,166
Nepal	3,518
Malaysia	3,402
Uruguay	2,939
Serbia	2,930
United Arab Emirates	2,720
Uzbekistan	2,621
Ghana	2,547
Morocco	2,335
Ecuador	2,247
Tunisia	2,187
Lithuania	2,138
Ethiopia	2,053
Estonia	1,967
Slovakia	1,951
Belarus	1,856
Venezuela	1,834
Kazakhstan	1,757
Croatia	1,678
Costa Rica	1,533
Nicaragua	1,409
Uganda	1,399
Guatemala	1,378
Rwanda	1,325
Angola	1,320
Algeria	1,270
Cameroon	1,218
Saudi Arabia	1,212
Slovenia	1,211
Fiji	1,176
Latvia	1,112

Note(s):
This table reports the total number of GitHub repositories contributed to by each location in 2024, using a fractional-counting method. Only locations that contributed to 1,000 repositories or more in 2024 are shown. Each repository's credit is divided equally across its developers, and each developer's share is further divided across their associated countries. This ensures that the total sum of all countries' contributions matches the total number of unique repositories. For example, if a developer is affiliated with two countries, each country receives half of that developer's share.

Source(s):
Westat and National Center for Science and Engineering Statistics, tabulations of GitHub data, December 2025.

Science and Engineering Indicators

Table STRN-37. Venture capital investment, by region, country, or economy of receiving firm: 2013–24

(Millions of dollars)

Region, country, or economy	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
United States	49,285.9	73,838.2	86,498.9	83,511.3	91,785.8	146,302.4	154,481.2	175,205.9	358,160.9	234,750.0	163,210.3	214,015.3
China	6,258.3	19,504.2	55,104.8	78,220.2	67,018.2	118,604.0	81,968.4	94,108.3	145,384.4	89,548.5	62,759.0	42,669.8
United Kingdom	3,622.8	4,486.7	6,638.6	6,082.7	11,554.5	11,792.7	14,545.3	17,769.8	34,653.3	30,021.1	19,904.1	20,746.1
India	1,667.3	6,598.1	10,055.4	4,168.7	13,118.4	8,639.3	19,398.4	12,236.9	35,765.1	24,782.2	12,490.4	15,907.6
Germany	1,598.5	3,093.0	3,647.4	2,351.9	3,602.5	5,069.7	6,406.9	7,292.1	17,436.3	12,964.1	7,824.5	8,784.2
France	1,356.1	1,541.5	1,817.1	3,035.2	2,902.8	4,788.0	5,322.5	8,412.7	12,535.0	15,277.7	9,959.1	8,635.4
Japan	988.9	1,174.3	1,275.4	2,020.6	2,289.4	3,808.5	4,780.2	5,480.5	6,805.9	5,391.0	5,118.8	5,202.3
Singapore	1,062.5	1,032.1	1,404.9	1,608.2	2,501.1	5,271.8	8,365.7	4,757.5	8,506.2	9,044.1	8,338.1	5,190.0
South Korea	449.8	941.8	1,734.3	1,250.7	2,358.8	5,350.6	4,966.5	14,664.4	9,979.9	9,532.2	6,537.6	5,182.7
Switzerland	517.7	458.0	933.5	1,117.9	926.4	1,592.8	2,243.1	2,825.6	3,886.6	4,197.9	3,078.6	3,757.7
Netherlands	405.7	1,039.3	1,022.6	518.4	853.0	1,002.6	1,328.2	1,987.8	6,904.7	4,037.6	2,994.8	2,924.7
Sweden	497.5	710.5	1,204.3	1,634.9	1,341.5	1,210.2	2,956.3	3,282.5	8,147.8	5,251.4	5,675.0	2,506.6
Spain	332.4	413.0	438.6	777.0	829.3	1,170.2	1,374.3	1,775.7	4,532.6	3,680.3	2,092.4	2,063.0
Italy	111.8	95.8	185.5	369.7	166.6	453.6	469.2	775.6	1,449.4	2,427.5	1,244.8	1,741.2
Belgium	552.0	411.7	353.3	488.4	550.9	1,489.4	1,059.7	1,116.8	1,566.8	2,152.2	1,128.3	1,546.5
Hong Kong	61.6	231.4	260.2	586.1	1,310.5	6,690.5	868.1	2,323.3	5,653.6	2,000.8	1,555.1	1,485.1
Denmark	319.8	241.5	418.2	312.5	378.4	661.8	969.5	1,072.1	2,555.9	1,893.3	1,591.0	1,152.0
Philippines	9.9	27.5	33.3	21.0	49.8	100.7	42.2	69.1	789.0	379.0	487.4	1,145.5
Ireland	531.5	514.5	592.8	756.7	845.3	1,382.4	497.4	1,304.6	1,855.5	1,513.9	1,379.2	1,103.3
Finland	250.5	255.4	305.2	336.3	343.3	630.2	948.0	1,416.1	2,055.8	2,401.4	1,100.0	974.9
Lithuania	38.0	40.7	59.2	10.1	65.9	80.7	26.8	175.9	513.6	243.9	162.5	771.4
Norway	134.9	191.0	143.9	280.7	287.4	430.8	361.8	1,014.9	2,047.7	1,518.2	681.2	765.7
Austria	29.5	39.8	78.6	141.8	135.6	138.9	261.1	338.6	1,260.8	1,051.3	732.6	621.0
Portugal	61.1	86.4	173.2	40.5	73.2	107.4	100.4	181.1	4,850.5	397.0	166.5	557.0
Taiwan	86.9	295.2	517.5	216.8	479.3	343.3	479.4	627.9	808.9	786.8	240.9	549.4
Indonesia	12.0	142.0	131.5	1,023.0	1,681.8	3,068.6	1,520.8	4,130.6	4,985.2	3,638.1	2,079.0	548.2
Estonia	27.0	40.9	29.0	41.2	38.3	232.5	137.8	101.2	1,423.4	1,654.8	414.9	436.6
Malaysia	15.3	26.6	51.7	66.8	70.8	166.9	163.1	149.7	451.6	778.7	307.2	411.3
Cyprus	2.3	29.2	60.8	47.2	76.4	152.1	20.3	96.8	548.3	1,221.3	313.6	378.7
Thailand	27.7	49.8	58.2	111.7	197.7	222.3	198.3	428.5	516.5	1,156.7	109.4	223.2
Slovakia	0.2	3.6	13.6	10.5	70.1	1.3	10.6	20.0	86.3	126.7	124.5	219.5
Vietnam	21.3	36.2	67.1	55.1	89.9	252.7	631.2	375.8	1,240.0	405.3	282.8	219.5
Iceland	7.9	145.0	161.9	26.7	18.1	58.0	53.1	128.4	195.6	404.9	366.4	208.2
Poland	19.4	48.7	58.5	136.9	257.1	91.3	226.2	278.5	557.1	351.2	184.3	199.3
Croatia	4.3	0.1	1.2	2.6	38.4	0.7	93.2	17.6	184.1	770.8	5.6	167.6
Liechtenstein	0.0	0.0	0.0	2.8	4.6	4.9	9.1	0.7	7.2	82.5	12.0	150.0
Luxembourg	78.0	148.2	303.7	424.1	56.3	71.9	133.4	61.8	1,393.3	872.0	205.6	149.6
Uzbekistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.1	2.2	2.7	134.4
Russia	881.3	602.3	292.3	100.2	210.7	140.7	149.9	149.7	1,525.3	362.4	344.1	125.9
Czechia	4.3	36.6	8.3	6.6	35.7	19.4	42.4	119.4	119.4	267.3	147.5	120.0
Pakistan	1.1	3.7	71.3	9.1	115.6	9.3	48.6	55.4	286.0	365.7	44.2	62.0
Bulgaria	3.6	6.2	11.9	6.9	7.0	6.6	5.1	34.7	50.4	60.1	89.6	61.7
Greece	14.1	7.9	8.3	8.9	5.1	17.7	111.0	627.4	74.4	423.5	95.0	54.2
Hungary	37.7	46.3	137.1	29.4	113.1	244.5	1,281.5	177.7	202.8	186.4	114.6	47.7
Bangladesh	1.5	10.0	12.2	5.5	6.0	43.3	8.3	36.6	280.7	227.4	52.1	40.0
Andorra	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	36.2
Malta	41.9	40.7	3.5	25.7	56.0	90.7	7.4	14.9	107.5	10.5	519.1	35.9
Romania	0.2	0.1	1.1	4.7	5.3	8.2	26.3	30.1	78.0	109.4	124.6	35.5
Latvia	7.8	5.3	34.8	11.4	10.3	15.8	4.7	19.0	157.3	23.8	70.5	29.8
Gibraltar	0.0	20.0	2.5	2.5	0.0	1.4	20.0	2.0	852.1	3.5	8.5	13.1
Kazakhstan	0.4	19.8	0.0	1.6	2.3	1.1	5.2	4.5	6.6	1.4	23.4	10.1

Table STRN-37. Venture capital investment, by region, country, or economy of receiving firm: 2013–24

(Millions of dollars)

Region, country, or economy	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ukraine	16.4	2.5	5.3	2.1	2.4	1.0	8.0	25.7	7.5	7.1	9.3	8.3
Monaco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3	0.0	6.0
Slovenia	1.2	4.6	3.7	2.7	3.5	0.5	12.6	9.3	7.6	25.7	47.4	3.4
Faroe Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	2.8
British Indian Ocean Territory	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Bosnia and Herzegovina	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.5	0.3	2.6	0.0	1.2
Moldova	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.4	0.0	1.1
Cambodia	0.0	1.5	0.0	0.0	0.8	0.0	5.3	8.2	5.7	7.8	0.0	1.0
North Macedonia	0.1	0.0	0.3	0.0	0.0	0.2	4.8	0.0	0.6	2.7	0.5	0.9
Azerbaijan	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.6
Afghanistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Albania	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0
Armenia	5.9	9.1	10.3	30.3	2.6	47.1	4.0	0.1	1.2	11.6	1.0	0.0
Belarus	1.7	0.0	0.0	3.0	0.5	0.5	8.1	0.7	1.3	0.0	0.3	0.0
Brunei	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
East Timor	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0
Georgia	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.1	34.9	2.3	0.0
Kosovo	0.0	0.0	0.0	2.0	0.0	6.7	0.5	0.2	0.5	0.0	0.0	0.0
Kyrgyzstan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.1	0.0	0.0
Laos	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Macau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0
Mongolia	0.0	12.6	0.0	5.0	0.0	2.8	0.0	0.0	15.3	3.4	0.0	0.0
Montenegro	0.0	0.0	10.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Myanmar	1.5	0.5	1.0	5.1	8.6	17.4	10.5	25.1	0.0	0.0	0.0	0.0
Nepal	0.0	0.2	0.1	0.0	0.5	2.7	15.8	72.8	27.5	1.3	2.6	0.0
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serbia	0.2	0.2	1.2	22.7	1.2	4.0	1.3	5.8	24.8	40.4	8.0	0.0
Sri Lanka	0.1	0.3	0.0	2.7	1.1	4.3	1.2	0.0	1.3	11.0	2.1	0.0
Tajikistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0

Note(s):
Table includes selected regions, countries, or countries in North America, Europe, and Asia. Tied regions, countries, or economies are listed alphabetically.

Source(s):
PitchBook, venture capital and private equity database, special tabulations, accessed May 2025.

Science and Engineering Indicators

Table STRN-38. Firms headquartered in the United States receiving venture capital investment, by industry: 2013–24

(Millions of dollars)

Year	Agriculture and food	Biomedical	Commercial services	Consumer goods and services	Energy	Financial services	Health care	IT hardware	Industrial products	Information	Other	Software	Transportation and defense
2013	902	2,894	2,426	3,130	628	492	2,558	974	1,346	3,370	56	11,280	410
2014	1,316	3,284	3,378	4,254	752	830	3,218	1,236	1,568	3,746	194	13,382	722
2015	1,938	3,882	7,398	5,644	946	1,192	5,458	1,432	2,232	4,292	774	14,624	1,832
2016	1,840	3,992	6,288	5,138	750	1,038	4,910	1,434	2,128	3,376	966	13,798	1,816
2017	2,106	4,726	7,168	5,670	850	1,152	5,214	1,668	2,364	3,872	1,006	14,920	1,810
2018	2,454	4,992	7,228	5,236	794	1,318	6,200	1,944	2,282	3,646	978	15,808	1,958
2019	2,366	5,344	7,220	5,926	874	1,426	6,596	1,844	2,362	3,978	984	16,836	2,074
2020	2,618	5,858	7,568	5,476	922	1,488	7,060	2,020	2,464	3,806	976	17,428	2,012
2021	3,116	6,728	9,120	6,874	1,148	2,588	8,888	2,162	3,158	4,502	1,032	23,080	2,562
2022	2,796	5,398	5,376	5,538	1,054	1,982	5,864	1,954	2,670	3,910	738	22,086	1,756
2023	2,460	4,576	4,026	4,114	1,160	1,472	5,122	1,710	2,778	3,120	74	18,914	1,320
2024	1,782	3,730	3,370	3,110	1,014	1,478	4,452	1,390	2,252	2,548	54	17,912	1,314

IT = information technology.

Note(s):
Industry categories are aggregates of PitchBook primary industry codes based on product or service markets.

Source(s):
PitchBook, venture capital and private equity database, special tabulations, accessed May 2025.

Science and Engineering Indicators

Table STRN-39. OECD classification of industries, by R&D intensity category

(Percent)

R&D intensity category	Manufacturing			Nonmanufacturing		
	ISIC, Rev.4, industry code	Name	R&D intensity (%)	ISIC, Rev.4, industry code	Name	R&D intensity (%)
High R&D intensity	303	Air and spacecraft and related machinery	31.69	72	Scientific R&D	30.39
	21	Pharmaceuticals	27.98	582	Software publishing	28.94
	26	Computer, electronic, and optical products	24.05			
Medium-high R&D intensity	252	Weapons and ammunition	18.87	62–63	IT and other information services	5.92
	29	Motor vehicles, trailers, and semi-trailers	15.36			
	325	Medical and dental instruments	9.29			
	28	Machinery and equipment nec	7.89			
	20	Chemicals and chemical products	6.52			
	27	Electrical equipment	6.22			
	30X	Railroad, military vehicles, and transport nec (ISIC 302, 304, and 309)	5.72			
Medium R&D intensity	22	Rubber and plastic products	3.58			
	301	Building of ships and boats	2.99			
	32X	Other manufacturing except medical and dental instruments	2.85			
	23	Other nonmetallic mineral products	2.24			
	24	Basic metals	2.07			
	33	Repair and installation of machinery and equipment	1.93			
Medium-low R&D intensity	13	Textiles	1.73	69–75X	Professional, scientific, and technical activities except scientific R&D services (ISIC 69–75 except 72)	1.76
	15	Leather and related products	1.65	61	Telecommunications	1.45
	17	Paper and paper products	1.58	05–09	Mining and quarrying	0.8
	10–12	Food products, beverages, and tobacco	1.44	581	Publishing of books and periodicals	0.57
	14	Wearing apparel	1.40			
	25X	Fabricated metal products except weapons and ammunition (ISIC 25 except 252)	1.19			
	19	Coke and refined petroleum products	1.17			
	31	Furniture	1.17			
	16	Wood and products of wood and cork	0.70			
	18	Printing and reproductions of recorded media	0.67			
Low R&D intensity				64–66	Financial and insurance activities	0.38
				35–39	Electricity, gas, and water supply; waste management; and remediation	0.35
				59–60	Audiovisual and broadcasting activities	0.32
				45–47	Wholesale and retail trade	0.28
				01–03	Agriculture, forestry, and fishing	0.27
				41–43	Construction	0.21
				77–82	Administrative and support services	0.18

Table STRN-39. OECD classification of industries, by R&D intensity category

(Percent)

R&D intensity category	Manufacturing			Nonmanufacturing		
	ISIC, Rev.4, industry code	Name	R&D intensity (%)	ISIC, Rev.4, industry code	Name	R&D intensity (%)
				90–99	Arts, entertainment, repair of household goods, and other services	0.11
				49–53	Transportation and storage	0.08
				55–56	Accommodation and food service activities	0.02
				68	Real estate activities	0.01

ISIC, Rev.4 = International Standard Industrial Classification of All Economic Activities, Revision 4; IT = information technology; nec = not elsewhere classified; OECD = Organisation for Economic Co-operation and Development.

Note(s):
R&D intensity is measured as the ratio of R&D expenditures to value-added output of industry. Industries are classified according to ISIC, Rev.4.

Source(s):
Galindo-Rueda F, Verger F, 2016, *OECD Taxonomy of Economic Activities Based on R&D Intensity,* OECD Science, Technology and Industry Working Papers, No. 2016/04, available at https://doi.org/10.1787/5jlv73sqqp8r-en, accessed 15 February 2024.

Science and Engineering Indicators

Table STRN-40. U.S. KTI industry value added: 2002–24

(Billions of dollars and percent share)

Industry	ISIC, Rev.4, industry code	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Billions of dollars																								
GDP		10,929	11,456	12,217	13,039	13,816	14,474	14,770	14,478	15,049	15,600	16,254	16,881	17,608	18,295	18,805	19,612	20,657	21,540	21,354	23,681	26,007	27,721	29,185
All manufacturing		1,495	1,551	1,637	1,721	1,823	1,877	1,830	1,725	1,818	1,895	1,955	2,005	2,047	2,109	2,073	2,149	2,303	2,311	2,191	2,451	2,732	2,889	2,909
Total private services		5,929	6,170	6,539	7,035	7,414	7,767	7,887	7,745	8,064	8,363	8,825	9,184	9,659	10,214	10,599	11,048	11,628	12,266	12,296	13,749	15,063	16,132	17,042
All KTI industries		1,082	1,116	1,169	1,217	1,303	1,357	1,387	1,351	1,475	1,560	1,605	1,688	1,751	1,831	1,899	1,990	2,144	2,239	2,302	2,566	2,804	3,066	3,313
KTI manufacturing		767	799	827	857	926	962	937	899	980	1,017	1,042	1,077	1,097	1,128	1,142	1,172	1,258	1,256	1,221	1,328	1,455	1,561	1,611
Chemicals and chemical products	20	110	110	121	119	136	145	142	144	172	175	181	187	187	181	191	192	221	200	198	252	284	281	276
Pharmaceutical, medicinal chemical, and botanical products	21	97	101	106	104	118	123	124	144	131	131	124	132	137	142	151	153	175	175	195	209	237	251	270
Weapons and ammunition	252	2	3	3	3	4	3	4	4	4	5	6	6	6	6	6	6	6	7	8	8	9	11	12
Computer, electronic, and optical products	26	173	193	201	212	225	230	231	221	230	230	230	230	234	244	243	251	263	270	277	296	303	313	335
Electrical equipment	27	44	46	42	43	51	50	56	51	51	48	52	58	53	61	56	58	60	60	58	61	70	76	79
Machinery and equipment nec	28	107	105	112	123	131	139	141	127	137	156	164	169	170	160	151	159	166	173	161	168	188	214	214
Motor vehicles, trailers, and semi-trailers	29	135	143	139	136	134	125	90	48	89	105	116	123	133	147	156	159	161	162	143	143	160	176	181
Air and spacecraft and related machinery	303	58	57	59	71	77	92	91	95	100	104	103	107	113	121	117	123	131	134	107	112	119	146	150
Railroad, military vehicles, and transport equipment nec	30X	8	8	9	10	10	13	15	12	12	13	13	15	15	15	16	14	14	15	15	18	18	20	21
Medical and dental instruments and supplies	325	33	34	35	37	40	41	44	53	54	50	52	50	50	51	55	58	61	62	59	62	67	73	74
KTI services		315	317	342	359	377	395	450	451	495	542	563	611	654	703	758	818	886	983	1,082	1,238	1,349	1,505	1,702
Software publishing	582	57	60	70	77	75	88	93	92	100	109	117	126	135	140	155	173	185	214	242	283	296	341	393
IT and other information services	62–63	187	186	199	207	228	232	274	274	306	338	350	385	415	445	485	525	568	624	675	770	853	937	1,070
Scientific R&D services	72	72	71	73	75	75	74	84	85	89	95	96	100	105	119	118	121	133	145	165	185	200	227	239
Analytical ratios (%)																								
All KTI/ GDP		9.9	9.7	9.6	9.3	9.4	9.4	9.4	9.3	9.8	10.0	9.9	10.0	9.9	10.0	10.1	10.1	10.4	10.4	10.8	10.8	10.8	11.1	11.4
KTI manufacturing/ GDP		7.0	7.0	6.8	6.6	6.7	6.6	6.3	6.2	6.5	6.5	6.4	6.4	6.2	6.2	6.1	6.0	6.1	5.8	5.7	5.6	5.6	5.6	5.5
KTI services/ GDP		2.9	2.8	2.8	2.8	2.7	2.7	3.0	3.1	3.3	3.5	3.5	3.6	3.7	3.8	4.0	4.2	4.3	4.6	5.1	5.2	5.2	5.4	5.8
GDP structure (selected sectors) (%)																								
Manufacturing/ GDP		13.7	13.5	13.4	13.2	13.2	13.0	12.4	11.9	12.1	12.1	12.0	11.9	11.6	11.5	11.0	11.0	11.2	10.7	10.3	10.4	10.5	10.4	10.0
Total private services/ GDP		54.2	53.9	53.5	54.0	53.7	53.7	53.4	53.5	53.6	53.6	54.3	54.4	54.9	55.8	56.4	56.3	56.3	56.9	57.6	58.1	57.9	58.2	58.4
KTI structure																								
KTI manufacturing/ all KTI		70.9	71.6	70.8	70.5	71.1	70.9	67.5	66.6	66.4	65.2	64.9	63.8	62.6	61.6	60.1	58.9	58.7	56.1	53.0	51.8	51.9	50.9	48.6
KTI services/ all KTI		29.1	28.4	29.2	29.5	28.9	29.1	32.5	33.4	33.6	34.8	35.1	36.2	37.4	38.4	39.9	41.1	41.3	43.9	47.0	48.2	48.1	49.1	51.4
Intrasector shares																								
KTI manufacturing/ manufacturing		51.3	51.5	50.6	49.8	50.8	51.3	51.2	52.1	53.9	53.7	53.3	53.7	53.6	53.5	55.1	54.5	54.6	54.4	55.7	54.2	53.2	54.0	55.4
KTI services/ total private services		5.3	5.1	5.2	5.1	5.1	5.1	5.7	5.8	6.1	6.5	6.4	6.7	6.8	6.9	7.1	7.4	7.6	8.0	8.8	9.0	9.0	9.3	10.0

GDP = gross domestic product; ISIC, Rev.4 = International Standard Industrial Classification of All Economic Activities, Revision 4; IT = information technology; KTI = knowledge and technology intensive; nec = not elsewhere classified.

Note(s):
Value added is the value of goods and services (gross output) minus the cost of intermediate inputs (energy, materials, and purchased services). *Industry value added* is a measure of an industry's contribution to overall GDP. KTI industries include high R&D intensive and medium-high R&D intensive industries based on a classification by the Organisation for Economic Co-operation and Development. The data have been crosswalked to the ISIC, Rev.4, classification. Total private services corresponds to main services in ISIC, Rev.4.

Source(s):
GDP data are from the Bureau of Economic Analysis, Industry Economic Accounts, accessed April 2025 (available at https://www.bea.gov/itable/national-gdp-and-personal-income); value-added data are from S&P Global Market Intelligence, Comparative Industry Service special tabulations, April 2025.

Science and Engineering Indicators

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	World (75)	A–U	32,311,460	36,196,506	40,600,192	43,884,609	47,333,217	53,098,509	58,059,831	55,335,156	60,439,179	67,208,038	68,285,566	70,289,802	72,217,658	68,598,579	70,107,662	74,527,046	79,442,306	80,731,937	79,035,536	90,132,295	93,830,224	97,503,023	101,331,707
All manufacturing	World (75)	C (10–33)	5,557,253	6,222,476	6,986,701	7,545,132	8,151,664	9,163,936	9,872,947	9,026,363	10,225,580	11,424,625	11,585,105	11,844,586	12,219,148	11,807,774	11,909,963	12,760,539	13,908,301	13,752,680	13,413,035	15,926,073	16,576,373	16,787,247	16,941,346
Total private services	World (75)	G–N	15,913,303	17,745,999	19,775,706	21,323,663	22,873,997	25,686,525	27,736,025	26,627,210	28,661,492	31,572,556	32,258,126	33,332,712	34,456,936	33,223,836	34,125,870	36,049,792	38,133,838	38,957,663	38,129,389	43,119,890	44,495,370	46,927,493	49,331,656
All KTI industries	World (75)		3,430,415	3,826,449	4,248,501	4,502,359	4,864,354	5,468,755	5,955,728	5,534,197	6,293,659	7,025,767	7,143,293	7,357,794	7,671,685	7,507,834	7,705,262	8,342,488	9,056,921	9,069,022	9,090,758	10,604,178	10,814,864	11,238,134	11,714,304
KTI manufacturing industries	World (75)		2,600,366	2,910,368	3,221,790	3,399,783	3,679,545	4,123,738	4,412,199	4,007,633	4,635,612	5,158,433	5,219,814	5,328,426	5,519,312	5,420,396	5,502,604	5,954,738	6,456,500	6,319,289	6,285,619	7,379,366	7,479,540	7,633,687	7,782,907
Chemicals and chemical products	World (75)	C20	389,991	428,408	491,407	511,427	554,856	642,124	698,759	665,160	790,208	914,273	906,166	930,922	934,939	927,874	920,489	979,224	1,081,060	1,031,895	1,025,197	1,230,921	1,263,926	1,271,248	1,238,211
Pharmaceutical, medicinal chemical, and botanical products	World (75)	C21	268,973	299,394	322,841	336,733	367,663	401,341	427,175	449,042	455,362	487,419	482,395	490,880	505,683	532,944	566,546	597,944	667,992	669,118	731,420	875,055	910,345	923,032	965,954
Weapons and ammunition	World (75)	C252	15,214	17,378	19,738	21,577	24,411	27,242	31,124	27,310	30,593	33,767	36,341	38,005	36,356	35,008	36,075	36,593	38,385	40,032	41,138	46,745	49,090	52,622	56,998
Computer, electronic, and optical products	World (75)	C26	538,281	614,757	686,010	717,135	771,605	833,336	858,208	774,985	887,022	944,573	950,767	980,588	1,035,083	1,028,405	1,034,084	1,133,666	1,241,406	1,211,833	1,250,123	1,458,150	1,470,192	1,407,396	1,487,529
Electrical equipment	World (75)	C27	241,334	269,174	295,676	314,750	352,548	395,398	452,610	417,955	470,253	514,530	525,944	545,103	561,732	544,637	550,337	607,291	657,475	655,186	668,400	790,309	823,004	874,545	897,633
Machinery and equipment nec	World (75)	C28	445,418	500,445	572,751	618,525	675,936	778,478	878,582	738,766	857,104	1,007,959	1,025,821	1,030,118	1,054,306	981,697	975,585	1,069,284	1,163,465	1,140,480	1,142,655	1,347,993	1,295,028	1,317,460	1,323,999
Motor vehicles, trailers, and semi-trailers	World (75)	C29	482,016	544,407	580,369	601,223	629,959	696,950	684,438	553,071	742,694	819,121	856,545	873,589	940,103	914,293	959,317	1,039,301	1,076,089	1,033,486	933,749	1,076,340	1,094,016	1,167,237	1,170,105
Air and spacecraft and related machinery	World (75)	C303	105,682	110,757	120,384	137,710	151,075	176,967	185,874	181,273	190,617	205,410	203,624	209,287	215,985	216,518	213,530	229,411	243,583	250,352	210,055	228,106	238,157	275,312	291,621
Railroad, military vehicles, and transport equipment nec	World (75)	C30X	39,982	44,278	47,156	51,738	55,553	65,850	77,859	78,780	87,424	99,512	99,854	94,107	96,460	97,384	100,476	102,107	111,487	112,841	106,485	127,457	129,762	132,970	137,479
Medical and dental instruments and supplies	World (75)	C325	73,475	81,371	85,458	88,965	95,938	106,052	117,571	121,291	124,335	131,868	132,356	135,826	138,666	141,636	146,166	159,917	175,558	174,066	176,398	198,290	206,019	211,867	213,380
KTI service industries	World (75)		830,049	916,081	1,026,712	1,102,576	1,184,809	1,345,016	1,543,529	1,526,563	1,658,047	1,867,334	1,923,479	2,029,368	2,152,373	2,087,438	2,202,659	2,387,750	2,600,420	2,749,733	2,805,139	3,224,812	3,335,324	3,604,447	3,931,397
Software publishing	World (75)	J582	85,978	92,247	108,544	119,519	120,576	139,420	148,189	148,545	161,949	184,148	190,806	204,038	218,862	216,118	234,984	258,883	285,635	323,270	357,685	415,098	421,530	466,873	526,840
IT and other information services	World (75)	J62–63	524,866	576,892	639,058	682,935	738,599	833,231	949,388	926,483	997,654	1,123,762	1,152,439	1,217,200	1,287,724	1,259,229	1,336,617	1,451,523	1,584,944	1,673,001	1,721,185	1,973,597	2,054,690	2,229,941	2,445,581
Scientific R&D services	World (75)	M72	219,206	246,942	279,110	300,122	325,634	372,365	445,951	451,535	498,444	559,424	580,235	608,130	645,787	612,092	631,057	677,344	729,841	753,462	726,269	836,117	859,104	907,633	958,975
Analytical ratios (%)															KTI shares (%)										
KTI/ all ISIC, Rev.4, industries (%)	World (75)		10.6	10.6	10.5	10.3	10.3	10.3	10.3	10.0	10.4	10.5	10.5	10.5	10.6	10.9	11.0	11.2	11.4	11.2	11.5	11.8	11.5	11.5	11.6
KTI manufacturing industries/ all KTI (%)	World (75)		75.8	76.1	75.8	75.5	75.6	75.4	74.1	72.4	73.7	73.4	73.1	72.4	71.9	72.2	71.4	71.4	71.3	69.7	69.1	69.6	69.2	67.9	66.4
KTI service industries/ all KTI (%)	World (75)		24.2	23.9	24.2	24.5	24.4	24.6	25.9	27.6	26.3	26.6	26.9	27.6	28.1	27.8	28.6	28.6	28.7	30.3	30.9	30.4	30.8	32.1	33.6
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	Canada	A–U	703,718	831,869	954,242	1,092,839	1,230,567	1,371,505	1,457,280	1,286,975	1,513,478	1,680,410	1,711,527	1,729,799	1,690,662	1,452,009	1,422,812	1,534,385	1,607,448	1,626,477	1,536,708	1,867,511	1,994,033	1,979,349	2,028,923
All manufacturing	Canada	C (10–33)	121,178	134,270	149,445	159,833	170,020	179,447	169,505	142,698	167,016	184,232	189,304	183,264	176,164	160,515	156,570	164,964	175,682	173,327	163,168	199,036	212,306	205,564	198,812
Total private services	Canada	G–N	330,024	387,800	444,856	507,817	578,884	648,019	674,043	623,308	723,274	790,279	811,426	820,602	804,015	714,667	712,268	761,116	791,720	806,036	760,137	924,009	985,785	978,259	1,011,839
All KTI industries	Canada		63,036	70,356	75,615	81,419	87,462	93,387	89,772	79,775	94,236	106,617	110,414	109,644	108,027	97,711	97,089	102,618	109,346	111,498	98,956	118,180	126,282	126,292	126,745
KTI manufacturing industries	Canada		50,199	54,971	57,622	60,812	63,611	66,929	62,175	52,781	63,625	71,417	73,724	71,503	69,240	62,665	61,072	63,268	66,114	66,244	57,028	67,671	72,907	71,222	69,181
Chemicals and chemical products	Canada	C20	6,603	7,174	7,826	7,899	7,861	8,456	8,508	8,130	10,630	13,435	13,321	13,670	11,944	11,527	11,256	11,908	13,132	12,057	10,218	12,494	13,828	13,869	13,338
Pharmaceutical, medicinal chemical, and botanical products	Canada	C21	2,941	3,588	3,523	3,735	4,998	4,450	4,176	4,116	4,540	4,283	4,693	3,800	4,465	3,994	4,109	4,077	4,274	4,283	4,756	5,821	6,587	6,207	6,924
Weapons and ammunition	Canada	C252	1,449	1,683	1,783	1,916	2,012	2,260	2,271	1,671	2,107	2,362	2,640	2,508	2,451	2,097	2,002	2,060	2,163	2,197	2,095	2,382	2,527	2,466	2,608
Computer, electronic, and optical products	Canada	C26	4,003	4,967	5,778	6,506	6,873	7,317	7,086	6,716	7,725	7,691	6,728	5,895	5,646	4,925	4,709	5,036	5,334	5,714	5,519	6,313	6,617	5,814	5,711
Electrical equipment	Canada	C27	2,445	2,302	2,746	3,059	3,146	3,478	3,540	3,232	3,513	4,061	3,997	3,789	3,007	2,893	3,002	3,129	3,198	3,231	2,911	2,898	3,051	3,319	3,437
Machinery and equipment nec	Canada	C28	7,632	8,390	9,699	10,739	11,987	13,035	12,722	10,155	11,440	14,507	15,253	14,717	13,899	11,613	10,720	12,145	13,265	12,929	11,743	15,240	16,367	16,120	15,287
Motor vehicles, trailers, and semi-trailers	Canada	C29	19,641	20,286	19,388	19,474	18,312	18,505	13,511	9,733	14,078	14,577	16,080	15,502	15,908	14,593	15,253	14,457	14,008	14,212	10,819	11,902	12,906	13,280	12,125

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Air and spacecraft and related machinery	Canada	C303	3,665	4,437	4,653	4,978	5,571	6,400	7,284	6,143	6,592	6,801	7,553	8,359	8,848	8,064	6,814	7,228	7,179	8,037	6,158	7,206	7,315	6,799	6,958
Railroad, military vehicles, and transport equipment nec	Canada	C30X	1,053	1,205	1,189	1,413	1,608	1,786	1,778	1,523	1,414	1,883	1,828	1,761	1,765	1,768	1,786	1,708	1,962	1,982	1,433	1,903	2,084	1,696	1,419
Medical and dental instruments and supplies	Canada	C325	768	937	1,038	1,092	1,245	1,243	1,301	1,363	1,585	1,817	1,631	1,500	1,307	1,191	1,421	1,522	1,599	1,602	1,376	1,512	1,625	1,653	1,375
KTI service industries	Canada		12,837	15,386	17,993	20,607	23,852	26,458	27,597	26,994	30,611	35,200	36,690	38,141	38,786	35,045	36,017	39,349	43,232	45,254	41,929	50,509	53,375	55,070	57,564
Software publishing	Canada	J582	1,865	2,138	2,710	3,098	3,493	3,976	3,819	3,122	3,622	4,319	4,881	5,262	5,739	4,953	5,012	5,255	6,226	6,760	5,892	7,059	7,549	7,536	7,731
IT and other information services	Canada	J62–63	8,757	10,650	12,348	14,130	16,490	18,009	19,117	19,400	22,157	25,325	26,453	27,326	27,740	25,628	26,679	29,459	31,939	33,501	31,341	37,754	39,776	41,488	43,474
Scientific R&D	Canada	M72	2,215	2,597	2,936	3,379	3,868	4,473	4,660	4,471	4,832	5,556	5,356	5,553	5,307	4,464	4,326	4,636	5,066	4,993	4,696	5,696	6,050	6,047	6,359
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	Canada		9.0	8.5	7.9	7.5	7.1	6.8	6.2	6.2	6.2	6.3	6.5	6.3	6.4	6.7	6.8	6.7	6.8	6.9	6.4	6.3	6.3	6.4	6.2
KTI manufacturing industries/ all KTI (%)	Canada		79.6	78.1	76.2	74.7	72.7	71.7	69.3	66.2	67.5	67.0	66.8	65.2	64.1	64.1	62.9	61.7	60.5	59.4	57.6	57.3	57.7	56.4	54.6
KTI service industries/ all KTI (%)	Canada		20.4	21.9	23.8	25.3	27.3	28.3	30.7	33.8	32.5	33.0	33.2	34.8	35.9	35.9	37.1	38.3	39.5	40.6	42.4	42.7	42.3	43.6	45.4
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	China	A–U	1,384,889	1,569,770	1,869,600	2,274,315	2,736,848	3,530,805	4,565,362	5,044,640	6,028,469	7,522,984	8,505,678	9,563,357	10,415,282	10,910,210	11,223,240	12,332,091	14,093,331	14,563,239	15,009,609	18,294,438	18,783,727	18,696,928	19,239,683
All manufacturing	China	C (10–33)	375,127	453,596	548,490	733,715	893,193	1,149,942	1,475,422	1,612,010	1,924,624	2,420,593	2,691,662	2,957,882	3,174,887	3,220,960	3,225,368	3,590,913	4,215,442	4,211,903	4,286,522	5,504,128	5,844,391	5,698,316	5,825,832
Total private services	China	G–N	465,805	516,704	588,039	683,358	841,566	1,133,501	1,456,051	1,669,967	2,007,508	2,508,180	2,912,886	3,406,491	3,774,717	4,106,480	4,242,498	4,646,378	5,254,365	5,345,744	5,486,868	6,638,962	6,484,512	6,539,105	6,795,631
All KTI industries	China		217,798	259,633	292,804	347,421	422,554	540,717	701,498	758,521	936,682	1,144,626	1,284,363	1,444,554	1,587,518	1,645,603	1,653,723	1,872,693	2,140,537	2,123,138	2,202,461	2,822,710	2,832,029	2,795,742	2,877,318
KTI manufacturing industries	China		200,917	242,329	272,668	320,907	388,458	494,477	639,852	683,607	847,569	1,029,303	1,141,468	1,277,754	1,390,908	1,441,201	1,445,825	1,636,094	1,863,188	1,832,434	1,907,953	2,436,420	2,432,310	2,395,706	2,449,963
Chemicals and chemical products	China	C20	36,569	43,507	55,998	62,561	74,080	99,845	119,966	126,824	163,391	214,458	221,151	241,822	249,926	253,129	236,275	262,839	313,956	302,602	303,041	360,910	362,623	375,832	355,578
Pharmaceutical, medicinal chemical, and botanical products	China	C21	14,455	16,153	16,114	19,623	22,313	28,014	37,449	41,293	47,292	58,640	73,240	84,256	95,100	105,220	111,165	128,386	147,930	147,253	155,172	222,201	206,692	182,538	186,585
Weapons and ammunition	China	C252	524	487	567	701	886	1,184	1,639	1,785	2,120	2,566	2,944	3,329	3,527	3,608	3,694	4,159	4,642	4,685	4,999	6,622	6,300	6,010	6,174
Computer, electronic, and optical products	China	C26	48,310	61,909	71,714	82,829	99,401	111,364	132,855	130,017	157,805	186,549	210,508	237,627	262,826	276,892	274,241	308,080	351,798	345,929	356,700	457,224	454,488	422,978	440,855
Electrical equipment	China	C27	27,445	31,896	36,148	45,846	56,988	74,166	102,377	112,814	133,058	156,889	174,511	195,974	213,999	223,521	226,680	256,409	287,159	295,401	318,227	424,458	452,537	468,480	494,053
Machinery and equipment nec	China	C28	33,508	40,961	46,785	59,628	75,223	100,152	144,712	150,567	186,383	231,064	254,555	280,106	292,879	294,486	292,055	331,877	377,729	372,004	390,436	503,485	485,751	463,923	479,867
Motor vehicles, trailers, and semi-trailers	China	C29	27,556	34,473	32,201	33,920	41,927	56,250	70,386	87,670	120,025	136,607	157,784	180,573	210,200	218,581	235,941	269,847	294,118	277,435	291,232	349,681	352,700	367,362	374,762
Air and spacecraft and related machinery	China	C303	2,822	3,226	3,291	4,077	4,903	7,332	8,428	8,712	9,172	8,605	8,973	9,477	10,358	10,896	11,627	13,752	17,399	19,238	19,914	25,610	25,976	26,633	28,625
Railroad, military vehicles, and transport equipment nec	China	C30X	5,691	5,997	6,184	7,337	7,742	9,811	13,387	14,422	17,586	21,183	25,068	27,757	34,105	35,876	35,540	39,611	43,362	43,226	43,196	53,934	53,233	53,193	54,470
Medical and dental instruments and supplies	China	C325	4,038	3,722	3,665	4,384	4,995	6,360	8,651	9,503	10,736	12,742	12,735	16,834	17,988	18,993	18,607	21,132	25,095	24,662	25,035	32,295	32,012	28,757	28,994
KTI service industries			16,881	17,305	20,136	26,514	34,095	46,241	61,647	74,914	89,113	115,323	142,894	166,801	196,610	204,402	207,898	236,600	277,349	290,704	294,508	386,290	399,718	400,037	427,356
Software publishing	China	J582	1,185	1,410	1,867	2,062	2,184	2,349	2,780	3,321	3,463	4,376	5,036	6,060	8,038	7,733	7,915	9,277	10,942	11,352	10,742	14,123	13,216	11,416	11,908
IT and other information services	China	J62–63	7,879	8,132	8,995	12,010	16,128	23,046	32,025	37,064	44,334	56,943	71,230	87,659	105,923	108,182	107,810	123,413	146,216	155,301	158,937	210,331	221,822	223,521	240,985
Scientific R&D	China	M72	7,817	7,762	9,274	12,442	15,783	20,846	26,842	34,528	41,316	54,005	66,628	73,081	82,649	88,487	92,173	103,910	120,190	124,051	124,829	161,836	164,680	165,100	174,463
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	China		15.7	16.5	15.7	15.3	15.4	15.3	15.4	15.0	15.5	15.2	15.1	15.1	15.2	15.1	14.7	15.2	15.2	14.6	14.7	15.4	15.1	15.0	15.0
KTI manufacturing industries/ all KTI (%)	China		92.2	93.3	93.1	92.4	91.9	91.4	91.2	90.1	90.5	89.9	88.9	88.5	87.6	87.6	87.4	87.4	87.0	86.3	86.6	86.3	85.9	85.7	85.1
KTI service industries/ all KTI (%)	China		7.8	6.7	6.9	7.6	8.1	8.6	8.8	9.9	9.5	10.1	11.1	11.5	12.4	12.4	12.6	12.6	13.0	13.7	13.4	13.7	14.1	14.3	14.9
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	EU-27	A–U	7,111,375	8,743,468	10,044,537	10,447,924	11,118,192	12,866,924	14,242,952	12,979,765	12,786,982	13,824,354	12,847,352	13,416,351	13,709,213	11,872,592	12,152,799	12,878,145	13,939,770	13,674,631	13,436,398	15,035,862	14,583,109	15,984,385	16,638,961

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
All manufacturing	EU-27	C (10–33)	1,324,361	1,588,644	1,804,752	1,852,131	1,973,604	2,292,003	2,435,156	2,009,456	2,071,383	2,288,780	2,096,636	2,173,142	2,256,831	2,036,046	2,097,314	2,214,427	2,378,958	2,281,978	2,187,449	2,504,993	2,436,308	2,656,000	2,646,960
Total private services	EU-27	G–N	3,467,473	4,282,566	4,930,075	5,160,222	5,495,921	6,404,074	7,106,203	6,528,800	6,385,040	6,908,888	6,437,185	6,752,848	6,923,929	5,994,010	6,138,841	6,511,733	7,067,853	6,970,503	6,812,416	7,623,823	7,412,403	8,109,112	8,573,192
All KTI industries	EU-27		808,422	974,829	1,108,928	1,142,763	1,231,223	1,440,308	1,555,776	1,327,721	1,393,639	1,553,955	1,448,342	1,532,727	1,603,120	1,467,908	1,526,366	1,639,682	1,801,327	1,765,895	1,736,788	1,971,667	1,908,853	2,094,254	2,134,619
KTI manufacturing industries	EU-27		604,508	727,818	823,012	841,836	907,108	1,055,591	1,122,678	920,192	987,309	1,098,841	1,014,625	1,058,605	1,108,336	1,032,115	1,067,211	1,136,800	1,226,527	1,178,276	1,133,330	1,299,864	1,266,923	1,381,370	1,375,952
Chemicals and chemical products	EU-27	C20	86,426	100,289	114,395	117,069	121,289	141,238	149,281	128,074	136,587	151,850	138,817	143,323	145,704	144,884	145,425	155,095	159,680	149,685	151,538	171,575	163,647	170,086	169,326
Pharmaceutical, medicinal chemical, and botanical products	EU-27	C21	69,186	82,919	89,076	94,549	97,957	111,138	120,303	118,836	116,059	121,554	113,945	118,829	121,452	133,525	140,067	144,299	165,695	170,473	189,459	224,914	238,440	248,078	249,373
Weapons and ammunition	EU-27	C252	3,949	4,786	4,998	5,112	5,727	6,716	7,008	6,512	6,409	6,912	6,977	7,183	7,316	6,265	6,883	7,089	7,691	7,643	7,673	8,813	8,663	10,167	10,891
Computer, electronic, and optical products	EU-27	C26	78,050	93,704	108,386	110,651	116,601	134,794	132,889	102,956	105,372	112,213	99,798	104,756	107,438	102,789	104,875	110,171	120,915	114,804	110,482	115,405	110,317	118,994	121,180
Electrical equipment	EU-27	C27	65,770	78,748	91,015	90,180	99,467	113,008	127,697	105,916	111,297	120,496	110,476	113,344	115,373	98,277	101,141	106,329	113,462	105,426	102,431	109,339	101,311	116,225	110,484
Machinery and equipment nec	EU-27	C28	131,400	158,201	184,376	190,231	209,754	251,515	277,438	211,041	225,907	263,720	245,239	253,966	264,823	227,531	230,391	249,061	270,223	259,288	251,960	293,068	273,976	303,161	297,831
Motor vehicles, trailers, and semi-trailers	EU-27	C29	119,650	150,148	169,351	167,248	183,733	214,479	210,770	156,719	197,552	227,826	207,686	220,851	245,203	222,951	241,804	258,503	272,254	255,972	211,241	252,652	246,503	279,957	275,773
Air and spacecraft and related machinery	EU-27	C303	16,146	18,270	19,221	21,753	23,511	27,367	33,640	30,639	30,939	33,245	34,375	38,548	41,839	37,369	39,191	43,869	46,024	46,730	37,857	43,271	42,687	50,303	55,311
Railroad, military vehicles, and transport equipment nec	EU-27	C30X	7,818	9,381	7,844	10,200	11,486	13,280	16,038	14,985	13,531	13,252	12,771	13,102	13,960	12,427	12,256	12,109	13,732	13,328	12,342	15,746	15,278	16,163	16,355
Medical and dental instruments and supplies	EU-27	C325	26,111	31,370	34,352	34,843	37,582	42,056	47,614	44,513	43,655	47,774	44,541	44,703	45,230	46,099	45,177	50,275	56,851	54,926	58,347	65,081	66,101	68,236	69,428
KTI service industries	EU-27		203,914	247,011	285,915	300,926	324,115	384,717	433,098	407,529	406,330	455,113	433,717	474,122	494,784	435,793	459,155	502,883	574,801	587,619	603,458	671,804	641,930	712,884	758,666
Software publishing	EU-27	J582	13,756	15,664	18,635	20,189	21,974	26,030	32,811	32,513	34,694	41,437	36,938	38,857	41,975	38,098	40,789	46,074	59,144	65,336	70,306	79,342	74,198	79,588	86,067
IT and other information services	EU-27	J62–63	127,538	152,971	176,517	185,897	201,381	241,897	271,725	252,376	248,404	280,385	271,245	297,086	311,999	275,401	293,058	323,219	371,688	379,015	386,206	432,462	415,111	470,182	502,482
Scientific R&D	EU-27	M72	62,620	78,376	90,763	94,840	100,760	116,791	128,562	122,640	123,232	133,292	125,533	138,179	140,810	122,294	125,308	133,590	143,969	143,268	146,946	160,000	152,621	163,114	170,117
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	EU-27		11.4	11.1	11.0	10.9	11.1	11.2	10.9	10.2	10.9	11.2	11.3	11.4	11.7	12.4	12.6	12.7	12.9	12.9	12.9	13.1	13.1	13.1	12.8
KTI manufacturing industries/ all KTI (%)	EU-27		74.8	74.7	74.2	73.7	73.7	73.3	72.2	69.3	70.8	70.7	70.1	69.1	69.1	70.3	69.9	69.3	68.1	66.7	65.3	65.9	66.4	66.0	64.5
KTI service industries/ all KTI (%)	EU-27		25.2	25.3	25.8	26.3	26.3	26.7	27.8	30.7	29.2	29.3	29.9	30.9	30.9	29.7	30.1	30.7	31.9	33.3	34.7	34.1	33.6	34.0	35.5
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	France	A–U	1,347,198	1,658,644	1,903,677	1,971,242	2,075,602	2,384,929	2,623,752	2,432,094	2,380,895	2,570,329	2,409,590	2,522,486	2,556,921	2,182,051	2,208,753	2,306,041	2,480,962	2,428,378	2,357,709	2,623,448	2,483,076	2,719,299	2,809,860
All manufacturing	France	C (10–33)	200,112	237,948	264,746	265,975	269,551	307,142	322,337	283,051	271,690	295,710	274,951	288,660	290,932	251,965	250,951	258,540	274,871	269,851	244,268	269,862	266,517	290,146	288,503
Total private services	France	G–N	686,283	852,466	985,470	1,031,138	1,099,863	1,272,103	1,409,022	1,293,602	1,272,829	1,370,136	1,280,127	1,339,001	1,358,547	1,165,796	1,185,953	1,236,430	1,333,491	1,312,441	1,272,443	1,430,301	1,375,568	1,434,154	1,507,211
All KTI industries	France		143,954	170,985	190,608	193,394	203,242	230,787	250,513	226,056	221,379	237,642	223,688	237,918	243,032	210,923	215,867	225,764	246,269	245,464	237,414	261,978	250,955	279,345	289,018
KTI manufacturing industries	France		81,575	95,757	105,084	105,683	108,616	122,078	129,122	111,893	109,519	115,262	107,683	114,974	116,801	102,445	102,233	104,446	112,325	112,078	97,380	107,394	104,717	122,178	123,555
Chemicals and chemical products	France	C20	10,069	12,000	13,543	14,301	14,454	16,792	18,646	17,133	16,125	18,372	17,099	19,686	20,444	18,411	17,652	19,473	19,813	19,783	18,021	18,517	20,610	20,338	20,201
Pharmaceutical, medicinal chemical, and botanical products	France	C21	10,661	13,581	14,496	15,130	16,787	17,639	17,903	16,291	15,463	16,256	14,802	15,804	15,057	13,393	13,345	13,594	14,250	13,896	13,633	15,458	14,097	15,999	18,033
Weapons and ammunition	France	C252	918	1,032	1,037	1,056	1,303	1,481	1,325	1,238	1,215	1,297	1,228	1,342	1,326	1,112	1,096	845	726	1,184	1,141	1,282	1,148	1,343	1,558
Computer, electronic, and optical products	France	C26	12,084	13,430	14,793	13,569	13,614	15,099	15,036	12,739	12,809	13,087	12,037	12,587	12,535	10,756	10,914	11,220	11,771	12,178	11,536	11,649	12,109	14,739	16,207
Electrical equipment	France	C27	8,189	9,275	10,675	10,025	9,750	11,483	12,165	10,709	10,099	10,438	9,838	10,206	9,986	8,155	8,179	8,412	8,946	8,527	7,433	8,058	7,652	9,816	9,678
Machinery and equipment nec	France	C28	12,637	15,220	17,247	17,295	18,201	20,880	22,403	17,617	16,681	19,214	17,974	17,968	18,538	15,110	14,610	14,559	15,351	15,294	14,088	16,607	14,044	18,439	17,447
Motor vehicles, trailers, and semi-trailers	France	C29	16,706	19,441	22,527	20,581	19,403	21,249	20,967	16,495	18,366	19,017	15,885	16,019	16,168	14,309	14,532	15,230	15,370	15,092	11,973	14,459	14,708	17,356	15,334
Air and spacecraft and related machinery	France	C303	6,410	7,284	5,630	8,703	9,862	11,490	13,980	12,802	11,984	12,133	13,072	14,930	16,118	15,640	16,170	15,939	20,179	20,264	13,909	14,805	14,015	17,585	18,347
Railroad, military vehicles, and transport equipment nec	France	C30X	1,206	1,237	1,571	1,531	1,679	1,948	2,554	2,725	2,756	1,199	1,857	2,068	2,252	1,985	1,971	1,802	2,165	2,225	2,053	2,690	2,649	2,652	2,706

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Medical and dental instruments and supplies	France	C325	2,694	3,257	3,564	3,490	3,564	4,016	4,143	4,144	4,020	4,250	3,889	4,363	4,376	3,575	3,765	3,373	3,752	3,635	3,593	3,869	3,684	3,910	4,044
KTI service industries	France		62,379	75,228	85,524	87,712	94,626	108,709	121,390	114,162	111,860	122,379	116,006	122,944	126,231	108,477	113,634	121,317	133,944	133,386	140,033	154,583	146,238	157,166	165,463
Software publishing	France	J582	3,051	3,488	4,028	4,327	4,751	5,315	7,272	7,098	7,070	7,737	8,097	8,160	8,486	7,446	8,179	8,925	9,787	9,427	12,508	14,374	12,372	12,478	13,489
IT and other information services	France	J62–63	32,933	39,552	44,967	45,880	50,448	58,425	64,838	59,097	57,557	62,382	59,620	62,811	64,761	56,576	60,222	65,448	73,944	75,015	76,312	86,734	84,062	91,503	98,362
Scientific R&D	France	M72	26,395	32,189	36,529	37,504	39,427	44,969	49,280	47,967	47,233	52,261	48,289	51,973	52,984	44,456	45,233	46,945	50,214	48,943	51,214	53,476	49,805	53,186	53,611
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	France		10.7	10.3	10.0	9.8	9.8	9.7	9.5	9.3	9.3	9.2	9.3	9.4	9.5	9.7	9.8	9.8	9.9	10.1	10.1	10.0	10.1	10.3	10.3
KTI manufacturing industries/ all KTI (%)	France		56.7	56.0	55.1	54.6	53.4	52.9	51.5	49.5	49.5	48.5	48.1	48.3	48.1	48.6	47.4	46.3	45.6	45.7	41.0	41.0	41.7	43.7	42.7
KTI service industries/ all KTI (%)	France		43.3	44.0	44.9	45.4	46.6	47.1	48.5	50.5	50.5	51.5	51.9	51.7	51.9	51.4	52.6	53.7	54.4	54.3	59.0	59.0	58.3	56.3	57.3
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	Germany	A–U	1,871,775	2,253,912	2,545,797	2,572,244	2,706,003	3,076,546	3,350,738	3,047,310	3,053,522	3,362,202	3,168,286	3,356,359	3,496,465	3,018,902	3,122,050	3,309,742	3,570,075	3,477,173	3,489,891	3,845,417	3,662,034	3,994,676	4,106,918
All manufacturing	Germany	C (10–33)	409,755	495,331	562,984	570,782	618,180	713,435	747,199	601,013	668,879	757,769	711,004	743,753	785,499	682,923	716,450	750,250	795,597	737,918	704,282	784,432	728,693	811,628	795,084
Total private services	Germany	G–N	900,945	1,086,751	1,225,011	1,243,843	1,304,166	1,484,256	1,617,214	1,498,677	1,442,073	1,586,018	1,481,113	1,579,213	1,643,352	1,422,227	1,457,633	1,543,032	1,668,790	1,633,789	1,650,206	1,809,276	1,730,457	1,878,945	1,957,576
All KTI industries	Germany		283,537	346,338	393,346	400,822	434,396	511,455	538,056	439,176	494,391	572,577	541,391	574,402	615,809	535,225	564,033	601,113	647,939	610,357	582,848	653,746	613,464	687,274	679,817
KTI manufacturing industries	Germany		236,440	290,713	329,748	333,906	363,903	425,517	445,149	351,871	409,011	469,209	439,270	458,921	493,532	429,432	454,011	482,493	512,488	472,150	439,675	495,284	463,998	517,804	502,734
Chemicals and chemical products	Germany	C20	33,644	38,923	43,474	43,546	44,210	51,349	55,032	47,314	53,121	56,488	51,141	53,014	55,584	50,396	52,589	56,013	55,110	50,668	52,167	58,502	50,310	52,942	52,613
Pharmaceutical, medicinal chemical, and botanical products	Germany	C21	12,504	16,793	19,629	22,044	23,545	26,982	31,294	28,523	27,198	29,602	28,403	29,553	31,318	25,289	28,134	24,755	29,948	29,015	30,488	33,989	33,982	39,434	39,416
Weapons and ammunition	Germany	C252	613	793	816	868	1,003	1,112	1,185	1,299	1,259	1,290	1,443	1,500	1,400	1,196	1,397	1,260	1,671	1,613	1,716	1,895	1,920	2,515	3,050
Computer, electronic, and optical products	Germany	C26	25,086	31,570	37,819	37,842	39,725	49,903	47,858	34,954	39,688	44,894	40,585	43,025	45,208	42,296	44,600	45,542	51,107	48,332	45,203	46,456	42,213	47,689	46,512
Electrical equipment	Germany	C27	29,792	35,556	41,595	40,314	45,485	48,176	53,982	46,511	51,679	57,312	52,290	54,474	57,259	45,775	47,500	50,361	53,751	48,135	46,682	49,911	45,663	51,187	43,835
Machinery and equipment nec	Germany	C28	58,328	70,504	82,263	84,181	91,901	110,715	122,913	90,526	100,372	118,306	111,598	116,588	122,054	104,038	106,663	115,580	125,134	114,261	109,627	122,956	111,221	120,794	113,513
Motor vehicles, trailers, and semi-trailers	Germany	C29	62,261	79,462	86,619	85,650	97,283	114,024	108,133	80,174	110,419	132,578	126,070	132,780	150,399	133,959	146,622	155,809	162,985	149,166	123,887	146,609	143,593	164,728	163,147
Air and spacecraft and related machinery	Germany	C303	5,046	5,685	7,583	6,734	6,744	8,123	9,397	8,278	9,715	9,892	10,617	10,935	11,824	10,446	10,802	14,730	12,424	12,775	11,840	14,652	15,138	17,326	19,433
Railroad, military vehicles, and transport equipment nec	Germany	C30X	1,855	2,257	89	2,610	2,820	2,767	2,800	3,002	2,854	3,162	2,852	2,695	3,446	3,382	3,250	3,049	3,377	2,803	2,884	3,928	3,942	3,996	3,892
Medical and dental instruments and supplies	Germany	C325	7,310	9,169	9,860	10,117	11,187	12,365	12,556	11,290	12,706	15,684	14,272	14,355	15,041	12,656	12,455	15,393	16,980	15,382	15,180	16,386	16,017	17,193	17,323
KTI service industries	Germany		47,097	55,625	63,598	66,915	70,493	85,938	92,907	87,305	85,380	103,368	102,120	115,481	122,277	105,793	110,022	118,621	135,451	138,208	143,173	158,462	149,466	169,470	177,083
Software publishing	Germany	J582	883	991	1,151	1,239	1,335	1,640	599	594	768	2,783	2,699	2,966	3,288	2,747	2,648	2,880	1,766	1,927	3,324	3,594	3,319	3,742	3,995
IT and other information services	Germany	J62–63	33,481	38,534	44,465	47,412	50,759	62,928	68,418	63,183	61,708	75,578	74,886	85,822	91,366	77,813	81,999	88,463	103,707	105,151	107,890	119,402	112,570	130,865	136,789
Scientific R&D	Germany	M72	12,733	16,100	17,981	18,265	18,399	21,370	23,890	23,528	22,905	25,007	24,535	26,693	27,624	25,232	25,375	27,279	29,979	31,131	31,960	35,465	33,577	34,863	36,298
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	Germany		15.1	15.4	15.5	15.6	16.1	16.6	16.1	14.4	16.2	17.0	17.1	17.1	17.6	17.7	18.1	18.2	18.1	17.6	16.7	17.0	16.8	17.2	16.6
KTI manufacturing industries/ all KTI (%)	Germany		83.4	83.9	83.8	83.3	83.8	83.2	82.7	80.1	82.7	81.9	81.1	79.9	80.1	80.2	80.5	80.3	79.1	77.4	75.4	75.8	75.6	75.3	74.0
KTI service industries/ all KTI (%)	Germany		16.6	16.1	16.2	16.7	16.2	16.8	17.3	19.9	17.3	18.1	18.9	20.1	19.9	19.8	19.5	19.7	20.9	22.6	24.6	24.2	24.4	24.7	26.0
Millions of current U.S. dollars																									
All ISIC, Rev.4, industries	India	A–U	471,275	550,941	640,893	754,403	861,874	1,085,936	1,189,016	1,234,350	1,549,162	1,737,061	1,674,016	1,726,274	1,855,274	1,910,291	2,019,455	2,314,643	2,457,613	2,569,301	2,383,262	2,821,370	3,066,782	3,176,730	3,455,841
All manufacturing	India	C (10–33)	79,781	93,442	111,286	131,556	162,493	199,799	216,721	225,478	284,335	302,115	288,709	286,400	301,913	322,108	339,628	380,720	406,497	389,825	355,335	447,988	445,706	453,198	464,014
Total private services	India	G–N	161,847	192,827	226,047	270,580	312,016	395,638	435,830	439,655	553,096	625,831	629,472	660,189	724,016	753,923	800,073	910,742	969,801	1,036,088	919,501	1,089,824	1,239,329	1,289,271	1,447,899

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
All KTI industries	India		30,780	36,441	44,773	53,546	60,954	77,286	83,642	90,583	110,918	133,361	124,953	127,458	141,782	159,487	168,765	189,926	199,626	200,770	190,267	229,120	249,910	255,888	278,709
KTI manufacturing industries	India		19,702	23,381	28,737	34,317	38,693	48,481	50,327	54,044	65,093	79,892	70,453	64,418	70,149	80,650	80,773	88,561	94,809	90,334	92,207	111,369	115,367	116,045	122,311
Chemicals and chemical products	India	C20	5,271	6,011	7,072	8,074	8,931	11,716	12,827	13,305	15,775	21,689	16,721	15,908	15,614	21,114	20,259	22,137	23,384	23,555	25,074	30,120	32,636	33,463	33,967
Pharmaceutical, medicinal chemical, and botanical products	India	C21	3,039	3,438	4,306	5,075	5,614	7,365	8,063	7,915	9,534	13,722	11,486	12,344	13,292	14,276	14,517	15,691	17,247	17,377	19,450	23,284	21,959	22,671	23,234
Weapons and ammunition	India	C252	6	8	10	8	9	12	13	28	25	29	20	43	40	42	62	49	68	49	206	502	477	440	466
Computer, electronic, and optical products	India	C26	2,480	2,882	2,985	3,653	4,051	4,743	4,257	4,390	4,838	4,326	3,955	4,200	3,869	4,481	4,791	4,968	5,116	4,578	4,975	6,165	5,908	4,454	4,708
Electrical equipment	India	C27	2,456	2,728	3,292	4,949	5,501	6,300	5,970	6,491	8,104	8,260	7,553	6,855	6,621	7,604	7,720	8,236	8,436	7,727	7,346	8,794	7,851	7,854	8,640
Machinery and equipment nec	India	C28	3,329	3,873	5,267	6,118	6,952	8,888	9,732	9,142	10,981	13,128	12,414	9,379	10,824	11,259	11,609	14,213	13,819	12,989	13,425	15,261	16,067	16,297	17,934
Motor vehicles, trailers, and semi-trailers	India	C29	1,974	2,959	3,916	4,256	5,104	6,472	6,400	8,909	10,657	13,381	13,248	10,771	14,090	16,091	15,633	15,987	18,492	15,296	14,280	18,326	21,033	21,583	23,614
Air and spacecraft and related machinery	India	C303	34	49	71	62	73	85	87	27	43	44	153	166	254	203	248	308	455	450	417	640	674	689	754
Railroad, military vehicles, and transport equipment nec	India	C30X	915	1,199	1,490	1,774	2,081	2,414	2,469	3,180	4,376	4,335	4,060	3,795	4,339	4,498	4,647	5,515	6,299	6,645	5,370	5,898	6,257	6,392	6,899
Medical and dental instruments and supplies	India	C325	197	234	328	347	375	487	511	656	759	978	843	958	1,207	1,083	1,286	1,456	1,492	1,668	1,663	2,379	2,504	2,203	2,095
KTI service industries	India		11,078	13,060	16,037	19,229	22,261	28,805	33,315	36,538	45,825	53,469	54,501	63,039	71,633	78,837	87,992	101,365	104,817	110,436	98,060	117,750	134,543	139,843	156,398
Software publishing	India	J582	472	579	558	839	987	1,260	1,304	1,361	1,194	1,395	1,287	1,356	1,321	1,326	1,422	1,598	1,579	1,693	1,405	1,668	1,919	1,940	2,150
IT and other information services	India	J62–63	7,789	9,165	11,367	13,505	15,624	20,228	23,543	25,740	32,688	38,233	35,560	40,904	45,115	50,313	54,445	61,893	62,373	65,899	53,487	64,589	75,243	76,856	86,636
Scientific R&D	India	M72	2,817	3,315	4,111	4,885	5,651	7,316	8,468	9,438	11,943	13,840	17,654	20,780	25,197	27,198	32,125	37,874	40,865	42,844	43,169	51,494	57,382	61,046	67,612
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	India		6.5	6.6	7.0	7.1	7.1	7.1	7.0	7.3	7.2	7.7	7.5	7.4	7.6	8.3	8.4	8.2	8.1	7.8	8.0	8.1	8.1	8.1	8.1
KTI manufacturing industries/ all KTI (%)	India		64.0	64.2	64.2	64.1	63.5	62.7	60.2	59.7	58.7	59.9	56.4	50.5	49.5	50.6	47.9	46.6	47.5	45.0	48.5	48.6	46.2	45.3	43.9
KTI service industries/ all KTI (%)	India		36.0	35.8	35.8	35.9	36.5	37.3	39.8	40.3	41.3	40.1	43.6	49.5	50.5	49.4	52.1	53.4	52.5	55.0	51.5	51.4	53.8	54.7	56.1
			Millions of current U.S. dollars																						
All ISIC, Rev.4, industries	Italy	A–U	1,146,637	1,424,106	1,627,449	1,672,987	1,745,307	1,984,189	2,161,969	1,980,494	1,919,547	2,059,055	1,873,381	1,927,227	1,940,673	1,650,346	1,684,397	1,755,677	1,876,361	1,803,823	1,712,450	1,895,293	1,802,617	1,977,160	2,030,650
All manufacturing	Italy	C (10–33)	213,755	253,974	286,744	288,639	303,980	352,645	370,784	300,587	303,638	325,854	289,059	297,214	301,766	264,285	277,450	291,892	313,851	299,356	276,333	319,589	283,708	317,834	312,095
Total private services	Italy	G–N	582,951	731,115	834,281	860,522	892,230	1,017,521	1,107,626	1,030,106	997,716	1,074,518	982,593	1,011,448	1,029,441	879,766	898,330	937,450	1,000,666	966,132	906,431	989,397	940,744	1,043,319	1,090,583
All KTI industries	Italy		106,146	127,099	143,986	145,249	155,070	179,009	192,825	165,777	169,323	181,122	164,938	171,900	172,637	153,616	161,853	172,516	184,338	176,265	171,860	190,221	172,913	193,779	195,172
KTI manufacturing industries	Italy		74,874	88,822	101,772	101,639	109,181	126,333	134,958	109,840	115,149	123,764	111,880	116,368	116,215	104,810	110,997	118,033	125,333	119,975	116,157	130,342	116,747	131,541	129,971
Chemicals and chemical products	Italy	C20	9,267	10,407	11,761	11,739	12,006	13,766	13,629	11,732	12,965	13,412	12,281	13,009	10,214	12,085	13,296	13,701	14,516	13,303	13,531	15,197	13,082	14,152	14,025
Pharmaceutical, medicinal chemical, and botanical products	Italy	C21	7,867	9,560	10,225	9,718	9,738	10,725	12,066	11,164	11,042	11,909	10,909	11,480	10,861	9,858	10,272	10,376	10,836	11,314	11,763	12,467	12,141	14,960	15,125
Weapons and ammunition	Italy	C252	561	696	694	632	701	837	899	881	846	923	974	850	938	794	626	679	763	811	806	1,148	1,068	1,139	956
Computer, electronic, and optical products	Italy	C26	7,349	8,578	9,894	10,122	10,445	11,822	12,025	10,223	10,720	11,870	10,728	10,552	10,625	9,224	8,926	9,361	9,978	9,797	9,788	9,290	8,242	9,390	9,498
Electrical equipment	Italy	C27	9,115	11,086	12,952	13,291	14,139	16,193	17,293	14,176	14,764	15,672	14,107	14,409	13,573	11,960	12,316	12,689	13,309	12,821	12,879	13,434	11,498	13,019	13,488
Machinery and equipment nec	Italy	C28	23,882	29,588	34,325	35,264	38,693	45,622	49,375	38,099	39,590	44,371	41,146	43,583	45,513	38,638	40,055	42,636	45,824	44,008	42,617	49,982	44,266	49,424	48,847
Motor vehicles, trailers, and semi-trailers	Italy	C29	9,962	11,633	13,498	13,058	14,750	17,586	17,121	12,856	14,375	14,868	11,920	13,277	13,812	13,227	15,263	17,234	17,895	16,030	13,331	16,464	14,661	15,902	13,504
Air and spacecraft and related machinery	Italy	C303	2,026	1,783	2,222	2,232	2,442	2,848	4,776	4,340	4,022	4,186	4,072	3,628	4,503	3,587	4,609	4,701	4,948	4,717	4,568	4,522	4,413	5,747	6,761
Railroad, military vehicles, and transport equipment nec	Italy	C30X	1,866	2,234	2,650	2,213	2,422	2,824	3,348	2,496	2,589	1,976	2,116	1,867	2,290	1,956	1,926	1,931	2,026	2,081	2,018	2,455	2,199	2,225	2,313
Medical and dental instruments and supplies	Italy	C325	2,981	3,257	3,550	3,369	3,846	4,111	4,426	3,872	4,235	4,577	3,626	3,714	3,885	3,481	3,708	4,724	5,238	5,093	4,857	5,382	5,177	5,584	5,454
KTI service industries	Italy		31,272	38,277	42,213	43,610	45,889	52,676	57,867	55,937	54,174	57,358	53,059	55,532	56,421	48,806	50,856	54,483	59,005	56,291	55,703	59,879	56,166	62,238	65,201

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Software publishing	Italy	J582	140	148	169	208	213	238	248	257	257	149	170	196	203	169	224	188	182	209	224	235	214	221	229
IT and other information services	Italy	J62–63	19,907	23,858	25,655	26,112	26,762	31,058	34,431	33,690	32,512	35,301	32,617	34,226	35,557	31,275	33,369	36,238	39,469	37,318	36,781	39,383	36,778	41,895	44,003
Scientific R&D	Italy	M72	11,224	14,271	16,390	17,290	18,914	21,380	23,188	21,990	21,406	21,908	20,272	21,111	20,661	17,361	17,263	18,057	19,354	18,764	18,697	20,262	19,174	20,122	20,970
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	Italy		9.3	8.9	8.8	8.7	8.9	9.0	8.9	8.4	8.8	8.8	8.8	8.9	8.9	9.3	9.6	9.8	9.8	9.8	10.0	10.0	9.6	9.8	9.6
KTI manufacturing industries/ all KTI (%)	Italy		70.5	69.9	70.7	70.0	70.4	70.6	70.0	66.3	68.0	68.3	67.8	67.7	67.3	68.2	68.6	68.4	68.0	68.1	67.6	68.5	67.5	67.9	66.6
KTI service industries/ all KTI (%)	Italy		29.5	30.1	29.3	30.0	29.6	29.4	30.0	33.7	32.0	31.7	32.2	32.3	32.7	31.8	31.4	31.6	32.0	31.9	32.4	31.5	32.5	32.1	33.4
			Millions of current U.S. dollars																						
All ISIC, Rev.4, industries	Japan	A–U	4,179,998	4,523,770	4,902,316	4,853,553	4,610,763	4,589,419	5,111,704	5,295,009	5,758,406	6,199,971	6,235,333	5,176,179	4,861,893	4,419,346	4,983,880	4,908,090	5,012,131	5,075,707	5,007,956	4,970,941	4,203,684	4,151,974	3,963,928
All manufacturing	Japan	C (10–33)	866,464	945,361	1,033,460	1,035,061	984,722	1,001,844	1,086,395	1,007,526	1,195,940	1,217,618	1,233,281	1,007,170	960,358	909,644	1,014,764	1,007,583	1,039,137	1,027,662	1,002,927	1,018,318	852,057	817,413	753,320
Total private services	Japan	G–N	2,044,563	2,225,354	2,431,088	2,427,535	2,312,055	2,305,141	2,592,827	2,717,092	2,901,863	3,188,882	3,201,951	2,670,339	2,482,240	2,212,866	2,487,180	2,444,873	2,487,541	2,516,159	2,467,740	2,467,275	2,075,737	2,054,668	1,993,241
All KTI industries	Japan		568,225	626,582	684,127	688,824	666,038	684,519	774,838	727,280	839,844	868,709	879,734	715,007	688,926	642,149	714,766	713,105	738,054	730,721	664,000	669,676	554,242	539,882	507,668
KTI manufacturing industries	Japan		449,805	498,768	548,957	554,503	536,002	552,985	589,271	528,155	633,188	648,041	653,943	524,756	504,401	478,288	530,912	531,761	553,596	538,416	519,936	526,763	432,944	417,728	388,276
Chemicals and chemical products	Japan	C20	50,228	54,197	57,070	54,012	50,096	50,287	54,718	59,936	68,936	72,068	70,374	59,414	55,394	56,465	66,473	64,348	64,926	67,584	60,492	61,516	36,752	32,712	30,001
Pharmaceutical, medicinal chemical, and botanical products	Japan	C21	34,649	38,806	40,797	40,472	37,756	36,268	37,904	44,325	50,418	53,698	53,549	41,919	35,998	36,481	43,689	40,383	40,746	42,499	43,470	47,179	48,972	50,149	51,460
Weapons and ammunition	Japan	C252	658	710	726	772	709	533	989	1,175	1,238	1,328	2,228	1,408	703	1,286	957	1,034	1,113	1,029	1,077	860	734	746	717
Computer, electronic, and optical products	Japan	C26	95,646	110,878	121,518	116,040	112,107	116,366	118,486	103,327	124,562	120,111	103,288	83,596	80,620	75,026	79,192	76,844	83,243	75,953	77,935	72,210	65,942	64,852	62,191
Electrical equipment	Japan	C27	54,668	60,861	65,832	66,233	64,754	66,342	69,144	63,081	73,400	76,918	75,434	61,081	62,685	54,783	60,435	62,899	69,104	67,152	68,722	62,146	56,639	58,945	53,262
Machinery and equipment nec	Japan	C28	98,135	110,723	128,611	133,056	134,450	139,984	159,450	128,043	152,440	173,297	178,044	141,904	137,379	130,661	144,916	149,972	159,765	156,332	156,617	166,784	125,795	115,041	104,996
Motor vehicles, trailers, and semi-trailers	Japan	C29	99,616	106,416	116,064	127,635	120,649	127,271	130,795	108,389	141,593	129,260	153,609	120,824	118,227	108,530	117,053	119,443	118,021	112,576	97,013	102,625	85,189	82,399	72,357
Air and spacecraft and related machinery	Japan	C303	6,004	5,995	7,137	6,236	6,101	6,244	6,824	7,780	8,278	8,324	6,188	6,501	5,795	5,302	8,770	7,471	7,155	6,857	5,263	3,726	4,322	4,842	5,943
Railroad, military vehicles, and transport equipment nec	Japan	C30X	6,551	6,542	7,788	6,804	6,657	6,813	7,446	8,490	9,033	9,082	7,789	4,799	4,436	6,540	6,033	5,803	5,547	4,038	3,834	4,231	3,934	3,533	3,125
Medical and dental instruments and supplies	Japan	C325	3,651	3,641	3,414	3,244	2,723	2,878	3,516	3,609	3,290	3,954	3,441	3,310	3,164	3,213	3,393	3,564	3,975	4,396	5,514	5,485	4,666	4,510	4,224
KTI service industries	Japan		118,419	127,814	135,169	134,321	130,036	131,533	185,567	199,125	206,657	220,668	225,791	190,251	184,525	163,862	183,854	181,344	184,458	192,305	144,064	142,913	121,298	122,154	119,392
Software publishing	Japan	J582	8,551	9,270	10,681	10,436	9,759	8,491	9,369	10,555	10,802	11,681	10,869	9,838	9,994	9,449	10,632	10,001	10,150	10,110	10,290	9,976	8,293	7,470	6,632
IT and other information services	Japan	J62–63	96,202	104,033	108,928	109,881	106,727	109,507	127,890	131,345	133,380	141,324	143,278	117,836	108,666	97,547	109,386	108,282	111,459	116,399	116,385	115,479	97,989	99,756	98,131
Scientific R&D	Japan	M72	13,666	14,511	15,561	14,005	13,550	13,536	48,308	57,224	62,474	67,662	71,644	62,576	65,865	56,865	63,836	63,060	62,849	65,796	17,388	17,458	15,016	14,928	14,629
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	Japan		13.6	13.9	14.0	14.2	14.4	14.9	15.2	13.7	14.6	14.0	14.1	13.8	14.2	14.5	14.3	14.5	14.7	14.4	13.3	13.5	13.2	13.0	12.8
KTI manufacturing industries/ all KTI (%)	Japan		79.2	79.6	80.2	80.5	80.5	80.8	76.1	72.6	75.4	74.6	74.3	73.4	73.2	74.5	74.3	74.6	75.0	73.7	78.3	78.7	78.1	77.4	76.5
KTI service industries/ all KTI (%)	Japan		20.8	20.4	19.8	19.5	19.5	19.2	23.9	27.4	24.6	25.4	25.7	26.6	26.8	25.5	25.7	25.4	25.0	26.3	21.7	21.3	21.9	22.6	23.5
			Millions of current U.S. dollars																						
All ISIC Rev.4, industries	South Korea	A–U	579,990	650,327	737,127	865,869	974,706	1,082,820	965,767	873,915	1,058,212	1,166,316	1,186,851	1,271,653	1,374,616	1,344,559	1,372,834	1,485,299	1,577,874	1,512,235	1,501,796	1,656,123	1,530,291	1,562,953	1,589,290
All manufacturing	South Korea	C (10–33)	152,119	167,488	203,063	236,537	261,888	294,948	267,206	242,521	314,027	353,792	355,877	381,418	402,352	389,984	395,396	437,574	459,449	416,539	407,703	463,508	429,365	404,821	409,240
Total private services	South Korea	G–N	262,609	291,209	319,631	377,871	427,503	474,982	426,645	378,627	452,345	497,431	506,254	537,152	583,418	568,800	577,629	616,926	662,267	652,273	644,506	708,111	667,040	703,824	724,635
All KTI industries	South Korea		103,498	115,621	141,391	163,635	187,092	211,995	187,160	177,414	230,626	264,723	272,780	295,693	322,319	301,741	308,770	353,720	382,365	357,117	360,756	409,769	376,129	364,906	384,505
KTI manufacturing industries	South Korea		77,470	86,298	107,579	122,119	137,123	155,500	135,518	129,803	174,512	200,584	206,870	223,695	234,676	227,381	231,437	269,236	287,049	261,376	262,581	300,046	272,554	255,362	267,289

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Chemicals and chemical products	South Korea	C20	12,686	13,852	17,076	18,878	19,811	22,508	20,652	19,119	24,879	32,449	32,232	33,706	34,393	33,674	34,189	35,966	36,767	33,179	31,618	40,600	31,880	26,910	26,698
Pharmaceutical, medicinal chemical, and botanical products	South Korea	C21	2,647	2,839	3,331	4,206	4,690	5,201	4,611	4,258	4,127	4,666	4,470	4,794	5,440	5,923	6,374	7,177	7,820	7,936	8,532	9,544	11,200	11,959	14,229
Weapons and ammunition	South Korea	C252	186	262	334	559	626	758	757	709	1,037	1,084	973	1,037	1,350	1,763	2,065	2,057	2,107	1,821	1,713	2,283	2,302	2,305	3,140
Computer, electronic, and optical products	South Korea	C26	28,708	31,924	42,978	46,828	52,442	59,518	50,943	53,639	72,951	81,802	83,463	91,433	95,365	90,060	93,925	121,739	134,814	116,352	119,720	135,638	125,282	107,977	117,915
Electrical equipment	South Korea	C27	7,578	8,566	10,608	11,538	13,505	14,633	13,773	13,574	18,612	20,279	21,087	23,454	24,966	23,447	22,640	24,503	26,627	28,733	28,170	27,583	28,767	38,150	36,547
Machinery and equipment nec	South Korea	C28	11,253	12,988	14,817	18,410	20,999	23,549	21,297	17,968	24,794	27,766	28,642	30,804	33,181	32,747	32,339	39,309	40,211	37,605	40,005	46,120	38,299	34,964	35,505
Motor vehicles, trailers, and semi-trailers	South Korea	C29	12,328	13,793	16,321	19,458	22,519	26,506	20,998	17,895	24,864	29,090	32,382	34,518	36,018	36,146	35,578	34,863	34,267	31,083	28,537	33,549	30,231	28,578	28,210
Air and spacecraft and related machinery	South Korea	C303	283	281	345	396	570	679	572	577	920	834	946	1,272	1,318	1,348	1,942	1,377	1,842	2,039	1,296	1,323	1,406	1,523	1,736
Railroad, military vehicles, and transport equipment nec	South Korea	C30X	978	915	891	857	864	881	749	910	1,149	1,094	1,083	946	872	795	837	700	775	688	610	740	719	651	1,010
Medical and dental instruments and supplies	South Korea	C325	824	878	878	991	1,097	1,265	1,166	1,154	1,180	1,520	1,593	1,730	1,774	1,479	1,548	1,545	1,819	1,940	2,379	2,665	2,468	2,346	2,299
KTI service industries	South Korea		26,028	29,323	33,812	41,515	49,969	56,495	51,642	47,610	56,114	64,138	65,910	71,999	87,643	74,360	77,333	84,484	95,317	95,741	98,175	109,723	103,575	109,544	117,216
Software publishing	South Korea	J582	3,924	3,991	4,596	5,686	6,702	7,336	6,731	7,022	8,096	10,530	10,197	12,118	13,619	11,676	12,934	13,172	18,097	18,676	19,713	21,897	20,541	19,597	21,784
IT and other information services	South Korea	J62–63	9,255	10,184	11,471	14,413	17,419	19,528	16,809	14,830	17,018	19,029	20,810	20,542	22,052	24,579	25,326	28,137	29,193	29,010	29,428	32,769	30,768	33,803	36,315
Scientific R&D	South Korea	M72	12,849	15,147	17,745	21,417	25,847	29,632	28,103	25,758	31,000	34,579	34,903	39,338	51,972	38,106	39,073	43,175	48,027	48,055	49,033	55,057	52,266	56,144	59,117
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	South Korea		17.8	17.8	19.2	18.9	19.2	19.6	19.4	20.3	21.8	22.7	23.0	23.3	23.4	22.4	22.5	23.8	24.2	23.6	24.0	24.7	24.6	23.3	24.2
KTI manufacturing industries/ all KTI (%)	South Korea		74.9	74.6	76.1	74.6	73.3	73.4	72.4	73.2	75.7	75.8	75.8	75.7	72.8	75.4	75.0	76.1	75.1	73.2	72.8	73.2	72.5	70.0	69.5
KTI service industries/ all KTI (%)	South Korea		25.1	25.4	23.9	25.4	26.7	26.6	27.6	26.8	24.3	24.2	24.2	24.3	27.2	24.6	25.0	23.9	24.9	26.8	27.2	26.8	27.5	30.0	30.5
			Millions of current U.S. dollars																						
All ISIC, Rev.4, industries	United Kingdom	A–U	1,605,241	1,852,374	2,177,983	2,292,394	2,448,286	2,797,259	2,660,413	2,209,773	2,244,579	2,390,078	2,439,735	2,503,579	2,756,423	2,640,651	2,429,393	2,410,811	2,591,689	2,574,506	2,460,524	2,845,593	2,790,332	3,029,281	3,228,780
All manufacturing	United Kingdom	C (10–33)	216,673	238,772	265,929	267,635	277,024	299,637	279,402	220,906	236,593	249,882	253,599	266,444	288,042	272,523	244,925	241,599	256,641	255,573	246,698	277,297	264,625	290,460	302,348
Total private services	United Kingdom	G–N	887,276	1,026,851	1,211,432	1,274,413	1,356,694	1,575,079	1,485,912	1,235,610	1,246,999	1,333,362	1,368,284	1,408,950	1,568,284	1,512,353	1,410,296	1,394,437	1,496,630	1,476,542	1,414,701	1,657,797	1,629,797	1,768,904	1,895,054
All KTI industries	United Kingdom		142,089	162,487	185,904	193,549	203,577	226,363	217,469	171,691	185,885	202,909	201,181	203,605	223,313	213,267	199,283	197,450	214,980	214,642	210,241	240,403	231,436	258,757	275,026
KTI manufacturing industries	United Kingdom		93,872	102,812	115,454	116,706	124,369	129,065	125,068	96,263	105,557	116,641	115,086	121,101	129,754	123,352	113,416	112,302	118,589	117,271	113,993	128,292	121,135	133,962	141,034
Chemicals and chemical products	United Kingdom	C20	14,012	15,965	14,905	16,667	17,494	16,229	14,573	12,048	11,882	14,789	13,959	16,477	18,378	18,554	15,341	13,874	14,702	15,621	16,916	18,028	14,950	14,341	14,641
Pharmaceutical, medicinal chemical, and botanical products	United Kingdom	C21	14,937	16,133	18,812	19,671	22,954	24,007	25,459	21,838	21,649	21,845	19,656	18,070	18,541	17,830	17,601	16,653	17,214	17,291	19,475	22,882	22,757	28,184	30,691
Weapons and ammunition	United Kingdom	C252	794	1,019	1,538	1,740	2,075	1,995	1,870	1,522	1,723	1,801	2,186	1,988	1,995	1,694	1,454	1,436	1,564	1,677	1,502	1,878	1,457	1,601	1,652
Computer, electronic, and optical products	United Kingdom	C26	13,601	13,183	17,099	15,602	16,449	17,178	17,990	15,628	16,847	17,943	17,378	17,540	18,365	16,234	16,101	16,331	17,592	17,807	13,632	16,195	17,703	19,911	21,214
Electrical equipment	United Kingdom	C27	7,546	7,974	8,792	8,329	8,493	9,438	8,664	6,756	7,095	6,857	7,239	6,854	7,922	6,770	6,330	6,190	6,314	6,349	6,466	6,106	5,422	5,900	6,284
Machinery and equipment nec	United Kingdom	C28	17,042	19,238	21,295	21,311	21,699	24,141	21,266	12,875	17,976	20,764	21,964	23,740	24,810	22,609	18,835	19,175	21,503	19,242	20,435	24,166	21,390	23,020	24,128
Motor vehicles, trailers, and semi-trailers	United Kingdom	C29	12,261	13,117	13,953	13,933	14,195	15,013	15,310	10,518	14,277	15,133	16,104	21,039	24,741	23,815	22,724	22,349	22,903	22,206	18,693	21,592	21,304	24,489	24,669
Air and spacecraft and related machinery	United Kingdom	C303	9,761	11,602	14,120	14,516	15,728	15,445	14,141	10,550	9,430	12,570	11,372	10,354	10,482	11,165	10,853	12,064	12,173	12,259	11,935	12,436	11,461	11,765	12,937
Railroad, military vehicles, and transport equipment nec	United Kingdom	C30X	818	931	1,223	1,175	1,222	1,028	1,250	690	990	1,157	1,333	1,612	1,248	1,356	995	1,024	1,122	1,147	1,571	1,410	1,018	842	881
Medical and dental instruments and supplies	United Kingdom	C325	3,099	3,650	3,716	3,762	4,059	4,591	4,546	3,837	3,685	3,782	3,896	3,426	3,271	3,326	3,182	3,205	3,502	3,672	3,368	3,597	3,673	3,910	3,937
KTI service industries	United Kingdom		48,217	59,675	70,451	76,843	79,209	97,297	92,401	75,428	80,329	86,268	86,095	82,504	93,558	89,915	85,867	85,149	96,392	97,371	96,248	112,111	110,300	124,796	133,992
Software publishing	United Kingdom	J582	951	1,006	1,206	1,285	1,311	1,562	1,070	1,070	966	1,763	1,696	1,874	2,104	1,969	1,952	2,029	2,405	2,233	2,237	2,509	2,383	2,621	2,774
IT and other information services	United Kingdom	J62–63	35,892	45,516	52,281	57,786	59,624	73,355	69,376	56,521	58,786	64,653	65,697	65,387	73,767	70,025	67,530	67,148	74,760	75,365	74,299	86,399	84,828	96,457	103,603

Table STRN-41. Value added, by industry, for the world and for selected economies: 2002–24

(Millions of current U.S. dollars, percent KTI shares)

Industry	Economy	ISIC, Rev.4, industry codes	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Scientific R&D	United Kingdom	M72	11,374	13,153	16,963	17,773	18,273	22,380	21,955	17,837	20,577	19,852	18,702	15,242	17,687	17,921	16,385	15,972	19,226	19,773	19,712	23,203	23,089	25,718	27,616
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	United Kingdom		8.9	8.8	8.5	8.4	8.3	8.1	8.2	7.8	8.3	8.5	8.2	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.5	8.4	8.3	8.5	8.5
KTI manufacturing industries/ all KTI (%)	United Kingdom		66.1	63.3	62.1	60.3	61.1	57.0	57.5	56.1	56.8	57.5	57.2	59.5	58.1	57.8	56.9	56.9	55.2	54.6	54.2	53.4	52.3	51.8	51.3
KTI service industries/ all KTI (%)	United Kingdom		33.9	36.7	37.9	39.7	38.9	43.0	42.5	43.9	43.2	42.5	42.8	40.5	41.9	42.2	43.1	43.1	44.8	45.4	45.8	46.6	47.7	48.2	48.7
			Millions of current U.S. dollars																						
All ISIC, Rev.4, industries	United States	A–U	10,929,108	11,456,450	12,217,196	13,039,197	13,815,583	14,474,228	14,769,862	14,478,067	15,048,971	15,599,732	16,253,970	16,880,683	17,608,138	18,295,019	18,804,913	19,612,102	20,656,516	21,539,982	21,354,105	23,681,171	26,006,893	27,720,709	29,171,405
All manufacturing	United States	C (10–33)	1,495,329	1,551,146	1,636,588	1,720,602	1,823,043	1,876,501	1,830,382	1,724,993	1,817,558	1,895,000	1,954,711	2,005,322	2,046,520	2,109,387	2,073,479	2,149,165	2,303,202	2,311,464	2,190,662	2,451,099	2,732,051	2,889,499	2,908,632
Total private services	United States	G–N	5,928,979	6,169,629	6,539,349	7,035,366	7,414,246	7,766,503	7,887,107	7,744,835	8,064,447	8,363,332	8,825,457	9,183,918	9,658,796	10,214,460	10,598,843	11,047,599	11,627,646	12,266,121	12,295,795	13,748,647	15,063,253	16,131,851	17,041,747
All KTI industries	United States		1,081,744	1,116,444	1,168,971	1,216,573	1,303,128	1,356,749	1,386,719	1,350,652	1,475,091	1,559,620	1,605,203	1,688,184	1,751,117	1,830,939	1,899,381	1,990,335	2,144,487	2,239,309	2,302,220	2,566,239	2,803,739	3,066,054	3,313,181
KTI manufacturing industries	United States		766,877	798,994	827,434	857,374	925,899	962,034	936,601	899,310	979,967	1,017,122	1,041,902	1,077,320	1,096,872	1,127,919	1,141,631	1,171,927	1,258,069	1,256,408	1,220,643	1,328,222	1,454,673	1,560,643	1,611,415
Chemicals and chemical products	United States	C20	110,416	110,060	121,101	119,214	135,907	144,842	141,607	144,212	172,147	175,458	180,983	187,170	186,908	181,216	190,855	191,721	221,137	199,834	197,543	252,479	284,024	280,737	276,184
Pharmaceutical, medicinal chemical, and botanical products	United States	C21	97,432	100,571	105,686	103,758	117,857	123,086	124,050	143,751	131,150	130,502	123,990	131,521	136,584	142,062	150,987	153,363	175,054	174,939	194,947	208,820	237,483	251,092	270,179
Weapons and ammunition	United States	C252	2,226	2,773	3,204	3,168	3,723	3,340	3,504	4,118	4,337	4,928	5,683	6,371	5,551	5,539	6,198	5,637	5,716	6,625	8,234	7,871	8,865	10,820	11,645
Computer, electronic, and optical products	United States	C26	173,270	193,221	201,479	211,546	224,873	229,912	230,698	221,075	230,058	229,795	230,464	230,386	233,750	244,232	243,129	250,993	262,778	269,669	277,183	295,921	302,847	312,654	334,864
Electrical equipment	United States	C27	43,690	45,545	42,063	43,212	51,425	50,296	55,513	50,640	50,777	48,309	52,152	57,504	53,360	61,391	55,987	57,627	59,751	60,072	57,697	61,160	69,873	76,111	78,953
Machinery and equipment nec	United States	C28	106,522	105,167	112,163	122,881	130,836	139,164	141,197	127,184	137,327	156,313	164,414	169,064	169,967	160,413	150,615	158,549	166,323	172,700	160,629	167,517	187,559	213,858	214,069
Motor vehicles, trailers, and semi-trailers	United States	C29	135,222	143,137	139,116	135,929	134,040	124,994	90,344	47,773	88,805	104,516	115,766	123,339	133,003	146,694	155,869	159,124	161,110	161,755	142,625	143,125	160,247	176,408	180,635
Air and spacecraft and related machinery	United States	C303	57,722	56,715	58,925	71,176	77,234	92,402	90,529	95,402	99,527	103,597	102,751	106,872	112,710	120,956	116,671	122,922	131,050	134,463	107,316	112,006	118,863	145,909	149,794
Railroad, military vehicles, and transport equipment nec	United States	C30X	7,877	8,293	8,901	9,976	10,481	12,619	14,679	12,450	11,952	13,324	13,224	14,784	14,663	14,794	16,314	14,150	14,240	14,644	15,474	17,587	18,194	19,565	21,274
Medical and dental instruments and supplies	United States	C325	32,500	33,512	34,796	36,514	39,523	41,379	44,480	52,705	53,887	50,380	52,475	50,309	50,376	50,622	55,006	57,841	60,910	61,707	58,995	61,736	66,718	73,489	73,819
KTI service industries	United States		314,867	317,450	341,537	359,199	377,229	394,715	450,118	451,342	495,124	542,498	563,301	610,864	654,245	703,020	757,750	818,408	886,418	982,901	1,081,577	1,238,017	1,349,066	1,505,411	1,701,766
Software publishing	United States	J582	56,665	59,721	69,668	77,115	74,686	88,295	92,814	92,023	100,279	109,470	117,410	126,445	134,615	139,532	154,889	172,790	185,076	214,304	241,698	282,828	295,912	341,462	392,910
IT and other information services	United States	J62–63	186,693	186,409	199,336	207,498	227,541	232,004	273,789	274,297	305,627	338,280	350,317	384,655	414,793	444,901	485,182	524,674	568,290	623,806	674,949	770,399	853,013	937,345	1,069,593
Scientific R&D	United States	M72	71,509	71,320	72,533	74,586	75,002	74,416	83,515	85,022	89,218	94,748	95,574	99,764	104,837	118,587	117,679	120,944	133,052	144,791	164,930	184,790	200,141	226,604	239,263
Analytical ratios (%)			KTI shares (%)																						
KTI/ all ISIC, Rev.4, industries (%)	United States		9.9	9.7	9.6	9.3	9.4	9.4	9.4	9.3	9.8	10.0	9.9	10.0	9.9	10.0	10.1	10.1	10.4	10.4	10.8	10.8	10.8	11.1	11.4
KTI manufacturing industries/ all KTI (%)	United States		70.9	71.6	70.8	70.5	71.1	70.9	67.5	66.6	66.4	65.2	64.9	63.8	62.6	61.6	60.1	58.9	58.7	56.1	53.0	51.8	51.9	50.9	48.6
KTI service industries/ all KTI (%)	United States		29.1	28.4	29.2	29.5	28.9	29.1	32.5	33.4	33.6	34.8	35.1	36.2	37.4	38.4	39.9	41.1	41.3	43.9	47.0	48.2	48.1	49.1	51.4

EU-27 = European Union; ISIC, Rev.4 = International Standard Industrial Classification of All Economic Activities, Revision 4; IT = information technology; KTI = knowledge and technology intensive; nec = not elsewhere classified.

Note(s):
KTI industries include high R&D intensive and medium-high R&D intensive industries based on a classification by the Organisation for Economic Co-operation and Development. Semiconductors is a subcategory of computer, electronic, and optical products manufacturing.

Source(s):
S&P Global Market Intelligence, Comparative Industry Service special tabulations, April 2025.

Table STRN-42. KTI value added, GDP, and KTI value added as a share of domestic GDP for selected economies: 2002–24

(Billions of dollars and percent share)

Economy	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
KTI value added																							
World	3,430	3,826	4,249	4,502	4,864	5,469	5,956	5,534	6,294	7,026	7,143	7,358	7,672	7,508	7,705	8,342	9,057	9,069	9,091	10,604	10,815	11,238	11,714
United States	1,082	1,116	1,169	1,217	1,303	1,357	1,387	1,351	1,475	1,560	1,605	1,688	1,751	1,831	1,899	1,990	2,144	2,239	2,302	2,566	2,804	3,066	3,313
China	218	260	293	347	423	541	701	759	937	1,145	1,284	1,445	1,588	1,646	1,654	1,873	2,141	2,123	2,202	2,823	2,832	2,796	2,877
Germany	284	346	393	401	434	511	538	439	494	573	541	574	616	535	564	601	648	610	583	654	613	687	680
Japan	568	627	684	689	666	685	775	727	840	869	880	715	689	642	715	713	738	731	664	670	554	540	508
South Korea	103	116	141	164	187	212	187	177	231	265	273	296	322	302	309	354	382	357	361	410	376	365	385
France	144	171	191	193	203	231	251	226	221	238	224	238	243	211	216	226	246	245	237	262	251	279	289
India	31	36	45	54	61	77	84	91	111	133	125	127	142	159	169	190	200	201	190	229	250	256	279
United Kingdom	142	162	186	194	204	226	217	172	186	203	201	204	223	213	199	197	215	215	210	240	231	259	275
Italy	106	127	144	145	155	179	193	166	169	181	165	172	173	154	162	173	184	176	172	190	173	194	195
Canada	63	70	76	81	87	93	90	80	94	107	110	110	108	98	97	103	109	111	99	118	126	126	127
ROW	690	794	927	1,018	1,141	1,356	1,533	1,347	1,535	1,754	1,735	1,789	1,817	1,717	1,722	1,923	2,049	2,060	2,070	2,442	2,604	2,670	2,787
GDP																							
World	35,013	39,319	44,256	47,952	51,945	58,638	64,362	60,957	66,682	74,034	75,475	77,698	79,808	75,330	76,598	81,479	86,497	87,772	85,519	97,403	101,409	105,685	110,065
United States	10,929	11,456	12,217	13,039	13,816	14,474	14,770	14,478	15,049	15,600	16,254	16,881	17,608	18,295	18,805	19,612	20,657	21,540	21,354	23,681	26,007	27,721	29,185
China	1,466	1,657	1,949	2,290	2,754	3,556	4,577	5,089	6,034	7,492	8,540	9,625	10,524	11,114	11,227	12,265	13,842	14,341	14,863	17,759	17,849	17,758	18,273
Germany	2,101	2,534	2,851	2,895	3,046	3,484	3,808	3,476	3,471	3,824	3,600	3,808	3,967	3,424	3,537	3,762	4,054	3,958	3,937	4,351	4,167	4,527	4,710
Japan	4,183	4,520	4,893	4,831	4,602	4,580	5,107	5,289	5,759	6,233	6,272	5,212	4,897	4,445	5,004	4,931	5,041	5,118	5,054	5,040	4,272	4,220	4,070
South Korea	650	728	823	972	1,095	1,221	1,093	983	1,193	1,307	1,335	1,435	1,556	1,539	1,579	1,710	1,824	1,751	1,744	1,942	1,799	1,839	1,870
France	1,491	1,835	2,109	2,193	2,318	2,656	2,926	2,697	2,648	2,870	2,685	2,816	2,862	2,443	2,470	2,588	2,783	2,723	2,646	2,968	2,799	3,053	3,174
India	515	608	709	820	940	1,217	1,199	1,342	1,676	1,823	1,828	1,857	2,039	2,104	2,295	2,651	2,703	2,836	2,675	3,167	3,353	3,568	3,889
United Kingdom	1,789	2,056	2,423	2,546	2,712	3,092	2,960	2,421	2,488	2,665	2,708	2,787	3,066	2,929	2,699	2,682	2,875	2,853	2,699	3,144	3,125	3,382	3,588
Italy	1,281	1,583	1,812	1,866	1,959	2,223	2,417	2,207	2,147	2,307	2,099	2,153	2,174	1,846	1,887	1,970	2,100	2,020	1,906	2,181	2,105	2,302	2,377
Canada	760	896	1,026	1,174	1,319	1,469	1,553	1,377	1,617	1,793	1,828	1,847	1,806	1,557	1,528	1,649	1,725	1,744	1,656	2,007	2,161	2,142	2,215
ROW	9,849	11,447	13,444	15,325	17,384	20,667	23,950	21,597	24,600	28,120	28,326	29,278	29,308	25,637	25,569	27,658	28,893	28,890	26,986	31,161	33,772	35,174	36,715
KTI value added as a share of GDP																							
World	9.8	9.7	9.6	9.4	9.4	9.3	9.3	9.1	9.4	9.5	9.5	9.5	9.6	10.0	10.1	10.2	10.5	10.3	10.6	10.9	10.7	10.6	10.6
United States	9.9	9.7	9.6	9.3	9.4	9.4	9.4	9.3	9.8	10.0	9.9	10.0	9.9	10.0	10.1	10.1	10.4	10.4	10.8	10.8	10.8	11.1	11.4
China	14.9	15.7	15.0	15.2	15.3	15.2	15.3	14.9	15.5	15.3	15.0	15.0	15.1	14.8	14.7	15.3	15.5	14.8	14.8	15.9	15.9	15.7	15.7
Germany	13.5	13.7	13.8	13.8	14.3	14.7	14.1	12.6	14.2	15.0	15.0	15.1	15.5	15.6	15.9	16.0	16.0	15.4	14.8	15.0	14.7	15.2	14.4
Japan	13.6	13.9	14.0	14.3	14.5	14.9	15.2	13.7	14.6	13.9	14.0	13.7	14.1	14.4	14.3	14.5	14.6	14.3	13.1	13.3	13.0	12.8	12.5
South Korea	15.9	15.9	17.2	16.8	17.1	17.4	17.1	18.1	19.3	20.3	20.4	20.6	20.7	19.6	19.6	20.7	21.0	20.4	20.7	21.1	20.9	19.8	20.6
France	9.7	9.3	9.0	8.8	8.8	8.7	8.6	8.4	8.4	8.3	8.3	8.4	8.5	8.6	8.7	8.7	8.8	9.0	9.0	8.8	9.0	9.2	9.1
India	6.0	6.0	6.3	6.5	6.5	6.4	7.0	6.8	6.6	7.3	6.8	6.9	7.0	7.6	7.4	7.2	7.4	7.1	7.1	7.2	7.5	7.2	7.2
United Kingdom	7.9	7.9	7.7	7.6	7.5	7.3	7.3	7.1	7.5	7.6	7.4	7.3	7.3	7.3	7.4	7.4	7.5	7.5	7.8	7.6	7.4	7.7	7.7
Italy	8.3	8.0	7.9	7.8	7.9	8.1	8.0	7.5	7.9	7.9	7.9	8.0	7.9	8.3	8.6	8.8	8.8	8.7	9.0	8.7	8.2	8.4	8.2
Canada	8.3	7.9	7.4	6.9	6.6	6.4	5.8	5.8	5.8	5.9	6.0	5.9	6.0	6.3	6.4	6.2	6.3	6.4	6.0	5.9	5.8	5.9	5.7

Table STRN-42. KTI value added, GDP, and KTI value added as a share of domestic GDP for selected economies: 2002–24

(Billions of dollars and percent share)

Economy	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
ROW	7.0	6.9	6.9	6.6	6.6	6.6	6.4	6.2	6.2	6.2	6.1	6.1	6.2	6.7	6.7	7.0	7.1	7.1	7.7	7.8	7.7	7.6	7.6

GDP = gross domestic product; KTI = knowledge and technology intensive; ROW = rest of the world.

Note(s):
Value added is the value of goods and services (gross output) minus the cost of intermediate inputs (energy, materials, and purchased services). KTI industries include high R&D intensive and medium-high R&D intensive industries based on a classification by the Organisation for Economic Co-operation and Development. High R&D intensive industries include air and spacecraft and related machinery; pharmaceutical, medicinal chemical, and botanical products; computer, electronic, and optical products; scientific R&D services; and software publishing. Medium-high R&D intensive industries include weapons and ammunition; motor vehicles, trailers, and semi-trailers; medical and dental instruments and supplies; machinery and equipment not elsewhere classified (nec); chemicals and chemical products; electrical equipment; railroad, military vehicles, and transport nec; and information technology and other information services.

Source(s):
Value-added data are from S&P Global Market Intelligence, Comparative Industry Service special tabulations, April 2025; GDP data are from International Monetary Fund World Economic Outlook, accessed April 2025 (available at https://www.imf.org/en/Publications/WEO/weo-database/2023/October), and Bureau of Economic Analysis, Industry Economic Accounts, accessed April 2025 (available at https://www.bea.gov/itable/national-gdp-and-personal-income).

Science and Engineering Indicators

Table STRN-43. Gross exports of goods trade, for the world and for selected economies: 2002–24

(Millions of U.S. current dollars)

Economy	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
All ISIC, Rev.4, industries																							
Canada	237,616	248,781	290,723	320,823	351,196	382,419	419,954	299,231	368,150	433,433	442,235	447,785	455,847	389,872	371,554	404,938	438,509	442,388	379,687	489,475	601,551	576,639	584,539
China	436,119	566,241	753,230	959,330	1,184,675	1,464,833	1,688,004	1,459,959	1,839,872	2,160,445	2,281,451	2,418,530	2,542,880	2,465,934	2,350,776	2,522,314	2,738,381	2,677,154	2,705,673	3,379,464	3,730,839	3,401,465	3,514,828
EU-27	2,174,631	2,626,848	3,137,490	3,363,105	3,828,623	4,539,459	4,979,861	3,861,523	4,339,065	5,076,238	4,855,938	5,029,462	5,147,605	4,512,914	4,546,476	4,977,008	5,453,781	5,306,971	4,940,931	5,913,713	6,187,866	6,343,357	6,303,626
France	305,353	360,013	412,647	434,943	486,972	551,274	600,137	471,485	516,044	577,208	548,316	562,652	567,834	498,930	490,439	523,848	561,017	556,829	472,856	557,025	583,168	617,502	618,915
Germany	590,708	717,705	874,864	950,773	1,085,440	1,290,336	1,367,292	1,068,571	1,209,631	1,415,037	1,346,712	1,384,184	1,431,337	1,272,687	1,278,958	1,386,394	1,496,887	1,432,761	1,334,776	1,565,430	1,591,426	1,639,756	1,644,333
India	53,575	63,963	84,720	105,536	130,238	162,558	207,673	170,432	234,589	308,359	302,577	321,454	328,296	277,939	274,168	310,116	336,129	337,539	285,963	403,020	472,556	442,654	451,441
Italy	243,025	287,650	335,625	357,961	403,980	485,200	531,473	398,086	431,639	505,441	486,012	500,672	515,739	447,752	451,997	497,077	538,704	521,399	478,708	585,454	625,825	643,535	652,170
Japan	425,290	480,436	575,080	618,196	667,322	736,313	801,973	599,734	784,445	840,816	824,610	740,273	713,490	648,276	662,180	715,933	757,361	725,648	658,420	773,715	776,237	742,855	738,382
South Korea	165,233	198,336	260,177	291,058	334,587	376,585	429,823	368,973	469,694	555,507	553,045	563,835	575,276	527,797	502,674	575,964	611,981	553,941	519,919	651,504	701,636	648,352	698,736
United Kingdom	286,532	310,220	353,601	405,394	454,523	453,203	500,321	362,176	431,634	547,067	497,963	549,535	506,255	451,012	399,693	421,531	470,384	440,965	375,463	439,812	505,794	489,362	481,301
United States	690,971	721,753	811,081	896,021	1,021,532	1,142,476	1,279,678	1,050,474	1,269,923	1,471,860	1,536,787	1,565,630	1,603,906	1,491,494	1,437,981	1,524,381	1,637,023	1,614,709	1,396,499	1,689,257	1,969,580	1,949,788	2,017,434
World (75)	6,046,414	7,051,806	8,535,483	9,609,611	11,113,778	12,833,661	14,649,473	11,488,691	13,929,166	16,587,103	16,613,148	16,974,640	17,088,565	15,087,642	14,743,069	16,220,258	17,808,824	17,337,327	16,104,415	20,022,835	22,069,065	20,976,020	21,321,029
Manufacturing industries																							
Canada	205,315	212,734	244,321	266,575	284,955	306,325	309,016	226,933	276,671	310,385	315,240	314,513	314,440	296,389	290,723	301,700	320,942	324,074	282,416	337,065	406,233	406,902	408,217
China	420,400	546,793	728,910	931,866	1,157,074	1,434,848	1,648,983	1,435,686	1,811,055	2,125,594	2,249,914	2,384,902	2,507,150	2,432,257	2,317,326	2,486,566	2,699,862	2,639,568	2,670,352	3,337,877	3,684,246	3,358,039	3,471,769
EU-27	2,072,792	2,505,478	2,993,210	3,210,200	3,659,892	4,338,014	4,717,166	3,652,879	4,100,664	4,794,492	4,569,445	4,729,922	4,852,467	4,270,857	4,306,466	4,718,456	5,173,470	5,040,173	4,689,585	5,593,252	5,866,472	6,029,025	5,996,013
France	292,865	344,852	395,778	418,437	469,584	530,474	573,702	450,422	493,115	549,016	522,898	534,698	541,179	475,032	468,032	501,012	535,720	532,123	448,396	529,505	551,583	588,523	589,146
Germany	580,833	706,220	861,353	937,124	1,069,399	1,270,184	1,340,290	1,044,844	1,183,885	1,384,109	1,318,919	1,353,808	1,400,091	1,244,439	1,250,615	1,357,621	1,466,571	1,403,153	1,304,416	1,530,310	1,553,856	1,603,262	1,606,064
India	41,313	49,761	66,433	81,908	107,140	133,549	171,228	138,635	191,512	253,311	252,602	266,149	278,521	235,573	230,429	261,031	286,194	291,270	243,829	342,283	410,812	388,856	401,672
Italy	237,263	280,714	327,779	349,298	394,331	473,168	516,683	385,915	419,236	491,191	472,147	486,445	501,045	434,264	438,281	482,022	523,348	506,768	463,646	567,468	607,613	624,216	632,452
Japan	423,884	478,887	573,283	616,207	665,227	733,981	799,118	597,691	781,700	837,751	821,484	737,344	710,484	645,302	658,978	712,605	753,838	722,214	655,345	769,404	771,557	739,134	734,879
South Korea	164,349	197,380	259,097	289,947	333,506	375,361	428,378	367,755	468,114	553,383	551,051	561,856	573,335	525,981	500,859	573,967	609,695	551,619	517,680	647,969	697,775	644,634	695,514
United Kingdom	262,138	283,559	324,984	372,590	419,538	417,559	458,732	334,360	394,419	505,605	454,854	508,077	468,628	426,054	377,666	393,455	433,765	408,948	352,163	412,345	471,412	460,254	455,534
United States	650,985	677,267	759,991	840,608	958,815	1,062,159	1,175,619	969,020	1,168,539	1,346,195	1,410,856	1,438,368	1,462,914	1,372,386	1,316,096	1,382,494	1,466,483	1,436,329	1,239,208	1,483,332	1,694,363	1,692,278	1,763,017
World (75)	5,446,276	6,322,549	7,616,722	8,477,285	9,761,665	11,298,955	12,543,921	10,035,255	12,061,152	14,119,494	14,178,646	14,538,143	14,754,266	13,462,174	13,235,588	14,437,254	15,711,100	15,352,321	14,456,677	17,703,121	19,265,224	18,543,821	18,956,155
KTI manufacturing industries: 20, 21, 26, 27, 28, 29, 302, 304 and 309, 303																							
Canada	112,963	116,479	131,595	144,981	151,272	160,253	154,526	115,648	138,005	154,699	162,477	160,085	162,878	157,293	153,983	154,954	162,032	164,339	137,021	150,666	177,001	192,586	190,988
China	196,886	273,734	388,290	518,394	650,624	805,191	927,595	827,117	1,066,235	1,248,611	1,330,742	1,427,801	1,477,649	1,468,602	1,407,811	1,545,591	1,685,524	1,636,798	1,688,842	2,170,109	2,364,898	2,152,938	2,226,422
EU-27	1,299,505	1,568,079	1,874,285	1,969,858	2,217,385	2,611,246	2,873,442	2,269,645	2,532,720	2,912,594	2,770,189	2,881,988	2,995,303	2,710,366	2,755,577	2,985,291	3,269,089	3,205,866	3,006,563	3,478,567	3,566,390	3,784,155	3,770,614
France	193,747	226,547	260,696	271,623	302,524	336,388	365,371	293,909	320,841	348,288	333,668	342,688	350,043	313,366	309,982	326,898	348,239	348,545	290,441	329,892	336,183	371,596	366,880
Germany	412,804	501,794	610,687	642,918	723,505	850,198	919,747	724,971	827,591	966,101	929,915	957,691	995,908	899,951	905,504	977,160	1,053,691	1,010,143	930,756	1,082,067	1,080,911	1,138,054	1,138,669
India	11,727	14,720	19,511	25,092	31,577	39,424	52,998	47,544	60,443	78,410	79,825	83,883	89,816	84,797	86,349	94,438	111,998	118,443	107,315	138,003	160,052	168,619	187,709
Italy	118,761	140,144	165,914	176,914	199,668	240,163	265,539	200,257	215,406	248,956	237,456	250,393	262,459	231,448	236,899	258,967	281,947	268,435	246,852	290,751	307,608	333,635	338,549
Japan	340,223	386,478	459,301	488,701	520,394	565,174	598,595	432,089	573,453	611,338	607,806	544,675	527,246	480,260	495,188	534,073	567,508	541,560	491,418	571,546	560,265	540,610	538,989
South Korea	109,524	136,192	181,202	205,754	232,549	261,593	275,327	239,136	312,096	352,763	359,134	378,566	386,554	369,577	352,509	404,830	442,994	394,223	382,426	478,681	500,769	462,683	507,432
United Kingdom	181,224	192,499	214,220	242,537	288,760	260,744	268,885	211,723	234,642	263,837	264,711	266,050	273,189	257,246	247,337	255,016	267,456	255,386	214,736	240,275	251,106	267,247	270,224
United States	478,712	495,145	559,690	615,417	691,321	756,699	803,585	672,179	789,584	872,489	920,444	936,866	967,147	942,221	912,621	943,443	989,543	982,965	840,391	980,621	1,084,303	1,126,372	1,178,555

Table STRN-43. Gross exports of goods trade, for the world and for selected economies: 2002–24

(Millions of U.S. current dollars)

Economy	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World (75)	3,377,484	3,907,078	4,693,904	5,191,134	5,885,737	6,708,813	7,319,383	5,973,419	7,152,245	8,139,707	8,181,463	8,386,969	8,642,221	8,158,400	8,094,304	8,812,761	9,575,543	9,384,559	8,902,989	10,717,120	11,409,898	11,317,401	11,654,688

EU-27 = European Union; ISIC, Rev.4 = International Standard Industrial Classification of All Economic Activities, Revision 4; KTI = knowledge and technology intensive.

Note(s):
KTI manufacturing exports include exports from the following industries: chemicals and chemical products; pharmaceutical, medicinal chemical, and botanical products; computer, electronic, and optical products; electrical equipment; machinery and equipment not elsewhere classified (nec); motor vehicles, trailers, and semi-trailers; air and spacecraft and related machinery; weapons and ammunition; and other transport equipment (the latter comprises railway locomotives and rolling stock manufacturing and transport equipment nec and military equipment manufacturing).

Source(s):
S&P Global Market Intelligence, Comparative Industry Service special tabulations, April 2025.

Science and Engineering Indicators

Table STRN-44. KTI manufacturing exports as a share of total manufacturing exports for selected economies: 2002–24

(Percent share)

Year	Canada	China	EU-27	France	Germany	India	Italy	Japan	South Korea	United Kingdom	United States
2002	55.0	46.8	62.7	66.2	71.1	28.4	50.1	80.3	66.6	69.1	73.5
2003	54.8	50.1	62.6	65.7	71.1	29.6	49.9	80.7	69.0	67.9	73.1
2004	53.9	53.3	62.6	65.9	70.9	29.4	50.6	80.1	69.9	65.9	73.6
2005	54.4	55.6	61.4	64.9	68.6	30.6	50.6	79.3	71.0	65.1	73.2
2006	53.1	56.2	60.6	64.4	67.7	29.5	50.6	78.2	69.7	68.8	72.1
2007	52.3	56.1	60.2	63.4	66.9	29.5	50.8	77.0	69.7	62.4	71.2
2008	50.0	56.3	60.9	63.7	68.6	31.0	51.4	74.9	64.3	58.6	68.4
2009	51.0	57.6	62.1	65.3	69.4	34.3	51.9	72.3	65.0	63.3	69.4
2010	49.9	58.9	61.8	65.1	69.9	31.6	51.4	73.4	66.7	59.5	67.6
2011	49.8	58.7	60.7	63.4	69.8	31.0	50.7	73.0	63.7	52.2	64.8
2012	51.5	59.1	60.6	63.8	70.5	31.6	50.3	74.0	65.2	58.2	65.2
2013	50.9	59.9	60.9	64.1	70.7	31.5	51.5	73.9	67.4	52.4	65.1
2014	51.8	58.9	61.7	64.7	71.1	32.2	52.4	74.2	67.4	58.3	66.1
2015	53.1	60.4	63.5	66.0	72.3	36.0	53.3	74.4	70.3	60.4	68.7
2016	53.0	60.8	64.0	66.2	72.4	37.5	54.1	75.1	70.4	65.5	69.3
2017	51.4	62.2	63.3	65.2	72.0	36.2	53.7	74.9	70.5	64.8	68.2
2018	50.5	62.4	63.2	65.0	71.8	39.1	53.9	75.3	72.7	61.7	67.5
2019	50.7	62.0	63.6	65.5	72.0	40.7	53.0	75.0	71.5	62.4	68.4
2020	48.5	63.2	64.1	64.8	71.4	44.0	53.2	75.0	73.9	61.0	67.8
2021	44.7	65.0	62.2	62.3	70.7	40.3	51.2	74.3	73.9	58.3	66.1
2022	43.6	64.2	60.8	60.9	69.6	39.0	50.6	72.6	71.8	53.3	64.0
2023	47.3	64.1	62.8	63.1	71.0	43.4	53.4	73.1	71.8	58.1	66.6
2024	46.8	64.1	62.9	62.3	70.9	46.7	53.5	73.3	73.0	59.3	66.8

EU-27 = European Union; KTI = knowledge and technology intensive.

Note(s):
KTI manufacturing exports include exports from the following industries: chemicals and chemical products; pharmaceutical, medicinal chemical, and botanical products; computer, electronic, and optical products; electrical equipment; machinery and equipment not elsewhere classified (nec); motor vehicles, trailers, and semi-trailers; air and spacecraft and related machinery; weapons and ammunition; and other transport equipment (the latter comprises railway locomotives and rolling stock manufacturing and transport equipment nec and military equipment manufacturing).

Source(s):
S&P Global Market Intelligence, Comparative Industry Service special tabulations, April 2025.

Science and Engineering Indicators

Table STRN-45. KTI manufacturing exports, imports, and trade balance for selected economies: 2002–24

(Billions of current dollars)

Economy	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Exports																							
Canada	113.0	116.5	131.6	145.0	151.3	160.3	154.5	115.6	138.0	154.7	162.5	160.1	162.9	157.3	154.0	155.0	162.0	164.3	137.0	150.7	177.0	192.6	191.0
China	196.9	273.7	388.3	518.4	650.6	805.2	927.6	827.1	1,066.2	1,248.6	1,330.7	1,427.8	1,477.6	1,468.6	1,407.8	1,545.6	1,685.5	1,636.8	1,688.8	2,170.1	2,364.9	2,152.9	2,226.4
EU-27	1,299.5	1,568.1	1,874.3	1,969.9	2,217.4	2,611.2	2,873.4	2,269.6	2,532.7	2,912.6	2,770.2	2,882.0	2,995.3	2,710.4	2,755.6	2,985.3	3,269.1	3,205.9	3,006.6	3,478.6	3,566.4	3,784.2	3,770.6
France	193.7	226.5	260.7	271.6	302.5	336.4	365.4	293.9	320.8	348.3	333.7	342.7	350.0	313.4	310.0	326.9	348.2	348.5	290.4	329.9	336.2	371.6	366.9
Germany	412.8	501.8	610.7	642.9	723.5	850.2	919.7	725.0	827.6	966.1	929.9	957.7	995.9	900.0	905.5	977.2	1,053.7	1,010.1	930.8	1,082.1	1,080.9	1,138.1	1,138.7
India	11.7	14.7	19.5	25.1	31.6	39.4	53.0	47.5	60.4	78.4	79.8	83.9	89.8	84.8	86.3	94.4	112.0	118.4	107.3	138.0	160.1	168.6	187.7
Italy	118.8	140.1	165.9	176.9	199.7	240.2	265.5	200.3	215.4	249.0	237.5	250.4	262.5	231.4	236.9	259.0	281.9	268.4	246.9	290.8	307.6	333.6	338.5
Japan	340.2	386.5	459.3	488.7	520.4	565.2	598.6	432.1	573.5	611.3	607.8	544.7	527.2	480.3	495.2	534.1	567.5	541.6	491.4	571.5	560.3	540.6	539.0
South Korea	109.5	136.2	181.2	205.8	232.5	261.6	275.3	239.1	312.1	352.8	359.1	378.6	386.6	369.6	352.5	404.8	443.0	394.2	382.4	478.7	500.8	462.7	507.4
United Kingdom	181.2	192.5	214.2	242.5	288.8	260.7	268.9	211.7	234.6	263.8	264.7	266.0	273.2	257.2	247.3	255.0	267.5	255.4	214.7	240.3	251.1	267.2	270.2
United States	478.7	495.1	559.7	615.4	691.3	756.7	803.6	672.2	789.6	872.5	920.4	936.9	967.1	942.2	912.6	943.4	989.5	983.0	840.4	980.6	1,084.3	1,126.4	1,178.6
Imports																							
Canada	141.0	150.1	168.3	188.7	206.7	222.5	225.0	180.1	220.4	245.2	255.8	257.3	259.9	245.1	237.2	253.9	269.7	271.1	235.1	276.9	317.5	327.2	332.0
China	123.8	175.2	232.7	267.7	311.7	373.5	410.1	390.6	537.8	619.8	603.1	628.3	655.8	589.6	585.8	694.1	777.2	731.6	759.6	890.1	857.8	778.4	813.8
EU-27	1,134.5	1,366.6	1,635.0	1,748.8	1,996.6	2,298.9	2,538.3	2,008.0	2,225.7	2,490.2	2,296.1	2,362.0	2,485.2	2,297.5	2,368.8	2,590.0	2,861.9	2,813.2	2,683.9	3,218.0	3,447.8	3,548.9	3,476.6
France	168.7	197.2	233.9	254.2	288.9	317.1	343.4	287.5	309.1	352.9	329.2	332.5	336.5	301.0	307.2	336.3	362.3	356.7	317.1	372.0	379.8	401.3	391.7
Germany	259.6	312.2	371.1	371.4	434.5	497.2	569.3	465.8	523.2	599.4	556.1	571.8	611.7	562.7	584.0	638.2	702.7	681.9	649.7	761.0	817.6	820.7	800.6
India	18.6	24.2	33.2	44.3	58.8	80.1	103.3	90.2	108.9	129.3	125.5	122.4	126.8	128.8	127.1	150.4	178.9	175.5	148.9	203.7	237.8	239.8	253.6
Italy	119.1	142.4	168.9	175.9	191.8	222.7	232.5	187.9	210.2	229.2	195.2	197.6	202.7	189.3	199.7	216.1	236.6	228.9	213.6	260.5	288.4	297.6	300.1
Japan	127.9	144.5	169.3	182.6	196.4	206.7	223.1	183.2	234.7	266.8	280.3	270.9	275.9	254.0	256.1	275.0	297.5	293.3	275.4	312.7	329.6	312.9	310.5
South Korea	72.8	86.4	104.7	116.4	132.6	147.5	157.2	132.9	172.6	192.8	188.9	196.1	204.3	201.6	198.5	229.7	240.5	228.9	237.7	288.2	318.1	295.7	294.0
United Kingdom	197.0	218.0	254.6	272.6	299.6	329.3	324.7	247.7	286.8	305.1	308.7	317.8	349.1	331.0	322.6	320.1	338.8	327.9	280.5	311.4	345.3	359.5	358.1
United States	634.1	671.0	762.3	839.2	917.9	966.3	971.8	783.8	960.5	1,075.9	1,151.0	1,172.3	1,245.6	1,288.7	1,273.7	1,344.3	1,446.3	1,442.3	1,349.0	1,572.8	1,782.5	1,809.7	1,972.5
Trade balance																							
Canada	-28.0	-33.6	-36.7	-43.7	-55.4	-62.3	-70.5	-64.4	-82.4	-90.5	-93.3	-97.2	-97.0	-87.8	-83.3	-98.9	-107.7	-106.7	-98.1	-126.2	-140.5	-134.6	-141.0
China	73.1	98.5	155.6	250.7	338.9	431.7	517.5	436.5	528.4	628.8	727.6	799.5	821.8	879.0	822.0	851.5	908.3	905.2	929.3	1,280.0	1,507.1	1,374.6	1,412.6
EU-27	165.0	201.4	239.3	221.1	220.8	312.3	335.2	261.7	307.0	422.4	474.1	520.0	510.1	412.8	386.8	395.3	407.2	392.7	322.6	260.5	118.6	235.3	294.0
France	25.0	29.3	26.8	17.4	13.6	19.3	22.0	6.4	11.7	-4.6	4.5	10.2	13.5	12.3	2.8	-9.4	-14.1	-8.2	-26.6	-42.1	-43.6	-29.7	-24.8
Germany	153.2	189.6	239.6	271.5	289.0	353.0	350.4	259.2	304.4	366.7	373.8	385.9	384.2	337.2	321.5	339.0	351.0	328.2	281.0	321.1	263.4	317.4	338.0
India	-6.8	-9.5	-13.7	-19.2	-27.2	-40.7	-50.3	-42.7	-48.5	-50.9	-45.6	-38.6	-37.0	-44.0	-40.8	-55.9	-66.9	-57.0	-41.6	-65.7	-77.7	-71.1	-65.9
Italy	-0.3	-2.2	-3.0	1.1	7.9	17.4	33.1	12.4	5.2	19.8	42.3	52.8	59.7	42.2	37.2	42.9	45.3	39.6	33.3	30.3	19.2	36.0	38.4
Japan	212.3	242.0	290.0	306.1	324.0	358.5	375.5	248.9	338.8	344.5	327.5	273.8	251.3	226.2	239.1	259.1	270.0	248.3	216.0	258.9	230.7	227.7	228.5
South Korea	36.7	49.8	76.5	89.3	99.9	114.1	118.1	106.3	139.5	160.0	170.2	182.5	182.3	168.0	154.0	175.1	202.5	165.3	144.7	190.4	182.6	167.0	213.4
United Kingdom	-15.8	-25.5	-40.4	-30.0	-10.8	-68.6	-55.8	-36.0	-52.2	-41.2	-43.9	-51.8	-75.9	-73.7	-75.3	-65.1	-71.3	-72.5	-65.7	-71.1	-94.2	-92.3	-87.8
United States	-155.4	-175.8	-202.6	-223.8	-226.6	-209.6	-168.2	-111.6	-170.9	-203.4	-230.5	-235.5	-278.4	-346.5	-361.1	-400.9	-456.7	-459.4	-508.6	-592.2	-698.2	-683.3	-793.9

EU-27 = European Union; KTI = knowledge and technology intensive.

Note(s):
Data include trade for the following KTI industries: chemicals and chemical products; pharmaceutical, medicinal chemical, and botanical products; computer, electronic, and optical products; electrical equipment; machinery and equipment not elsewhere classified (nec); motor vehicles, trailers, and semi-trailers; air and spacecraft and related machinery; weapons and ammunition; and other transport equipment (the latter comprises railway locomotives and rolling stock manufacturing and transport equipment nec and military equipment manufacturing).

Source(s):
S&P Global Market Intelligence, Comparative Industry Service special tabulations, April 2025.

Science and Engineering Indicators