

## DOCUMENTATION OF RISIS DATASETS: RISIS Patent Database

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# RISIS



# RESEARCH INFRASTRUCTURE FOR SCIENCE AND INNOVATION POLICY STUDIES

# DOCUMENTATION OF RISIS DATASETS RISIS Patent

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#### 1 Basic Characteristics

The RISIS Patent database derives from the EPO PATSTAT. The database is designed for the analysis of technological knowledge creation, using patent as a proxy. It thus focuses on 'priority patents' that represent the creation of new knowledge, while other non-priority patents describe either technical ameliorations or market extensions and are mobilised as indicators of the importance of the priority patent. We shall explain in the documentation an important enrichment made to ensure a good coverage of the priority patents, that is the reintroduction in the database of so-called 'artificial priority patents' (11,7% of total priority patents).

Overall, 20,656,894 priority patents of inventions were applied for by legal entities from 2000 to 2020<sup>1</sup>. They include 59,150,156 inventors<sup>2</sup>.

As we are first interested in tracking knowledge creation, (more than the extension of the knowledge protection), the dates that matter, are the first filing date (when the organisation is applying for a priority patent, i.e., the first filing for a new invention) and the first publication date, as the time stamp of when the knowledge has been created is an important information for research.

Besides the date of the filing and the office where the patent was first filed, we specifically consider in RISIS Patent 5 core attributes on patents:

- Their content, using textual pieces of information such as the patent titles, the patent abstracts<sup>3</sup> and a text aggregating the definition of the patent IPC (International Patent Classification) codes. Based on the definition of some **75000 IPC classes** provided for by PATSTAT, the latter builds a rich vocabulary enriching widely the content available for semantic analyses.
- Their technological content using the standard technology classification: (IPC subclasses, aggregation of IPC codes) by technological domains, fields or subfields. Patent allocation in the different classifications is realised on a fractional count basis according to their IPC.
- The geographical location of inventive activities. As we are interested in the geography of knowledge creation, we focus on inventors' addresses (instead of using applicants' addresses which would more capture commercialisation). We shall explain the difficulties associated with this approach and the extensive developments made. These addresses are geocoded and associated to 'functional areas' (urban and rural) worldwide mobilizing the RISIS CORTEXT geocoding service.

<sup>&</sup>lt;sup>1</sup> i.e. ipr\_type = PI in PATSTAT

<sup>&</sup>lt;sup>2</sup> Corresponding to 11,970,694 distinct person\_id.

<sup>&</sup>lt;sup>3</sup> Translation in English for titles and abstracts that remain in their native language will be included in a next release of RISIS Patent.





- The legal organisations that apply for patents (the applicants). We use both available (but tested and in part improved) types proposed by PATSTAT. But one central effort is to articulate it and mobilise the extensive work done by other RISIS databases to identify worldwide large firms (CIB), European fast growing mid-sized firms (Cheetah), European venture capital backed start-up firms (VICO) and European public research organisations (ORGREG covering universities, PROs and research hospitals). ORGREG entities as patent applicants are already recognized in this new updated RPD version. The link with CIB, VICO and CHEETAH databases will be implemented step by step in 2023.

The complete methodology used to build the RPD database is detailed in https://gitlab.com/cortext/patents/patstat/-/tree/version-2021/version\_2021

- Characteristics linked to the 'value' of the patent: In this context, the database provides information on whether the patent was granted or not, as well as the size of patent families, i.e. the number of different applications for a given invention (or group of linked inventions), which tells something about the interest of applicants for developing and protecting the knowledge; moreover, the presence in 5 world-level patent offices (EPO, USPTO, Japan Patent Office, Korean Patent Office, China Patent Office) tells something about the potential for future markets; and citations they have received indicate knowledge flows to other inventions and therefore its value for further technological development.

The coverage of the database is 2000-2020 (using the PATSTAT 2021 Edition April as a source) but the PATSTAT coverage for patent applied in 2020 is very limited. The first release is in November 2022. Further releases including the tagging of Tirmreg entities (CIB, CHEETAH, VICO) as applicants will be displayed in 2023. The database will be only periodically updated using new PATSTAT version. The database is developed and maintained by UGE. The database is located on the servers of UGE at Marne La Vallee, France.

#### 2 Database content

2.1 Definition and description of observations

As a proxy for knowledge creation, the unit of observation is a priority patent application, i.e. the very first patent application, anywhere in the world to protect an invention. The priority date is used to determine the novelty of the invention, which implies that it is an important concept in patent procedures. For statistical purposes, the priority date is the closest date to the date of invention.

In RPD, we consider only applications of priority patents of invention (i.e. ipr\_type = PI in PATSTAT)<sup>4</sup>. Accordingly, the database covers priority patents applied since 2000, whether or not they turn later into granted patents. The 20,656,894 priority patents are distributed across three main types of applications:

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<sup>&</sup>lt;sup>4</sup> Other types of patent are: Utility Models (ipr\_type = 'UM') and Design patents (ipr\_type = 'DP').





-a large category of patents 'A', i.e. 'regular' patents following the Paris convention (appln kind ='A'): 19,198,231 applications,

-provisional patent, i.e. preliminary and temporary patents proposed in some patent offices like USPTO (appln\_kind = 'P'): 1,153,226 applications,

-PCT patent in the international phase (appln\_kind = 'W'): 305,437 applications.

We also include priority patents tagged as 'artificial priority patents due to priorities' in PATSTAT (11,7% of the overall priorities in RPD but 50,6% in the priorities applied at the US patent office and 38,7% the priorities applied at the EPO). As these latter documents only contain the filling date and patent office in PATSTAT, we have devised a complex method to fill the information on their applicants, inventors, title, IPC classes. (See Appendix 1 for the description of technical developments and share of applications by patent offices and Laurens et al., 2018<sup>5</sup> for the importance of such an enrichment).

As we are interested in the development of organised knowledge, we focus only on patents taken by organisations, i.e., legal persons (firms, university, NGO...); therefore, the priority patents applied only by natural persons have been discarded.

Moreover, when a co-application of patent includes both legal and natural persons, the patent is maintained in the database with its legal applicant only.

In order to do so, we have first devised a method to recognise applicants that are 'natural persons', and we take them out from the database.

A fractional counting was employed to calculate the number of legal applicants in a patent applications: All applicants with a fract\_applt\_below 1 have legal co-applicants.

#### 2.2 Data acquisition and processing (e.g. data cleaning)

#### a) Data sources

The RISIS Patent database uses four sources of information. It builds first and mainly on the PATSTAT public database from EPO (version April 2021). Secondary, sources are used for complementing this main data source, mainly for filling addresses that are void in PATSTAT:

- REGPAT data base (provided freely on request) from OECD that presents patent data that have been linked to regions according to the addresses of the applicants and inventors.
- Data from the French patent office (INPI) for filling addresses in patent applications from INPI that are missing in PATSTAT.

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<sup>&</sup>lt;sup>5</sup> Laurens et al., 2018, "The artificial patents in the PATSTAT database: how much do they matter when computing indicators of internationalisation based on worlwide priority patents?" Scientometrics 114,1, 91–112.





• Data from the Japanese patent office (JPO) for filling addresses in patent applications from JPO that are missing in PATSTAT.

#### b) Data processing

The principal data processing includes:

#### 1- Data enrichment steps of the initial raw patent data

- Filling missing addresses, missing information on IPC (international patent classification) and on inventors and applicants using the REGPAT, INPI and JPO data (see above),
- Re-allocation of addresses' information contained in other fields (person" names)
- Propagating information (using fuzzy matching) within patent families for missing info on applicants and inventors,
- Propagating information for filling information in artificial applications using other applications within patent families,

#### 2- Addition of complementary information

- Identifying priority patent applications, the artificial priority applications, singletons (i.e. lone patent applications in an Inpadoc family), transnational patents (applied in at least 2 patent offices), triadic patents (applied in at JP, EP, US), ip5 family patents (applied in at least 1 IP5 patent office), 2ip5 family patents (applied in at least 2 IP5 patent offices) and ip5 patents (applied in the 5 IP5 patent offices),
- Identifying the type of applicants (legal/person/unknown),
- Extraction, cleaning and harmonisation of country information for applicants and inventors by analysing respectively applicants' and inventors' addresses,
- Addition of geographical classification on continent for applicants and inventors.
- Geocoding of addresses (applicants and inventors),
- Attribution of the urban area for the address based on geocoded data,
- Addition of information on technology classification at three levels (5 domains, technology fields according to WIPO classification in 35 categories and technology subfields according to IFRIS classification in 400 categories),
- Addition of the IPC definition (full textual information),
- Extraction of year of application from the date of application,
- Addition of tags characterising the patent applications with no inventors, the patent applications with no IPC,
- Fractional counting at the patent application level according to different dimensions: technological classifications, number of applicants, number of inventors,
- Calculation of the priority patent geographical coverage (based on patent families): number of patent offices, applications in the IP5 patent offices (EPO, USPTO, JPO, SINO, KINO), number of patents in the docdb and inpadoc families of the priority applications.
- Assignement of an ORGREG-ID for applicants belonging the ORGREG repository (using ORGREG data available in winter 2021).





#### 3- Filtering of patents

We select only priority patents of inventions applied from 2000 to 2020 with at least one legal applicant (including artificial priority applications).

#### 4- Creation of the final tables

The final tables includes data on priority patents only and covering 6 dimensions: Basic patent data, Geographical data on inventors and applicants, Institutional data on applicants, Technological data based on classification, Textual data, Patent value data.

#### 2.3 Information on all variables/indicators

For each priority patent application, the database gives:

- patent ID number
- date of first filing
- country of first filing
- date of first publication
- date of first granting
- title
- abstract
- IPC categories mentioned: their number and their language description: as many variables as IPC categories, only one linguistic description
- whether the patent is a singleton (only one single application) or not
- whether the patent is a transnational patent, i.e., was the priority application extended in at least a foreign country) or not
- size of the DOCDB family
- size of the INPADOC family
- presence (directly or through extension) in the 5 core offices (so called IP 5 families) (5 variables Y/N per office)
- For each applicant: the applicant 'natural name' and its ID; the applicant standardised name and its ID; the applicant standardised name by Leuven and its ID; the applicant RISIS standardised name and its ID when available
- For each inventor: same variables as for applicants
- For each applicant: presence or not in the CIB database (next release), name and
   ID of the group firm (GUO) (next release), presence or not in the CHEETAH





database(next release), ID of the Cheetah firm (next release), presence or not in the VICO database and ID of the VICO firm(next release); presence in firmreg database and Firmreg ID. (to be provided in 2023) (next release), presence or not in the ORGREG repository and Orgreg\_id

- For each applicant: The applicant address, the applicant geo coordinates, the applicant urban and rural cluster it belongs to, the NUTS3 regions for EU countries
- For each inventor: the inventor address, the inventor geo coordinates, the inventor urban or rural cluster he/she belongs to, the NUTS3 regions for EU countries

#### 2.4 Sectorial, temporal and geographical coverage

#### - Sectorial coverage

Sectors of the legal applicants

In the current RISIS Patent database, we rely on the sectorial information provided in the raw PATSTAT database<sup>6</sup>. Data are shown in the table below.

Table 1: Industrial sectors of priority patent applicants

psn_sector	Number of applicants	Share of applicants
NULL	33	0,0%
COMPANY	18,284,645	81,0%
COMPANY GOV NON-PROFIT	41,637	0,2%
COMPANY GOV NON-PROFIT UNIVERSITY	1,460	0,0%
COMPANY HOSPITAL	1,636	0,0%
COMPANY UNIVERSITY	4,164	0,0%
GOV NON-PROFIT	701,141	3,1%
GOV NON-PROFIT HOSPITAL	2	0,0%
GOV NON-PROFIT UNIVERSITY	201,021	0,9%
HOSPITAL	36,288	0,2%
INDIVIDUAL	511,261	2,3%
UNIVERSITY	2,361,015	10,5%
UNKNOWN	423,876	1,9%
Total	22,568,179	100,0%

For about 96% of the applicants, our identification of the applicant status (legal vs individual) follows the sector (legal/individual/unknown) assigned in Patstat. However, we

<sup>&</sup>lt;sup>6</sup> Harmonizing names and allocation of assignee sectors in Patstat raw data was done by ECOOM (K.U. LEUVEN; http://www.ecoom.be/en/EEE-PPAT).





have discarded about 0.6% of the applicants assigned as legal in Patstat (and considered as individual according to our treatment and further checking steps). Conversely, we have included 2.3% of applicants considered as Individuals in Patstat. In this set, we have detected company names and we need further checking.

Moreover, our own matching of ORGREG entities with patent applicant names in RPD has shown that among the 22.5millions of applicants, 0,79% are ORGREG entities. They have applied for 156,132 patents (0,76% of RPD priority patents).

#### Technological coverage of patents

There is a thematic coverage of the technology that the patents protect linked to the IPC classification of patents (one patent can belong to multiple classes). Patents are allocated to fields of technology on a fractional count basis according to their IPC. Building on the correspondence table developed by ISI FhG for WIPO - which defines domains (5) and fields (35) of technology, an additional level of sub fields (401) of technology was developed (See Appendix 3 on technological fields).

The distributions of patents with the domains and the technological fields are shown below.

Table 1: Domains of technology of priority patent applications

Domain code	Domain name	Number of patents (fractional counting)	Share of patents
TD01	Electrical engineering	6,605,360	32,6%
TD02	Instruments	2,996,713	14,8%
TD03	Chemistry	4,399,498	21,7%
TD04	Mechanical engineering	4,620,405	22,8%
TD05	Other fields	1,619,730	8,0%
Total		20,241,706	100,0%

Table 2: Technology fields of priority patent applications

Field code	Field_name	Number of patents (fractional counting)	Share of patents
TF01	Electrical machinery, apparatus, energy	1,460,025	7,2%
TF02	Audio-visual technology	745,623	3,7%
TF03	Telecommunications	550,958	2,7%
TF04	Digital communication	870,580	4,3%
TF05	Basic communication processes	154,328	0,8%
TF06	Computer technology	1,696,641	8,4%
TF07	IT methods for management	393,579	1,9%
TF08	Semiconductors	733,624	3,6%
TF09	Optics	697,791	3,4%
TF10	Measurement	1,136,741	5,6%





TF11	Analysis of biological materials	106,365	0,5%
TF12	Control	439,344	2,2%
TF13	Medical technology	616,473	3,0%
TF14	Organic fine chemistry	357,053	1,8%
TF15	Biotechnology	301,112	1,5%
TF16	Pharmaceuticals	582,232	2,9%
TF17	Macromolecular chemistry, polymers	387,679	1,9%
TF18	Food chemistry	390,867	1,9%
TF19	Basic materials chemistry	535,738	2,6%
TF20	Materials, metallurgy	546,088	2,7%
TF21	Surface technology, coating	352,656	1,7%
TF22	Micro-structural and nano-technology	37,708	0,2%
TF23	Chemical engineering	519,153	2,6%
TF24	Environmental technology	389,211	1,9%
TF25	Handling	603,590	3,0%
TF26	Machine tools	677,266	3,3%
TF27	Engines, pumps, turbines	463,621	2,3%
TF28	Textile and paper machines	405,759	2,0%
TF29	Other special machines	672,267	3,3%
TF30	Thermal processes and apparatus	388,143	1,9%
TF31	Mechanical elements	553,279	2,7%
TF32	Transport	856,482	4,2%
TF33	Furniture, games	528,471	2,6%
TF34	Other consumer goods	332,163	1,6%
TF35	Civil engineering	759,096	3,8%
Total		20,241,706	100,0%

#### - Temporal coverage

The database of this first release covers patent applications from 2000 to 2020 (based upon PATSTAT2021 Version Spring). It is most likely that years 2019 and 2020 are still only partially filled. It includes 20,241,706 applications of priority patents

The number of PI priority patents applied every year is shown below. It has increased by 170% during the 18 years. Year 2020 is poorly completed.

Table 3: Number of priority patent applications over time

Filing year	Number of PI priority patent applications	
2000	670,246	
2001	678,265	
2002	665,576	
2003	680,682	





2004	693,834	
2005	730,992	
2006	746,253	
2007	765,074	
2008	793,153	
2009	775,383	
2010	833,730	
2011	906,741	
2012	1,042,377	
2013	1,160,214	
2014	1,223,779	
2015	1,339,724	
2016	1,526,923	
2017	1,716,362	
2018	1,833,727	
2019	(1,341,263) <sup>1</sup>	
2020	(532,596) <sup>1</sup>	
Total	20,656,894	

#### - Geographical coverage

#### Geography of the PI protection

The data cover all priority patent applications worldwide, i.e. at all regional and national offices in the world (see table below). More than 50% of the priority applications are applied for at the Japanese or Chinese ones. The IP5 patent offices (US, EP, JP, CN, KR) cumulate together 86,2% of the applications.

Table 4: Number of priority patent applications and share of artificial priorities according to the patent offices

Patent office	Number of PI patent applications	Distribution of PI patent applications	Share of artificial priority patents
CN	8,034,493	38,9%	0,9%
JP	5,214,992	25,2%	11,7%
US	2,534,379	12,3%	50,6%
KR	1,696,261	8,2%	4,8%
DE	726,530	3,5%	10,2%
EP	328,008	1,6%	38,7%
GB	305,440	1,5%	0,5%
wo	305,437	1,5%	5,2%
RU	287,777	1,4%	0,5%
TW	270,273	1,3%	1,9%





FR	223,880	1,1%	2,0%
IT	114,231	0,6%	9,8%
AU	79,318	0,4%	44,1%
PL	45,934	0,2%	0,8%
BR	42,482	0,2%	1,3%
IN	36,576	0,2%	87,6%
SE	35,180	0,2%	20,4%
ES	29,644	0,1%	5,7%
NL	29,109	0,1%	10,3%
FI	24,594	0,1%	7,9%
UA	22,977	0,1%	2,9%
TR	22,840	0,1%	24,2%
Others	246,539	12,0%	
Total	20,656,894	100%	11,7%

After a first priority patent application for a new invention, the IP protection can be further extended in several geographical countries considered as future market. The following tables give information on the geography of the patent protection of a given priority patent using data available in its Inpadoc family. Most of the patents, for a given invention are applied in a single patent office and only 25% of the priority patents are transnational, i.e. further extended in another patent office (20% from 2 to 5 patent offices).

Table 6: Number of patent offices where patents are applied for a given invention

Number_of distinct patent offices in the inpadoc family	Number of priority patents	Share of priority patents
1	15,500,510	75,0%
2	1,742,758	8,4%
3	1,000,989	4,8%
4	770,614	3,7%
5	583,166	2,8%
More than 5	1,642,023	5,1%
Total	20,656,894	100,0%

Almost 50% of the inventions are protected in China (either in the first (39%) or secondary (20%) subsequent filings), 28% in Japan, 24% in US, 12% at EPO, 12% in Korea. 16% of the families include a PCT patent<sup>7</sup>. Respectively 23,8% and 17,3% of the patents were applied (first filling or further geographical extension) in at least 1 or 2 IP5 patent offices. Only 1.3% of them have been applied in the 5 IP5 patent offices. Only 37% of the patents are granted (either because they were rejected or because the granting decision is still pending).

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<sup>&</sup>lt;sup>7</sup> The Patent Cooperation Treaty (PCT) provides a unified procedure for filing patent applications to protect inventions in each of its contracting states. A patent application filed under the PCT is called an international application, or PCT application.





Table 7: Number and share of patents (priority or secondary applications) applied in the five largest patent offices (IP5 patent offices) and other offices

Content of Inpadoc family <sup>8</sup>	Number of priority patents	Share of priority patents
Total	20,656,894	100%
US application	4,894,036	23,7%
EP application	2,526,412	12,2%
JP application	5,713,216	27,7%
KR application	2,472,223	12,0%
CN application	10,145,321	49,1%
W application	3,312,187	16,0%
Transnational patent	5,156,384	25,%
Triadic	719,293	3,5%
lp5	273 ,801	1,3%
2ip5 family	3,567,686	17,3%
lp5 family	4,912,441	23,8%
Granted	7,673,581	37,1%

#### Geography of the inventions

In 80% of the patents, the information of the inventors" geographical location is given (country assignment); in 75% of the patents, the information of the applicants" geographical location is given (country assignment).

The shares of patents, inventors' addresses and applicants' addresses according to the inventors' and applicants' addresses are shown in the tables below.

Among the 59 million inventors, the geographical location (country assignment) was identified for 83% of them and for 61% of them, the addresses were geocoded and assigned to an URA (Urban and Rural Area). Among the 22 million applicants, the geographical location (country assignment) was identified for 76% of them and for 63% of them, the addresses were geocoded and assigned to an URA.

Almost 30% of RPD priority patents have at least one inventor located in China. Then come Japanese inventors (27% of the patents) and US inventors (10% of the patents). More than 65% of the patents have at least one Asian inventor and more than 75% of the overall set of inventors are located in Asia.

Table 8: Number of priority patent applications according to the country of inventors

Country of inventors	Number of patent applications with inventor from the country	Share of patent applications with inventor from the country
CN	6,049,743	29,3%
JP	5,545,334	26,8%

<sup>8</sup> Only ipr\_type: PI is considered in inpadoc family.

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Unknown	4,135,671	20,0%
US	2,162,462	10,5%
KR	1,706,754	8,3%
DE	885,923	4,3%
TW	433,187	2,1%
FR	310,509	1,5%
RU	251,011	1,2%
GB	159,517	0,8%
IT	140,428	0,7%
CA	135,854	0,7%
NL	110,184	0,5%
СН	96,095	0,5%
IN	90,057	0,4%
SE	86,902	0,4%
AU	64,210	0,3%
IL	59,691	0,3%
ES	54,321	0,3%
PL	51,518	0,2%
FI	49,644	0,2%
BR	48,115	0,2%
AT	46,379	0,2%
BE	46,364	0,2%
нк	44,415	0,2%
DK	41,162	0,2%
SG	33,929	0,2%
TR	26,860	0,1%
UA	25,654	0,1%
NO	19,376	0,1%
Total number of patents	20,656,894	100%

Table 9: Number and share of inventors according to the country of inventors. Share of inventors allocated to URAs and NUTS3 regions

Country of inventors	Number of inventors	Share of inventors	Cumulated share	Share of addresses allocated to URA	Share of addresses allocated to NUTS3 (EU countries)
CN	18,512,361	31,3%	31,3%	60,0%	-
JP	12,647,940	21,4%	52,7%	67,8%	-
Unknown	9,831,894	16,6%	69,3%	0,0%	-
US	5,761,034	9,7%	79,0%	98,2%	-
KR	4,349,848	7,4%	86,4%	86,2%	-





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DE	2,116,297	3,6%	90,0%	97,1%	96,9%
RU	901,027	1,5%	91,5%	94,7%	-
TW	898,469	1,5%	93,0%	92,4%	-
FR	658,218	1,1%	94,1%	83,0%	83,0%
GB	301,650	0,5%	94,6%	93,1%	92,9%
CA	295,339	0,5%	95,1%	94,3%	-
IT	262,756	0,4%	95,6%	84,6%	79,4%
IN	236,465	0,4%	96,0%	95,3%	-
NL	236,404	0,4%	96,4%	98,2%	98,2%
CH	190,423	0,3%	96,7%	96,3%	96,2%
SE	173,977	0,3%	97,0%	84,1%	83,8%
IL	146,473	0,2%	97,2%	85,6%	-
PL	143,842	0,2%	97,5%	98,4%	98,0%
ES	138,949	0,2%	97,7%	87,4%	87,3%
AU	120,053	0,2%	97,9%	80,1%	-
BR	117,344	0,2%	98,1%	64,1%	-
FI	107,527	0,2%	98,3%	97,5%	97,3%
UA	93,483	0,2%	98,5%	90,8%	-
BE	90,787	0,2%	98,6%	97,8%	97,6%
AT	89,993	0,2%	98,8%	96,7%	96,6%
DK	89,354	0,2%	98,9%	90,4%	89,6%
SG	70,330	0,1%	99,0%	95,6%	-
RoW	567,919	1,0%	100,0%		-
Total number of inventors	59,150,156	100,0%		61,7%	

Table 10: Number of priority patent applications according to the country of applicants

Country of applicants	Number of patent applications with applicant from the country	Share of patent applications with applicant from the country
JP	5,810,690	28,1%
Unknown	5,119,587	24,8%
CN	3,327,160	16,1%
US	2,041,026	9,9%
KR	1,581,758	7,7%
DE	851,613	4,1%
TW	423,951	2,1%
FR	275,960	1,3%
RU	240,333	1,2%
GB	226,183	1,1%
NL	117,804	0,6%





СН	115,186	0,6%
IT	101,487	0,5%
SE	91,825	0,4%
CA	88,490	0,4%
AU	61,093	0,3%
FI	53,925	0,3%
PL	46,200	0,2%
BR	42,494	0,2%
ES	42,315	0,2%
IL	41,897	0,2%
DK	37,504	0,2%
BE	37,401	0,2%
AT	36,398	0,2%
SG	30,406	0,1%
IN	29,685	0,1%
TR	25,421	0,1%
UA	23,055	0,1%
НК	21,719	0,1%
NO	18,057	0,1%
Total number of patents	20,656,894	100%

Table 11: Number and share of applicants according to the country of the applicants. Share of applicants allocated to URAs and NUTS3 regions

Country of applicants	Number of applicants	Share of applicants	Cumulated share	Share of addresses allocated to URA	Share of addresses allocated to NUTS3
JP	6,283,479	27,8%	27,8%	80,2%	-
Unknown	5,367,580	23,8%	51,6%		-
CN	3,642,558	16,1%	67,8%	89,1%	-
US	2,209,343	9,8%	77,6%	98,6%	-
KR	1,667,166	7,4%	84,9%	67,8%	-
DE	879,819	3,9%	88,8%	89,0%	88,9%
TW	438,804	1,9%	90,8%	71,8%	-
FR	299,716	1,3%	92,1%	78,3%	78,1%
RU	254,707	1,1%	93,2%	35,3%	-
GB	238,296	1,1%	94,3%	77,9%	76,0%
NL	122,247	0,5%	94,8%	91,6%	91,6%
СН	118,775	0,5%	95,4%	94,2%	94,1%
IT	105,883	0,5%	95,8%	90,5%	90,4%
SE	94,336	0,4%	96,3%	92,5%	92,5%
CA	94,151	0,4%	96,7%	87,5%	-





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AU	64,764	0,3%	97,0%	73,6%	-
FI	56,903	0,3%	97,2%	97,9%	97,9%
PL	49,805	0,2%	97,4%	64,8%	64,1%
BR	48,829	0,2%	97,6%	52,7%	-
ES	47,533	0,2%	97,9%	78,5%	78,4%
IL	47,218	0,2%	98,1%	85,8%	-
BE	40,015	0,2%	98,2%	91,4%	91,2%
DK	38,867	0,2%	98,4%	92,0%	91,4%
AT	37,353	0,2%	98,6%	87,8%	87,8%
SG	32,457	0,1%	98,7%	96,7%	-
IN	31,466	0,1%	98,9%	90,5%	-
TR	26,739	0,1%	99,0%	51,3%	-
RoW	229,370	1,0%	100,0%		
Total number of applicants	22,568,179	100,0%		63,1%	

#### 2.5 Quality and accuracy of data

Checking the data quality is not carried out on the initial PATSTAT raw data but on the further improvements done at LISIS to produce RISIS Patent. It includes tests of completedness and consistency.

#### Tests of completedness

- 1- Patent applications without any information on applicants (all applicants)
  All patent applications of RPD have at least one applicant. If there were patents without any information on at least one applicant in the initial database and if no information was completed during the enrichment steps, such priority patents were not included in RPD
- 2- Patent applications with legal applicants without any information on inventors nor IPC codes

Table 12: Share of priority patent applications with legal applicants without any information on inventors or IPC codes according to the patent office for the 25<sup>th</sup> largest patent offices

Patent office	Number of patent applications	Share of patent applications with at least one inventor	Share of patent applications with ipc information
Total	20,656,894	98,40%	98,20%
CN	8,034,493	99,97%	99,75%
JP	5,214,992	99,99%	99,83%
US	2,534,379	99,90%	99,53%
KR	1,696,261	99,99%	99,24%
DE	726,530	97,11%	99,95%





EP	328,008	97,68%	99,53%
GB	305,440	25,76%	35,68%
WO	305,437	99,81%	99,34%
RU	287,777	99,04%	99,69%
TW	270,273	97,01%	98,59%
FR	223,880	99,34%	99,73%
IT	114,231	98,67%	44,44%
AU	79,318	71,82%	78,23%
PL	45,934	99,74%	99,45%
BR	42,482	99,71%	98,89%
IN	36,576	99,55%	98,50%
SE	35,180	98,69%	98,07%
ES	29,644	99,75%	99,81%
NL	29,109	99,69%	99,80%
FI	24,594	98,18%	96,36%
UA	22,977	98,08%	92,21%
TR	22,840	98,50%	94,11%
AT	19,793	54,15%	96,72%
CA	19,274	97,32%	99,39%
СН	18,959	98,83%	99,80%
DK	18,044	99,29%	99,76%

<sup>\*</sup> appln\_id not in table rpd\_inventors

## 3- Patent applications with missing country of the inventors' or missing geocoded address of inventors

For 2/3 of the inventors, the country is identified either in the priority patent, a subsequent patent of the same Inpadoc family in Patstat or other patent ressources (step 1). For 0,03% of the inventors, the country can be allocated after the geocoding and further geographical allocation steps using Cortext facilities (situation where the initial inventors' addresses include an address but where the country information cannot be isolated because it is missing or not recognized during the automated process). When still missing, the country of the applicant is allocated to the inventor' when the patent is also applied in the country of the applicant (16% of the inventors' country allocation).

The allocation of geographical information (country or URA) to patent inventors drastically varies according to the patent offices. The completed assignment of all the patent inventors is satisfying in most of the EU countries (except the United Kingdom) and the US but cannot be properly done for patents applied in China, Japan or Brazil.

Selecting priority patents with further subsequent extensions allows to significantly reduce the share of patents where inventors' allocation is missing. The share of unassigned

<sup>\*\*</sup> appln id not in table rpd technological classification





countries among the inventors drops from 16% to 1% when selecting transnat or 2ip5 priority patents; the share of unassigned URA among the inventors decreases from 38% to 12%.

Table 13: Assignment of the country of inventors: numbers and shares

Source of the inventors' country assignement	Number of inventors' addresses	Share of inventors' addresses	
Initial Patstat data (priority or inpadoc family) or other data sources (step 1)	39,958,215	67,55%	
Country allocation based on geocoded information (step 2)	18,339	0,03%	
Country assigned based on applicant and patent office data (step 3)	9,341,708	15,79%	
Unknown	9,831,894	16,62%	

Table 14: Share of priority patent applications with information on the country of the inventor or with geocoded address of inventors according to the patent office for the 25<sup>th</sup> largest patent offices

Patent office	Number of patent applications	Share of patents without any information of the inventors*	Share of patents with unassigned countries among the inventors' addresses (after step1)**	Share of patents with unassigned countries among the inventors' addresses (after step3)**	Share of patents with unassigned URA among the inventors' addresses**	Total share of patents with unassigned countries among inventors' addresses**	Total share of patents with unassigned URA among inventors' addresses**
Total	20,656,894	1,6%	36,6%	15,8%	47,8%	17,4%	49,4%
CN	8,034,493	0,0%	78,4%	49,3%	78,9%	49,3%	78,9%
JP	5,214,992	0,0%	15,6%	0,4%	48,1%	0,4%	48,1%
US	2,534,379	0,1%	1,0%	0,4%	6,9%	0,5%	7,0%
KR	1,696,261	0,0%	13,0%	2,2%	23,8%	2,2%	23,8%
DE	726,53	2,9%	0,2%	0,1%	6,1%	3,0%	9,0%
EP	328,008	2,3%	0,3%	0,3%	9,7%	2,6%	12,0%
GB	305,44	74,2%	0,2%	0,1%	1,7%	74,3%	75,9%
WO	305,437	0,2%	0,9%	0,9%	6,1%	1,1%	6,3%
RU	287,777	1,0%	17,5%	15,1%	20,2%	16,1%	21,1%
TW	270,273	3,0%	0,4%	0,2%	14,6%	3,2%	17,6%
FR	223,88	0,7%	0,3%	0,0%	34,0%	0,7%	34,7%
IT	114,231	1,3%	38,3%	19,4%	41,4%	20,7%	42,7%
AU	79,318	28,2%	34,9%	15,0%	35,9%	43,2%	64,0%
PL	45,934	0,3%	0,7%	0,5%	3,6%	0,8%	3,9%
BR	42,482	0,3%	46,5%	3,6%	54,5%	3,9%	54,8%





IN	36,576	0,4%	4,1%	2,7%	13,3%	3,1%	13,7%
SE	35,18	1,3%	26,1%	3,7%	38,0%	5,0%	39,3%
ES	29,644	0,3%	11,5%	0,6%	18,5%	0,9%	18,8%
NL	29,109	0,3%	8,0%	3,8%	10,2%	4,1%	10,6%
FI	24,594	1,8%	0,3%	0,1%	5,4%	1,9%	7,2%
UA	22,977	1,9%	9,8%	1,9%	10,5%	3,8%	12,4%
TR	22,84	1,5%	0,6%	0,5%	2,9%	2,0%	4,4%
AT	19,793	45,9%	0,6%	0,2%	3,3%	46,1%	49,1%
CA	19,274	2,7%	0,9%	0,3%	13,2%	3,0%	15,8%
СН	18,959	1,2%	0,8%	0,3%	7,8%	1,5%	9,0%

<sup>\*</sup> appln\_id not in table rpd\_inventors

Table 15: Share of priority patent applications with information on the country of the inventor or with geocoded address of inventors according the patent value

Patent value	Number of patents	Share of appln_id without any inventor*	Share of patents with at least one inventor without assigned country**	Total share of patents with missing information on inventors' country	Total share of patents with missing information on inventors' URA
Transnat	5,156,384	2,5%	1,5%	4,0%	32,8%
2ip5	3,567,686	2,0%	1,3%	3,3%	35,3%
All	20,656,894	1,6%	20,0%	21,6%	38,4%

<sup>\*</sup> appln id not in table rpd inventors

Table 16: Share of inventors' addresses with information on the country of the inventor or with geocoded address of inventors according the patent value

Patent value	Number of inventors	Share of inventors without assigned country	Share of inventors without assigned URA
Transnat	14,325,880	1,2%	11,8%
2ip5	10,201,420	1,1%	12,4%
All	59,150,156	16,6%	38,3%

4- Patent applications with legal applicants with missing country of the applicants' or missing geocoded address of applicants

1/4 of the patents have unassigned country or unassigned URA for the applicants. These shares significantly vary according to the patent office.

<sup>\*\*</sup> appln\_id present in rpd\_inventors but none or only partial information is available to assign a country/URA to each of the patent inventors

<sup>\*\*</sup> appln\_id present in rpd\_inventors but none or only partial information is available to assign a country/URA to each of the patent inventors





Table 17: Share of priority patent applications with legal applicants with information on the country of the applicant or with geocoded address of applicant according to the patent office for the 25<sup>th</sup> largest patent offices

Patent office	Number of patent applications	Share of patents with missing country information among the applicants' adresses	Share of patents with missing URA information among the applicants' adresses
Total	20,656,894	24,8%	38,4%
CN	8,034,493	59,7%	64,8%
JP	5,214,992	0,5%	2,6%
US	2,534,379	2,8%	7,7%
KR	1,696,261	1,3%	12,1%
DE	726,530	0,1%	6,0%
EP	328,008	0,1%	280,2%
GB	305,440	29,8%	222,8%
WO	305,437	0,2%	11,2%
RU	287,777	16,3%	2,6%
TW	270,273	0,4%	1,6%
FR	223,880	0,0%	1,4%
IT	114,231	29,0%	3,6%
AU	79,318	19,5%	28,4%
PL	45,934	0,6%	19,6%
BR	42,482	0,1%	259,2%
IN	36,576	1,3%	6,1%
SE	35,180	0,1%	75,7%
ES	29,644	2,1%	6,0%
NL	29,109	4,3%	30,2%
FI	24,594	0,1%	366,2%
UA	22,977	8,2%	28,7%
TR	22,840	0,7%	13,4%
AT	19,793	0,2%	90,1%
CA	19,274	0,3%	166,8%
СН	18,959	0,4%	63,2%
DK	18,044	0,2%	1,5%

Tests of consistency

1- Priority patents





We now rely on earliest\_filing\_id now provided in Patstat to define priority patent application. It is more reliable than our own methodology to avoid to miss some linkages with priorities.

#### 2- Geocoding of the addresses of inventors

We compare the country of the inventors given in the RISIS patent database with the country attributed to the inventor after the geocoding step. When the 2 countries are known for a given address (in 62% of the total 59,150,156 addresses), the country is the same for in 97,40% of the addresses. After a careful manual checking of these country discrepancies, we have selected the correct country in "'country final enriched'".

#### 3 Technical Specifications

#### 3.1 Information on the data base system

#### Current data base system used

The current data base system is My SQL 5.1.63 with MyISAM as the default storage engine. In term of maintainability and backup, the main advantage of this storage engine is to use three different files for each table of a database:

- the data file has a .MYD (MYData) extension;
- the index file has a .MYI (MYIndex) extension;
- the structure file has a .frm extension.

MySQL is optimized for an intensive usage: a high level of accessibility and efficiency, for a low amount of users

#### Planned future technical changes concerning data base system

None

#### 3.2 Technical variable definition

Variables present in PATSTAT raw data are defined below.

Table 14: Name and definition of the variables already present in PATSTAT and included in RISIS Patent

APPLN_ID	Application unique identifier
APPLN_KIND	Kind of Application
	□□□A patent
	☐ _W PCT application (in the international phase)
	☐ _T used by some offices (e. g. AT, DE, DK, ES, GR, HR, PL, PT, SI, SM, TR) for applications which





AND INNOVATION POLICE STUDIES	are "translations" of granted PCT or EP
	applications
	□ _P provisional application (US only)
	□ _F design patent
	□ _D2, D3 artificial
	□ _Other "exotic" kind codes
APPLN_NR	Application number
	Number issued by the Patent Authority where the National, International or Regional application was filed
APPLN_AUTH	Office where the patent was applied
APPLN_ABSTRACT	Abstract of the application
APPLN_TITLE	Title of application
APPLN_ABSTRACT_LG	Language of abstract of application
APPLN_TITLE_LG	Language of title of application
DOCDB_FAMILY_SIZE	Size of DOCDB simple family of a given application
DOC_STD_NAME	Standardised name as recorded in DOCDB
	Standard name attributed to applicant and inventor names for inclusion in DOCDB.  It is not 100% certain that the DOCDB standardised names are always linked with the correct person name, in particular if the person information came from a source other than DOCDB. This is especially true for names in USPTO patents.  In case DOCDB does not provide a DOCDB standardized name, this attribute will contain the same data as the attribute PERSON_NAME.
DOC_STD_NAME_ID	ID for the DOCDB standardized name
EARLIEST_FILING_DATE	Date of the earliest filing
	The earliest date of the filing dates of the application itself, its international application, its Paris Convention priority applications, the applications with which it is related via technical relations and its application continuations. Only directly related applications are considered; this is unlike the INPADOC family, where applications might also be indirectly related.
EARLIEST_FILING_YEAR	Year of the earliest filing date
EARLIEST_PUBLN_YEAR	Year of the earliest publication date of an application
GRANTED	Granted indicator





AND INNOVATION POLICY STUDIES	
	"1" if there exists a publication of the grant; "0" otherwise
IPC_CLASS_SYMBOL	IPC classification symbol (IPC 8th edition)
	Classification symbol according to the International Patent Classification, eights edition (entered into force January 1, 2006)
NB_CITING_DOCDB_FAM	Number of forward citations on family level
DEDEON ID	Number of distinct DOCDB simple families citing at least one of the publications or applications of the DOCDB simple family of the current application
PERSON_ID	Person identification
PERSON_NAME	Person name
PSN_ID	ID for the PATSTAT standardized name
PSN_NAME	PATSTAT standardized name
	The attribute is populated for all persons. Names of persons which have not been harmonized are just copied from the attribute PERSON_NAME.
PSN_SECTOR	Sector of the applicant
PSN_SECTOR	INDIVIDUAL ; COMPANY ; UNKNOWN ; GOVERNMENT ; NON-PROFIT ; UNIVERSITY ; HOSPITAL
DUDI N. ALITU	Publication Authority or Publishing office
PUBLN_AUTH	Patent Authority that issued the publication of the application
PUBLN_CLAIMS	Indicator of the <b>number of claims</b> in the given publication
PUBLN_DATE	Publication date
	Date on which the publication was made available to the public
PUBLN_KIND	Kind of Publication
	Publication kind attributed by the Patent Authority issuing the publication
PUBLN_LG	Publication language
PUBLN_NR	Publication number
	Number given by the Patent Authority issuing the





publication

Table 15: Name and definition of the variables added in RISIS Patent (non included in PATSTAT or modified)

adr_final	Addresses of inventors and applicants	Completed	
lso_ctry	Addresses of inventors and applicants (country)	Completed	
Ctry_final_enrich	Addresses of inventors (enriched country)	Completed	
Source_ctry_final _enriched	Method for enriched inventors" country assignement	Completed	
Latitude	Addresses of inventors and applicants	New in provided	nfo
Longitude	Addresses of inventors and applicants	•	nfo
Rurban area code	Allocation of addresses of inventors and applicants	New in provided	nfo
Rurban area name	Allocation of addresses of inventors and applicants	New in provided	nfo
Rurban area caracteristics	Allocation of addresses of inventors and applicants	New in provided	nfo
NUTS3 Id	Allocation of addresses of inventors and applicants	New in provided	nfo
RISIS register id	ID Allocation to applicants included in RISIS registers (ORGREG, FIRMREG)	New in provided	nfo
RISIS register	ORGREG, FIRMREG (VICO, CHEETAH,CIB)	New in provided	nfo
Singleton	Priority patent without any extension	New in provided	nfo
Transnat	Priority patent further extended in a second country at least	New in provided	nfo
IP5 family	Priority patent further extended in a second country at least and applied in one IP5 patent office (info of Inpadoc family)	New in provided	nfo
2_IP5 family	Priority patent further extended in a second country at least and applied in two IP5 patent office (info of Inpadoc family)	New in provided	nfo
Triadic	Priority patent for which the invention is protected at JPO, USPTO and JPO (info of Inpadoc family)	New in provided	nfo
IP5	Priority patent for which the invention is protected at EPO, USPTO, SINO, KINO and JPO (info of Inpadoc family)	New ii provided	nfo
US	Priority patent for which the invention is protected at USPTO (info of Inpadoc family)	New ii provided	nfo
EP	Priority patent for which the invention is	New in provided	nfo





AND INNOVATION POLIC	protected at EPO, (info of Inpadoc family)		
JP	Priority patent for which the invention is protected at JPO, (info of Inpadoc family)	New provided	info
CN	Priority patent for which the invention is protected at SINO (info of Inpadoc family)	New provided	info
KR	Priority patent for which the invention is protected at KINO (info of Inpadoc family)	New provided	info
PCT in the Inpadoc family	Priority patent for which the invention is protected using a PCT patent (info of Inpadoc family)	New provided	info
Number patents in docdb family	Number patent applications in docdb family (restricted family)	New provided	info
Number distinct offices in docdb family	Number of distinct patent offices where patents where applied for in docdb family (restricted family)	New provided	info
Number patents in inpadoc family	Number patent applications in docdb family (extended family)	New provided	info
Number distinct offices in inpadoc family	Number of distinct patent offices where patents where applied for in docdb family (extended family)	New provided	info
Domain	Fractional counting of priority patent on the 5 domains	New provided	info
Techno fields	Fractional counting of the priority patent on the 35 technological fields	New provided	info
Techno subfields	Fractional counting of the priority patent on the 401 technological subfields	New provided	info
IPC full textual description	Aggregation of the hierarchical IPC description	New provided	info
IPC class 4 digits	Fractional counting of the priority patent on the 615 technological 4 digits classes	New provided	info
Earliest publication of grant	First notification of a grant	Reshaped from PATSTA	info \T

#### 3.3 Description of the Entity Relationship Model

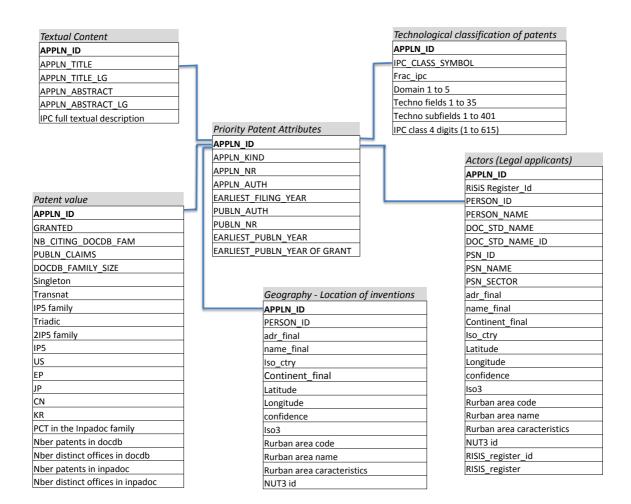
The data model of the RISIS Patent database is shown below. It includes 6 tables related using the identifier of the priority patent application (appln\_id):





- Table "Priority Patent Attributes" gives a set of information related to the patent application and publication places and dates,
- Table "Textual Content" includes the pieces of textual information useful for text mining. It aims at defining the core of the protected inventions beside the predefined technological classifications
- Table "technological classification of patents" relates patent to technology on a fractional counting based using existing classification built on IPC codes
- Table "Patent value" proposes several indicators to estimate the patent application value
- Table "Geography Location of inventions" informs on the locations of the inventions based on the inventors' addresses.
- Table "Actors" focuses on the institutions that patent and give information on their type, name and location.

Table 16: Data model of RISIS Patent



The data model of the PATSTAT2021 database in shown in Appendix 5.





#### 3.4 Interfaces for access and to other infrastructures

RISIS Patent will be interlinked with the RISIS organisation registers, i.e. the firm register (FirmReg), and public sector (org register id of institutions). Furthermore, the database is designed to comply with RISIS integrative dimensions, actors, space as described in the following.

#### Geocoding and allocation to rurban areas

Geocoding is done on inventors and applicants using the CORTEXT geocoding tools (see specific documentation on the CORTEXT Platform). It provides for each inventor and applicant it geo-coordinates. The % of addresses that can be geocoded is very high (around 98%), but the issue is to have addresses, and we face here a critical issue for the PATSTAT database.

We focus here on inventor addresses, i.e. pieces of detailed geographical information enabling address geocoding (city, county, street, ...). There are multiple strategies by firms where to take their patents. We thus do not use the address of applicants for analysing the geography of inventions. We focus on the addresses of inventors. Their presence and quality varies depending upon offices. For instance a study done by SPRU in the early 2000s demonstrated that the USPTO could not be trusted for addresses of inventors for patents taken elsewhere and extended to the US.

The raw coverage of addresses in PATSTAT for priority patents is limited and it has been a preoccupation by numerous teams to increase it.

We process data with the following steps to improve the address coverage:

- We first retrieve addresses that are not locate in the adequate item in PATSTAT (addresses retrieved from natural or doc standardised names) (step 1-a)
- We incorporate external resources available: REGPAT from OECD, addresses provided for by INPI, Japanese addresses (thanks to colleagues in Japan) (step 1b)
- For priority patents still without addresses, we then look into the Inpadoc family to look for inventors and addresses with specific rules linked to proximity non-US patents (step 1-c)
- We geocode and allocate URA addresses using the CORTEXT geographical modules. If a country is assigned after geocoding to a previously empty country address, we keep it (step 2).
- For priority patents still without countries, we allocate the country of the applicant to the inventor if the country of the applicant is the country where the patent was applied for (ctry\_applt=appln\_auth) (step 3)

Actors





We deal with actors that are legal applicants (individual applicants were discarded from the database in RISIS Patent. In the current RISIS Patent database, we only rely on the sectorial information provided in the raw PATSTAT database<sup>9</sup>.

Among the 59 million inventors, the geographical location (country assignment) was identified for 83% of them and for 61% of them, the addresses were geocoded and assigned to an URA (Urban and Rural Area). Among the 22 million applicants, the geographical location (country assignment) was identified for 76% of them and for 63% of them, the addresses were geocoded and assigned to an URA. Details are given above in the documentation in Tables 8 to 17.

#### Integration with RCF

The current RISIS Patent is made available for access to researchers in RISIS is foreseen to be fully incorporated in RCF, under the condition of controlled access and that security of usage is given (i.e. access for selected users with a concrete research project to the parts of the dataset needed for the research). Linking to other datasets in the RCF will be realized via the RISIS registers (providing the respective identifiers to the registers in RISIS Patent). Technical issues for incorporation of RISIS Patent into RCF (e.g. database system, how can a user access which parts of the dataset, etc.) are to be defined in close cooperation with WP4 beginning with autumn.

#### 4 Scientific use and main references

RISIS Patent is an accessible and rich data source via RISIS for research activities in the production of knowledge using patent data. It allows studying the dynamics of knowledge creation along different dimensions: space, actors and technologies.

Thanks to its links with other RISIS facilities, Risis Patent enables to access to these dimensions at a coarse level or at a fine grained level using either usual classification (for technologies, geography) or designing ad-hoc data subsets of patents in specific topics of inventions, for a particular type of institutions in given geographical spaces.

It had been recently used to:

.Observe the distribution and location of the inventive activities of a group of European public research centres in the field of marine biotechnology (the EMBRIC project)

.Analyse the **exploitation of new knowledge** in specific industries (pharmaceutical and chemical industries), done by researchers from Universite Gustave Eiffel

<sup>&</sup>lt;sup>9</sup> Harmonizing names and allocation of assignee sectors in Patstat raw data was done by ECOOM (K.U. LEUVEN; http://www.ecoom.be/en/EEE-PPAT).





.Explore the **Inventive Productivity of Multinational Firms** using non parametric modelling (Conditional Efficiency Analysis)

.Analyse the internationalisation of applied knowledge production with a focus on special countries (Israel, central European countries)

.Analyse **the knowledge** production in worldwide Metropolitan Areas (Universite Gustave Eiffel team)

.Analyse **the knowledge** production specialization in EU NUTS regions University (Vilnius University)

#### Recent References

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## **Appendix**







#### **Appendix 1**: Artificial patents

The very first filing of a patent application that aims at protecting a novel invention, also known as a priority patent, is considered as a promising type of document for analysing the dynamics of knowledge creation in the field of technology (de Rassenfosse et al., 2013).

If most of the worldwide priority patent applications included in the PATSTAT database are the published patents, there is an additional group of patents, classified as « artificial patents » that are not part of the EPO database. The artificial priority patents are priority patents cited in further patent extensions included in the PATSTAT database but for these patents the application was not identified with 100% certainty by EPO.

An artificial priority patent in its original state contains very scarce information. The only information included in the Patent database provided by EPO for these documents relates to the patent office where the artificial priority patent has been applied for, the date and the type of the application and whether the patent has been cited as a priority patent or through another type of citation. All the other information, which is usually included in fully documented patent documents, is missing: the technology domains, the inventors' and applicants' addresses and names, the title and the abstract of the patent application.

In RISIS Patent, we fill both the applicants' and the inventors' names and addresses but also of IPC codes in the artificial priority patents based on the identification and use of this piece of information retrieved from a non artificial patent belonging to the same INPADOC family (Laurens et al., 2018). To select the candidate from which information is retrieved, a set of sequential rules is defined in order to select a candidate patent as close as possible to the artificial one. The criteria relate to the type of information available in the candidate patent, the nature of the priority link between the artificial patent and the selected candidate patent, the time lag between the two applications and the patent offices. In order to be considered as a potential candidate, the patent must contain information concerning addresses, either the inventors' addresses or the applicants' addresses or both. A candidate with a direct priority link with the artificial patents is selected first (from table tls204 of the PATSTAT database). In absence of such a link, a candidate with a direct continuity link is selected (continuation, division/continuation in parts/internal continuities in table tls 216). At last, candidate patents with indirect links are selected. Besides the type of links, we also consider the time lag between the artificial and the candidate patents. For two candidates with the same link, we select the candidate with a date of filing closest to the filing date of the artificial patent (the maximum authorised time lag is fixed to five years). Finally, we give a higher priority to US candidates to fill US artificial patents. For non US artificial patent applications, candidates filed as PCT, or EP, JP, FR, DE received the highest priority. A schematic view of the rules of selection of candidates chosen for replenishing artificial patents is presented in figure A1.

As soon as a candidate patent is selected, its information related to the names and addresses and the IPC codes is used to fill the artificial patent. This procedure made possible to propagate information from a candidate patent in 99.3% of the artificial priority patents filed between 1995 and 2010

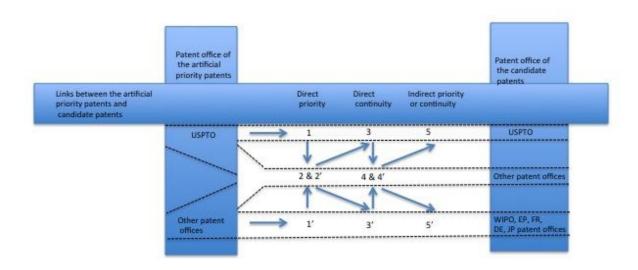
These high retrieval percentages show that the filling step of artificial patents was very effective. It thus provides a better coverage of the overall inventive activities when using the priority patents, in particular in patent offices where the share of artificial patents is





high (EPO, USPTO patent offices in India or Australia).

Figure A1: Schematic description of the different steps to fill inventors' and applicants' addresses in artificial priority patents.



Scripts are shown in https://gitlab.com/cortext/patents/patstat/-/tree/version-2021/version\_2021/artificial\_patents

#### References:

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@software{cortext\_manager\_v2\_bibtex,

keywords = {natural language processing, social network analysis, geospatial analysis, descriptive statistics, scientometrics, biliometrics},





author = {Breucker, Philippe and Cointet, Jean-Philippe and Hannud Abdo, Alexandre and Orsal, Guillaume and de Quatrebarbes, Constance and Duong, Tam-Kien and Martinez, Cristian and Ospina Delgado, Juan Pablo and Medina Zuluaga, Luis Daniel and Gómez Peña, Diego Fernando and Sánchez Castaño, Tatiana Andrea and Marques da Costa, Joenio and Laglil, Hajar and Villard, Lionel and Barbier, Marc},

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month = {10},
title = {CorTexT Manager},
url = {https://docs.cortext.net},
year = {2016}
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#### **Appendix 2**: Type of applicants

One of the main goals in our research activities is the study and analysis on the dynamics of R&D and innovations made by legal entities, such as corporations, universities, research centers and in general every class of entity that do not fit into the categorization of "natural person". Considering the above, we have worked with the data contributed by PATSTAT to start with the data restructuring in order to begin on the classification process, in this way we have defined two entities classes: "legal" and "person". A third one "unknown" contains the cases where it was not possible to allocate a type to the applicant.

In the entities that can be found within the PATSTAT applicants coexist a large proportion of homonym names, for instance, the word 'Ford' may be tagged as a company or as an individual, which means that, using a direct approach of detection where several functions that implement gazetteers and by combing regular expressions, could lead in a low quality results for the categorization of legal entities and individuals. Another ambiguity that we had to face was for companies names that do not have any corporate ending and consequently is not likely that we are able to label those entities with just a dictionary list of legal suffix.

Therefore, we turn the approach of the solution, instead of merely doing a direct match of terms we used a heuristic approach in the patent context in order to separate the different entities into three subsets named as 'probably legal', 'probably individual' and 'ambiguous'. The allocation of each entity is designated by a series of methods and rules that are relay on not only on the use of gazetteers but on the characterization of the applicants through the relation with the patent, besides some simple lexical identifiers.

We then compare our allocation of the applicant type with the one available in the Patstat raw data (psn\_secor). If the 2 allocations converge, we keep this type as a final allocation type of applicant. If not, we manually examine the set of applicants and allocate the most appropriate type (we were rather generous and allocate a legal type in case of doubt. We are aware that individual are still be present in particular when type UGE is """legal' and 'psn sector is 'Individual'.

At the end of the process, only applicants with a final\_UGE\_type set to legal were included in the table RPD\_actor.

Table A-2: Final allocation of the applicant type

	mar and carerr or and approant type	1	1
Type_UGE	psn_sector	count(*)	final UGE_type
NULL	NULL	1842	legal
NULL	п	27	legal
	'COMPANY'	37	individual
NULL	'INDIVIDUAL'	7082	individual
NULL	'UNKNOWN'	203	individual
'legal'	п	154	individual
'legal'	'COMPANY'	7692509	legal
'legal'	'COMPANY GOV NON-PROFIT'	50602	legal
'legal'	'COMPANY GOV NON-PROFIT UNIVERSITY'	556	legal
'legal'	'COMPANY HOSPITAL'	2278	legal





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'legal'	'COMPANY INDIVIDUAL'	4	legal
'legal'	'COMPANY UNIVERSITY'	1909	legal
'legal'	'GOV NON-PROFIT'	283713	legal
'legal'	'GOV NON-PROFIT HOSPITAL'	6	legal
'legal'	'GOV NON-PROFIT UNIVERSITY'	16876	legal
'legal'	'HOSPITAL'	19257	legal
'legal'	'INDIVIDUAL'	1432286	legal
'legal'	'UNIVERSITY'	178650	legal
'legal'	'UNKNOWN'	1243885	legal
'person'	п	4742	person
'person'	'COMPANY'	116319	legal
'person'	'COMPANY GOV NON-PROFIT'	388	legal
'person'	'COMPANY GOV NON-PROFIT UNIVERSITY'	1	legal
'person'	'COMPANY HOSPITAL'	17	legal
'person'	'COMPANY INDIVIDUAL'	2	legal
'person'	'COMPANY UNIVERSITY'	16	legal
'person'	'GOV NON-PROFIT'	4834	legal
'person'	'GOV NON-PROFIT UNIVERSITY'	121	legal
'person'	'HOSPITAL'	129	legal
'person'	'INDIVIDUAL'	6223141	person
'person'	'UNIVERSITY'	2437	legal
'person'	'UNKNOWN'	505611	person

#### Final results are shown in Table 1

We are currently matching RPD applicants' names with legal entities names included in RISIS register (ORGREG register for EU universities and PROs) and FIRMREG register (including 3 firms data set: CIB, VICO and CHEETAH). The results of the matching with ORGREG entities is already available: among the 22.5millions of applicants, 0,79% are ORGREG entities. They have applied for 156,132 patents (0,76% of RPD priority patents).

Details of the methodology are described in: https://gitlab.com/cortext/patents/patstat//tree/version-2021/version\_2021/applicants\_classification





# Appendix 3: Classification of patent technologies

Table A-3: Definition of the Domains, fields and subfields classification

Label domaines	field s	Label fields	sfiel ds	Label subfields	ipc	not _ipc	not_ appl n_id
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T01 F01	Lighting	F21		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T02 F01	Cables with Special Electric Properties	H01B		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T03 F01	Resistors	H01C		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T04 F01	Magnets	H01F		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T05 F01	Capacitors	H01G		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T06 F01	Electric Switches	H01H		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T07 F01	Discharge Lamps	H01J		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T08 F01	Electric Incandescent Lamps	H01K		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T09 F01	Batteries and related	H01M		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T10 F01	Electrically-Conductive Connections	H01R		
Electrical engineering	TF0	Electrical machinery, apparatus, energy	T11 F01	Spark Gaps	H01T		
Electrical engineering	TF0 1	Electrical machinery,	T12 F01	Boards For The Distribution Of Electricity	H02		





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		apparatus,				
		energy				
		Electrical				
		machinery,				
Electrical	TF0	apparatus,	T13			
engineering	1	energy	F01	Electric Heating	H05B	
		Electrical				
		machinery,				
Electrical	TF0	apparatus,	T14	Electrical Device stopping		
engineering	1	energy	F01	human beings	H05C	
originio orinig	<u> </u>	Electrical		inaman semige	1.000	
		machinery,				
Electrical	TF0	apparatus,	T15			
engineering	1	energy	F01	Static Electricity	H05F	
engineering		Electrical	101	Static Electricity	11031	
Electrical	TF0	machinery,	T16			
		apparatus,		Other subjects electricity	H007	
engineering	1	energy	F01	Other subjects electricity	H99Z	
Electrical	TF0	Audio-visual	T01	B	0005	
engineering	2	technology	F02	Displaying Advertising	G09F	
Electrical	TF0	Audio-visual	T02		0000	
engineering	2	technology	F02	Arrangements For Control	G09G	
Electrical	TF0	Audio-visual	T03	Information Storage Based		
engineering	2	technology	F02	Record Carrier	G11B	
Electrical	TF0	Audio-visual	T04		H04N	
engineering	2	technology	F02	Scanning details of television	3	
Electrical	TF0	Audio-visual	T05		H04N	
engineering	2	technology	F02	Details of television systems	5	
Electrical	TF0	Telecommunica	T06		H04N	
engineering	2	tions	F02	Television systems	7	
Electrical	TF0	Audio-visual	T07	Details of colour television	H04N	
engineering	2	technology	F02	systems	9	
Electrical	TF0	Telecommunica	T08		H04N	
engineering	2	tions	F02	Colour television systems	11	
Electrical	TF0	Audio-visual	T09	Stereoscopic television		
engineering	2	technology	F02	systems	13	
Electrical	TF0	Audio-visual	T10	Stereoscopic colour	H04N	
engineering	2	technology	F02	television systems	15	
Electrical	TF0	Audio-visual	T11	Diagnosis for television	H04N	
engineering	2	technology	F02	systems	17	
Electrical	TF0	Audio-visual	T12	ayaleiiia	H04N	
	2		F02	Pictorial Communication	104N	
engineering		technology		r icional Communication	101	
Electrical	TF0	Audio-visual	T13	Loudopoolsono Microphone	HO 4D	
engineering	2	technology	F02	Loudspeakers Microphones	H04R	
Electrical	TF0	Audio-visual	T14	Otamanha i O t	110.40	
engineering	2	technology	F02	Stereophonic Systems	H04S	
Electrical	TF0	Audio-visual	T15			
engineering	2	technology	F02	Printed Circuits	H05K	
Electrical	TF0	Telecommunica	T01		_	
engineering	3	tions	F03	Transmission Systems	G08C	
Electrical	TF0	Telecommunica	T02			
engineering	3	tions	F03	Waveguides	H01P	
Electrical	TF0	Telecommunica	T03			
engineering	3	tions	F03	Aerials	H01Q	





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Electrical	TF0	Telecommunica	T04				
engineering	3	tions	F03	Transmission	H04B		
Electrical	TF0	Telecommunica	T05				
engineering	3	tions	F03	Broadcas Communication	H04H		
Electrical	TF0	Telecommunica	T06				
engineering	3	tions	F03	Multiplex Communication	H04J		
Electrical	TF0	Telecommunica	T07				
engineering	3	tions	F03	Secret Communication	H04K		
Electrical	TF0	Telecommunica	T08				
engineering	3	tions	F03	Telephonic Communication	H04M		
Electrical	TF0	Telecommunica	T09	Transmission or	H04N		
engineering	3	tions	F03	reproduction of documents	1		
Electrical	TF0	Telecommunica	T10				
engineering	3	tions	F03	Selecting (Switches/Relays)	H04Q		
Electrical	TF0	Digital	T01	Transmission Of Digital			
engineering	4	communication	F04	Information	H04L		
Electrical	TF0	Digital	T02		H04N		
engineering	4	communication	F04	Selective content distribution	21		
Electrical	TF0	Digital	T03				
engineering	4	communication	F04	Wireless Communication	H04W		
		Basic					
Electrical	TF0	communication	T01				
engineering	5	processes	F05	Basic Electronic Circuitry	H03		
Electrical	TF0	Computer	T01	Mechanically computed		G06	
engineering	6	technology	F06	Digital Computers	G06	Q	
Electrical	TF0	Computer	T02	·			
engineering	6	technology	F06	Speech Anal. Or Synth.	G10L		
Electrical	TF0	Computer	T03				
engineering	6	technology	F06	Static Stores	G11C		
Electrical	TF0	IT methods for	T01				
engineering	7	management	F07	Data Processing Systems	G06Q		
Electrical	TF0	Semiconductor	T01				
engineering	8	s	F08	Semiconductor Devices	H01L		
	TF0		T01				
Instruments	9	Optics	F09	Optical Elements Systems	G02		
	TF0		T02				
Instruments	9	Optics	F09	Photograph Apparatus	G03B		
	TF0	•	T03				
Instruments	9	Optics	F09	Photographic Processes	G03C		
		•		Apparatus For Processing			
	TF0		T04	Exposed Photographic			
Instruments	9	Optics	F09	Materials	G03D		
	TF0	•	T05				
Instruments	9	Optics	F09	Photomechanics of Surfaces	G03F		
	TF0	•	T06	Photomechanical Production			
Instruments	9	Optics	F09	Of Surfaces	G03G		
	TF0	1	T07	-			
Instruments	9	Optics	F09	Holography	G03H		
	TF0	- p	T08	Devices Using Stimulated			
Instruments	9	Optics	F09	Emission	H01S		
	TF1	C   P	T01	Measuring Length	. 10 10		
Instruments	0	Measurement	F10	Thickness	G01B		
otranicino	TF1	Mododiomon	T02	111101111000	2010		
Instruments	0	Measurement	F102	Measuring Distances Levels	G01C		
in ou difficillo	L	MOGGGIOTICITE	1 10	I WOODONING DISTANCES LOVEIS	5510		





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	TF1		T03				
Instruments	0	Measurement	F10	Multivariable Measuring	G01D		
	TF1		T04		00.5		
Instruments	0	Measurement	F10	Measuring Volume Flow	G01F		
mstruments		Measurement		Measuring volume Flow	GUIF		
	TF1		T05		0010		
Instruments	0	Measurement	F10	Weighing	G01G		
	TF1		T06				
Instruments	0	Measurement	F10	Measuring Vibrations	G01H		
	TF1		T07				
Instruments	0	Measurement	F10	Optical Measurements	G01J		
	TF1		T08				
Instruments	0	Measurement	F10	Measuring Temperature	G01K		
motiumento	TF1	Measurement	T09	·	COTIC		
la atauna anta		N4			0041		
Instruments	0	Measurement	F10	Torque Work	G01L		
	TF1		T10				
Instruments	0	Measurement	F10	Testing Structures	G01M		
						G01	
	TF1		T11			N	
Instruments	0	Measurement	F10	Chemical Physical Analyses	G01N	33	
motramonto	TF1	Mododiomont	T12	Measuring Speed	00111	00	
Instruments		Magauramant	F10	Acceleration	G01P		
mstruments	0	Measurement		Acceleration	GUIP		
	TF1		T13				
Instruments	0	Measurement	F10	Scanning-Probe Techniques	G01Q		
	TF1		T14				
Instruments	0	Measurement	F10	Measuring Electric Variables	G01R		
	TF1		T15				
Instruments	0	Measurement	F10	Radio Direction-Finding	G01S		
motramento	TF1	Measurement	T16	Tradio Birection i maing	0010		
Inatrumanta		Magauramant	F10	Coophysics	C01\/		
Instruments	0	Measurement		Geophysics	G01V		
	TF1		T17		004144		
Instruments	0	Measurement	F10	Meteorology	G01W		
	TF1		T18				
Instruments	0	Measurement	F10	Horology	G04		
	TF1		T19				
Instruments	0	Measurement	F10	Details Of Instruments	G12B		
moti amonto	TF1	Moderation	T20	Detaile of motivations	0.25		
Instruments	0	Measurement	F10	Other subjects nucleonics	G99Z		
monuments	0		1 10	Other subjects flucteoffics	Gaar		
		Analysis of	T04	NA-1	0041		
	TF1	biological	T01	Material Analysis by	G01N		
Instruments	1	materials	F11	Chem/Phys Properties	33		
	TF1		T01				
Instruments	2	Control	F12	Control Systems in General	G05B		
	TF1		T02	Regulating Non Electric			
Instruments	2	Control	F12	Variables	G05D		
ou arriorito	TF1	55111151	T03	- Caridoloo	2000		
Inetrumente		Control	F12	Pogulating Floatric Variables	G05F		
Instruments	2	Control		Regulating Electric Variables	GUSF		
l	TF1		T04	la	0.5-		
Instruments	2	Control	F12	Checking Devices	G07		
	TF1		T05				
Instruments	2	Control	F12	Signalling Systems	G08B		
	TF1		T06				
Instruments	2	Control	F12	Traffic Control Systems	G08G		
monuments	TF1	Johnson	T07	Educational Or	5000		
In other case seeks	1	Control			COOD		
Instruments	2	Control	F12	Demonstration Appliances	G09B		





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	TF1		T08			
Instruments	2	Control	F12	Ciphering Apparatus	G09C	
	TF1		T09	Railway Or Like Time Or		
Instruments	2	Control	F12	Fare Tables	G09D	
	TF1	Medical	T01			
Instruments	3	technology	F13	Surgery-Diagnosis	A61B	
	TF1	Medical	T02			
Instruments	3	technology	F13	Dentistry	A61C	
	TF1	Medical	T03			
Instruments	3	technology	F13	Veterinary	A61D	
	TF1	Medical	T04			
Instruments	3	technology	F13	Blood Vessel Filters	A61F	
	TF1	Medical	T05			
Instruments	3	technology	F13	Furniture for Patients	A61G	
	TF1	Medical	T06			
Instruments	3	technology	F13	Therapy Apparatus	A61H	
	TF1	Medical	T07			
Instruments	3	technology	F13	Medical Containers	A61J	
	TF1	Medical	T08			
Instruments	3	technology	F13	Methods For Sterilising	A61L	
	TF1	Medical	T09	Devices for Introducing		
Instruments	3	technology	F13	Media in Body	A61M	
	TF1	Medical	T10	j		
Instruments	3	technology	F13	Electrotherapy	A61N	
	TF1	Medical	T11	1 7		
Instruments	3	technology	F13	X-Ray Technique	H05G	
	TF1	Organic fine			A61K	
Chemistry	4	chemistry	F14	Cosmetic Preparations	8	
-	TF1	Organic fine				
Chemistry	4	chemistry	F14	Use of Cosmetics	A61Q	
<u> </u>	TF1	Organic fine			7.0.4	
Chemistry	4	chemistry	F14	Organic Chemistry	C07B	A61K
Criorinotry	TF1	Organic fine		Acyclic or Carbocyclic	00.0	AOTA
Chemistry	4	chemistry	F14	Compounds	C07C	A61K
Grioringary	TF1	Organic fine		- Compounds	00.0	AOTA
Chemistry	4	chemistry	F14	Heterocyclic Compounds	C07D	A61K
Criorinotry	·	orioiriioti y	1	Compounds with Elts Other	0010	AOTK
	TF1	Organic fine	T06	Than C H Halogen O N S		
Chemistry	4	chemistry	F14	Se or Te	C07F	A61K
Chomistry	TF1	Organic fine		00 01 10	0071	AOTK
Chemistry	4	chemistry	F14	Sugars Nucleotides	C07H	A61K
Orientistry	TF1	Organic fine		- Cagara radicollacs	00711	AOTA
Chemistry	4	chemistry	F14	Steroids	C07J	A61K
On on instru	TF1	Organic fine		0.010100	2010	AOIN
Chemistry	4	chemistry	F14	Combinatorial Chemistry	C40B	A C 4 1 2
Officialistry	TF1	onomian y	T01	Compounds Of Unknown	0700	A61K
Chemistry	5	Biotechnology	F15	Constitution	C07G	4044
Onemialiy	TF1	ייין פוטופטוויט	T02	Constitution	507 G	A61K
Chemistry	5	Riotochnology	F15	Peptides	C07K	4044
CHEITHSHY	TF1	Biotechnology	T03	Apparatus For Enzymology	CUIN	A61K
Chomiotry		Riotochnology	F15		C12N4	4000
Chemistry	5 TF1	Biotechnology		Or Microbiology	C12M	A61K
Chamiata		Diotochaola	T04	Micro-Organisms Enzymes	CAON	
Chemistry	5	Biotechnology	F15	Culture Media	C12N	A61K
Chemistry	TF1	Biotechnology	T05	Fermentation Or Enzyme-	C12P	A61K





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	5		F15	Using Processes			
				Measuring Processes with			
	TF1		T06	Enzymes Or Micro-			
Chemistry	5	Biotechnology	F15	Organisms	C12Q		A61K
			T07		0.12.0		7.011
Chemistry		Biotechnology	F15	Micro-Organisms-General	C12R		A61K
Officialistry		Diotecrinology	1 10	Where Organisms Ceneral	01210		AOIN
				Micro-Organisms To treat			
	TF1		T08				
Chemistry	5	Biotechnology	F15	solid materials	C12S		A61K
	TF1	Pharmaceutical	T01			A61K	
Chemistry	6	S	F16	Medical Preparations	A61K	8	
	TF1	Pharmaceutical	T02	Therapeutic Activity Of			
Chemistry	6	s	F16	Chemical Compounds	A61P		
,		Macromolecula		•			
	TF1	r chemistry,	T01				
Chemistry	7	polymers	F17	Polysaccharides	C08B		
Officialistry	+'	Macromolecula	1 17	- Orysacchariaes	OOOD		
	TF1		T02				
Ob a maintum.		r chemistry,		Transfer and Of Dulahara	0000		
Chemistry	7	polymers	F17	Treatment Of Rubbers	C08C		
		Macromolecula					
	TF1	r chemistry,	T03	Macromol with C-to-C			
Chemistry	7	polymers	F17	Unsaturated Bonds	C08F		
		Macromolecula					
	TF1	r chemistry,	T04	Macromol withouth C-to-C			
Chemistry	7	polymers	F17	Unsaturated Bonds	C08G		
,		Macromolecula					
	TF1	r chemistry,	T05	Derivatives Of Natural			
Chemistry	7	polymers	F17	Macromolecules	C08H		
Onomiday	+'	Macromolecula	,	Madremolecules	00011		
	TF1	r chemistry,	T06	Inorg Or Non-Macromolr			
Chamiatru	7		F17		C08K		
Chemistry	/	polymers	ГІ/	Organ Subst	CUOK		
		Macromolecula	T07	0			
	TF1	r chemistry,		Compositions Of	0001		
Chemistry	7	polymers	F17	Macromolecular Compounds	C08L		
	TF1		T01				
Chemistry	8	Food chemistry	F18	New Plants	A01H		
	TF1		T02				
Chemistry	8	Food chemistry	F18	Treatment of Dough	A21D		
	TF1		T03				
Chemistry	8	Food chemistry	F18	Preseving food	A23B		
_	TF1		T04				
Chemistry	8	Food chemistry	F18	Dairy Products	A23C		
	TF1		T05	,			
Chemistry	8	Food chemistry	F18	Edible Oils	A23D		
On on motify	TF1	. coa oriorniony	T06		, ,_00		
Chemistry	8	Food chemistry	F18	Coffee and Tea	A23F		
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Chamiata		Food oborstates	T07	Chapalata	A 22C		
Chemistry	8	Food chemistry	F18	Chocolate	A23G		
	TF1		T08				
Chemistry	8	Food chemistry	F18	Proteins for Food	A23J		
	TF1		T09				
Chemistry	8	Food chemistry	F18	Fodder	A23K		
	TF1		T10				
Chemistry	8	Food chemistry	F18	Other Foods	A23L		
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Chemistry         8         Food chemistry         F18         Fermented Solutions         C12F           Chemistry         8         Food chemistry         F18         Alcoholic Beverages         C12G           Chemistry         8         Food chemistry         F18         Beverages         C12H           Chemistry         8         Food chemistry         F18         Beverages         C12J           Chemistry         8         Food chemistry         F18         Vinegar         C12J           Chemistry         8         Food chemistry         F18         Production of sugar juices         10           Chemistry         8         Food chemistry         F18         Production of sugar juices         20           Chemistry         8         Food chemistry         F18         Production of sugar juices         20           Chemistry         8         Food chemistry         F18         Production of sugar juices         20           Chemistry         8         Food chemistry         F18         Production of sugar juices         20           Chemistry         8         Food chemistry         F18         Crystallisation of sugar juices         20           Chemistry         8         Food chemistry	Chemistry		Food chemistry		Brewing Of Beer	C12C	
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engineering 8 machines F28 Paper Making D21  Mechanical TF2 paper T22 Other Subjects textiles and engineering 8 machines F28 papers D99Z  Mechanical TF2 Other special T01 machines F29 Soil Working A01B  Mechanical TF2 Other special T02 machines F29 Planting A01C  Mechanical TF2 Other special T03 machines F29 Harvesting A01D  Mechanical TF2 Other special T04 machines F29 Harvested Produce A01F  Mechanical TF2 Other special T04 machines F29 Harvested Produce A01F  Mechanical TF2 Other special T05 machines F29 Horticulture A01G  Mechanical TF2 Other special T05 machines F29 Horticulture A01G  Mechanical TF2 Other special T06 machines F29 Production of Dairy Products A01J  Mechanical TF2 Other special T06 machines F29 Production of Dairy Products A01J	NA l l l			T04		
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Mechanical engineeringTF2 9Other machinesspecial F29T01 F29Soil WorkingA01BMechanical engineeringTF2 9Other machinesT02 F29PlantingA01CMechanical engineeringTF2 9Other machinesT03 F29HarvestingA01DMechanical engineeringTF2 9Other machinesT04 F29Harvested ProduceA01FMechanical engineeringTF2 9Other machinesT05 F29HorticultureA01GMechanical engineeringTF2 9Other machinesT06 F29Production of Dairy ProductsA01JMechanical engineeringTF2 9Other machinesT07Production of Dairy ProductsA01J					1	D007
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Mechanical engineeringTF2Other special machinesTO2 plantingA01CMechanical engineeringTF2Other special machinesTO3 plantingA01DMechanical engineeringTF2Other special machinesTO4 plantingA01DMechanical engineeringTF2Other special machinesTO4 plantingA01FMechanical engineeringTF2Other special machinesTO5 plantingA01GMechanical engineeringTF2Other special machinesTO6 plantingA01GMechanical engineeringTF2Other special machinesTO6 plantingA01JMechanical TF2Other special TO7Production of Dairy ProductsA01J						
engineering9machinesF29PlantingA01CMechanical engineeringTF2Other special parametris of the par					Soil Working	AU1B
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Mechanical engineeringTF2 9Other machinesspecial F29T04 Harvested ProduceA01FMechanical engineeringTF2 9Other machinesT05 F29HorticultureA01GMechanical engineeringTF2 9Other machinesT06 F29Production of Dairy ProductsA01JMechanical engineeringTF2 9Other machinesT07T07			•		l	
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Mechanical engineeringTF2 9Other machinesspecial F29T05 HorticultureA01GMechanical engineeringTF2 9Other machinesT06 F29Production of Dairy ProductsA01JMechanicalTF2Other specialT07T07			-			
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Mechanical TF2 Other special T07			•			
					Production of Dairy Products	A01J
engineering 9 machines F29 Husbandry A01K						
	engineering	9	machines	F29	Husbandry	A01K





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Mechanical	TF2	Other special			
engineering	9	machines	F29	Shoeing Of Animals	A01L
Mechanical	TF2	Other special	T09		
engineering	9	machines	F29	Traps for animals	A01M
Mechanical	TF2	Other special	T10		
engineering	9	machines	F29	Baking	A21B
Mechanical	TF2	Other special	T11		
engineering	9	machines	F29	Dough	A21C
Mechanical	TF2	Other special	T12		
engineering	9	machines	F29	Treatment of Meat	A22
Mechanical	TF2	Other special	T13		
engineering	9	machines	F29	Process of Harvests	A23N
Mechanical	TF2	Other special	T14		
engineering	9	machines	F29	Working Of Foodstuffs	A23P
Mechanical	TF2	Other special	T15		
engineering	9	machines	F29	Preparing Grain and Fruit	B02B
Mechanical	TF2	Other special	T16		
engineering	9	machines	F29	Working Cement or Stone	B28
Mechanical	TF2	Other special	T17		
engineering	9	machines	F29	Working of Plastics	B29
Mechanical	TF2	Other special	T18	Other Micro and Nao	
engineering	9	machines	F29	Technology	B99Z
Mechanical	TF2	Other special	T19		
engineering	9	machines	F29	Manufacturind or Shaping	C03B
Mechanical	TF2	Other special	T20		
engineering	9	machines .	F29	Processes Of Compounding	C08J
Mechanical	TF2	Other special	T21		
Mechanical engineering	TF2 9	Other special machines	T21 F29	Pitching Machines	C12L
		•		Pitching Machines Reducing the size of material	C12L
		machines	F29	Reducing the size of material	
engineering	9	machines	F29		
engineering  Mechanical	9 TF2	machines Other special	F29 T22	Reducing the size of material from which sugar is to be	C13B
engineering  Mechanical	9 TF2	machines Other special	T22 F29	Reducing the size of material from which sugar is to be extracted	C13B
Mechanical engineering  Mechanical	9 TF2 9	Machines Other special machines	T22 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from	C13B 5
engineering  Mechanical engineering	9 TF2 9	Other special machines  Other special machines	T22 F29 T23 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar	C13B 5 C13B 15
engineering  Mechanical engineering  Mechanical engineering	9 TF2 9 TF2 9	Other special machines  Other special machines	T22 F29 T23 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted	C13B 5 C13B 15
Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical	9 TF2 9 TF2 9 TF2	Other special machines  Other special machines  Other special machines  Other special	T22 F29 T23 F29 T24	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar	C13B 5 C13B 15 C13B
Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9	Other special machines  Other special machines  Other special machines  Other special machines	T22 F29 T23 F29 T24 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices	C13B 5 C13B 15 C13B 25
engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical	9 TF2 9 TF2 9 TF2 9	Other special machines  Other special machines  Other special machines  Other special machines  Other special	T22 F29 T23 F29 T24 F29 T25	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially	C13B 5 C13B 15 C13B 25 C13B
engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially	C13B 5 C13B 15 C13B 25 C13B
engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines  Other special	T22 F29 T23 F29 T24 F29 T25 F29 T26	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar	C13B 5 C13B 15 C13B 25 C13B 45
engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar	C13B 5 C13B 15 C13B 25 C13B 45
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production	C13B 5 C13B 15 C13B 25 C13B 45
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus	C13B 5 C13B 15 C13B 25 C13B 45
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	F29 T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production	C13B 5 C13B 15 C13B 25 C13B 45 C13C
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar	C13B 5 C13B 15 C13B 25 C13B 45 C13C
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus	C13B 5  C13B 15  C13B 25  C13B 45  C13C  C13G  C13H
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar  Weapons	C13B 5  C13B 15 C13B 25 C13B 45  C13C  C13G  C13H  F41
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines	T22 F29 T23 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar	C13B 5  C13B 15  C13B 25  C13B 45  C13C  C13G  C13H
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines  Thermal	F29 T22 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29 T30 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar  Weapons	C13B 5  C13B 15 C13B 25 C13B 45  C13C  C13G  C13H  F41
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines  Other special machines	F29 T22 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29 T30 F29 T01	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar  Weapons  Ammunitions Blasting	C13B 5  C13B 15  C13B 25  C13B 45  C13C  C13G  C13H  F41  F42
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines  Thermal processes and apparatus	F29 T22 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29 T30 F29	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar  Weapons	C13B 5  C13B 15 C13B 25 C13B 45  C13C  C13G  C13H  F41
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines  Thermal processes and apparatus  Thermal	F29 T22 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29 T30 F29 T01 F30	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar  Weapons  Ammunitions Blasting  Steam generation	C13B 5  C13B 15  C13B 25  C13B 45  C13C  C13G  C13H  F41  F42
engineering  Mechanical engineering	9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9 TF2 9	Other special machines  Thermal processes and apparatus	F29 T22 F29 T24 F29 T25 F29 T26 F29 T27 F29 T28 F29 T29 F29 T30 F29 T01	Reducing the size of material from which sugar is to be extracted  Expressing water from material from which sugar has been extracted  Evaporating or boiling sugar juices  Cutting machines specially adapted for sugar  Sugar Production  Evaporation Apparatus  Cutting of Sugar  Weapons  Ammunitions Blasting	C13B 5  C13B 15  C13B 25  C13B 45  C13C  C13G  C13H  F41  F42





AND INNOVATI	ON POL	CY STUDIES				*	 300
		Thermal					
Mechanical	TF3	processes	and	T03	Combustion Apparatus		
engineering	0	apparatus		F30	Using Fluent Fuel	F23C	
- ingg		Thermal					
Mechanical	TF3	processes	and	T04			
engineering	0	apparatus	and	F30	Burners	F23D	
engineening	0	Thermal		1 30	Daniers	1 230	
Machaniaal	тга		ام م	TOE			
Mechanical	TF3	processes	and	T05		<b>50011</b>	
engineering	0	apparatus		F30	Grates	F23H	
		Thermal					
Mechanical	TF3	processes	and	T06	Feeding Fuel To Combustion		
engineering	0	apparatus		F30	Apparatus	F23K	
		Thermal					
Mechanical	TF3	processes	and	T07			
engineering	0	apparatus		F30	Air Supply	F23L	
		Thermal					
Mechanical	TF3	processes	and	T08			
engineering	0	apparatus		F30	Combustion Chambers	F23M	
- ingg		Thermal					
Mechanical	TF3	processes	and	T09			
engineering	0	apparatus	ana	F30	Controlling Combustion	F23N	
Crigineering	-	Thermal		1 00	Controlling Combastion	1 2011	
Mechanical	TF3		and	T10			
		· .	and		Extinguishing Dovices	FaaO	
engineering	0	apparatus		F30	Extinguishing Devices	F23Q	
	<b>TE</b> 0	Thermal		<b>T</b> 44	D " 0" E 0 " I		
Mechanical	TF3	processes	and		Domestic Stoves For Solid	<b>-</b> 0.4	
engineering	0	apparatus		F30	Fuels	F24	
		Thermal					
Mechanical	TF3	processes	and	T12			
engineering	0	apparatus		F30	Refrigeration Systems	F25B	
		Thermal					
Mechanical	TF3	processes	and	T13			
engineering	0	apparatus		F30	Ice	F25C	
		Thermal					
Mechanical	TF3	processes	and	T14			
engineering	0	apparatus		F30	Furnaces ovens	F27	
3 3 3		Thermal					
Mechanical	TF3	processes	and	T15			
engineering	0	apparatus	aa	F30	Heat Exchange	F28	
Mechanical	TF3	Mechanical		T01	Tout Exchange	. 20	
engineering	1	elements		F31	Fluid Pressure Actuator	F15	
Mechanical	TF3	Mechanical		T02	TIMIL TESSUIT ACIUATOL	1 10	
					Engineering Elter or Unite	E16	
engineering	1	elements		F31	Engineering Elts or Units	F16	
Mechanical	TF3	Mechanical		T03	Stroring Distributing Non		
engineering	7	elements		F31	Solids	F17	
Mechanical	TF3	Mechanical		T04			
engineering	1	elements		F31	Mechanical Control Systems	G05G	
Mechanical	TF3			T01			
engineering	2	Transport		F32	Vehicles	B60	
Mechanical	TF3			T02			
engineering	2	Transport		F32	Railways	B61	
Mechanical	TF3	•		T03	•		
engineering	2	Transport		F32	Land Vehicles	B62	
Mechanical	TF3	Transport		T04	Ships	B63B	
Modifical	110	Tanoport				כטטכ	





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)	2		F32			
Mechanical 1	TF3		T05			
engineering 2	2	Transport	F32	Launching of Vessels	B63C	
	TF3	•	T06			
	2	Transport	F32	Weapons on Vessels	B63G	
	TF3		T07			
	2	Transport	F32	Marine Propulsion	B63H	
	TF3	тапэроп	T08	Warrie Fropulsion	D0311	
	2	Transport	F32	Auxilaries on Vessel	B63J	
	Z TF3	Transport		Auxiliaries on vessei	D033	
	_	T	T09	A:	D04	
	2	Transport	F32	Aircraft	B64	
	TF3	Furniture,	T01	Furniture and Domestic		
	3	games	F33	Equipment	A47	
	TF3	Furniture,	T02			
Other fields 3	3	games	F33	Sports and Games	A63	
		Other				
	TF3	consumer	T01			
Other fields 4	4	goods	F34	Tobacco	A24	
		Other				
	TF3	consumer	T02			
	4	goods	F34	Shirts	A41B	
	•	Other		- C		
-	TF3	consumer	T03			
	-			Caracta	A44C	
Other fields 4	4	goods	F34	Corsets	A41C	
		Other				
	TF3	consumer	T04			
Other fields 4	4	goods	F34	Outerwear	A41D	
		Other				
	TF3	consumer	T05			
Other fields 4	4	goods	F34	Suspenders	A41F	
		Other				
7	TF3	consumer	T06			
Other fields 4	4	goods	F34	Wigs	A41G	
		Other				
	TF3	consumer	T07			
	4	goods	F34	Headwear	A42	
231 113130	-	Other				
-	TF3	consumer	T08			
	4	goods	F34	Footwear	A43B	
Outer fields 4	7		1 34	i ootweai	ハサンレ	
	TE2	Other	TOO			
	TF3	consumer	T09	1		
Other fields 4	4	goods	F34	Laces	A43C	
		Other				
	TF3	consumer	T10			
Other fields 4	4	goods	F34	Fasteners and Braselets	A44	
		Other				
	TF3	consumer	T11			
Other fields 4	4	goods	F34	Hand or Travelling Articles	A45	
		Other		<u> </u>		
-	TF3	consumer	T12			
	4	goods	F34	Brushes	A46B	
	•	Other	1 0-7	2.401100	, (105	
-	TF3	consumer	T13			
				Mothodo For Life Conting	AGOD	
TOTHEL HEIOS 14	4	goods	F34	Methods For Life-Saving	A62B	





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		Other				
	TF3	consumer	T14	Other Life saving and		
Other fields			F34	,	A99Z	
Other fields	4	goods	F34	Amusement	A99Z	
		Other				
	TF3	consumer	T15			
Other fields	4	goods	F34	Bookbinding	B42	
		Other		3		
	TF3	consumer	T16			
Oth an fields			I	Muitin or los of laws and a	D40	
Other fields	4	goods	F34	Writing Implements	B43	
		Other				
	TF3	consumer	T17			
Other fields	4	goods	F34	Decorative Arts	B44	
		Other				
	TF3	consumer	T18			
Other fields			F34	Coddlery and Unhalatery	B68	
Other fields	4	goods	F34	Saddlery and Upholstery	D00	
		Other				
	TF3	consumer	T19			
Other fields	4	goods	F34	Trimmings	D04D	
		Other				
	TF3	consumer	T20			
Other fields	4	goods	F34	Laundering	D06F	
Other helds	4		1 34	Laundening	D001	
		Other				
	TF3	consumer	T21			
Other fields	4	goods	F34	Wall Floor Covering	D06N	
		Other				
	TF3	consumer	T22			
Other fields	4	goods	F34	Rope non electric cable	D07	
Other fields	7	Other	1 54	Trope from electric cable	D01	
	TEO		<b>T</b> 00	Ossilian Os Fassilian		
	TF3	consumer	T23	Cooling Or Freezing		
Other fields	4	goods	F34	Apparatus	F25D	
		Other				
	TF3	consumer	T24			
Other fields	4	goods	F34	Organs Harmoniums	G10B	
Guiloi iliolad		Other		ergane mannemanie	0.02	
	TF3		T25			
0.1 (1.1)		consumer		D:	0400	
Other fields	4	goods	F34	Pianos	G10C	
		Other				
	TF3	consumer	T26			
Other fields	4	goods	F34	Musical Instruments	G10D	
		Other				
	TF3	consumer	T27	Automatic Musical		
Other fields					C10E	
Other fields	4	goods	F34	Instruments	G10F	
		Other				
	TF3	consumer	T28			
Other fields	4	goods	F34	Aids For Music	G10G	
		Other				
	TF3	consumer	T29	Electrophonic Musical		
Other fields			F34		G10H	
Other neids	4	goods	г 34	Instruments	GIUП	
		Other				
	TF3	consumer	T30			
Other fields	4	goods	F34	Sound-Producing Devices	G10K	
	TF3	Civil	T01			
Other fields	5	engineering	F35	Permanent ways	E01B	
Other fields	TF3	Civil	T02	Surfaces for roads and sport		
	– `	LOIVII	LIUZ	rounaces for toads and SDON.		





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	5	engineering	F35	grounds		
	TF3	Civil	T03			
Other fields	5	engineering	F35	Bridges	E01D	
	TF3	Civil	T04		E01F	
Other fields	5	engineering	F35	Platforms or refuge islands	1	
	TF3	Civil	T05		E01F	
Other fields	5	engineering	F35	Landing for helicopters	3	
	TF3	Civil	T06		E01F	
Other fields	5	engineering	F35	Draining of roads	5	
	TF3	Civil	T07	Protection again snow or	E01F	
Other fields	5	engineering	F35	sand drifts	7	
	TF3	Civil	T08		E01F	
Other fields	5	engineering	F35	Road signs or traffic signals	9	
	TF3	Civil	T09	Sensitive and restricitng and	E01F	
Other fields	5	engineering	F35	safety in roads	1	
	TF3	Civil	T10			
Other fields	5	engineering	F35	Street Land Cleaning	E01H	
	TF3	Civil	T11	Hydraulic Eng. Foundations		
Other fields	5	engineering	F35	Soil-Shifting	E02	
	TF3	Civil	T12			
Other fields	5	engineering	F35	Water supply sewerage	E03	
	TF3	Civil	T13			
Other fields	5	engineering	F35	Building	E04	
	TF3	Civil	T14			
Other fields	5	engineering	F35	Locking Safing	E05	
	TF3	Civil	T15			
Other fields	5	engineering	F35	Openings in Building Ladder	E06	
	TF3	Civil	T16			
Other fields	5	engineering	F35	Earth Or Rock Drilling	E21	
	TF3	Civil	T17			
Other fields	5	engineering	F35	Other Subjects Building	E99Z	

### Appendix 4: Building description for International Patent Classification

Patents have fine grained information to describe the technologies that are combined by the applications. The International Patent Classification (IPC) is a hierarchical patent <u>classification</u> system used to classify the content of <u>patents</u> in a uniform manner. with approximately 70 000 subdivisions <sup>10</sup>. Each subdivision is described with a short text

that we have collected.

Each classification symbol is of the form « A01B 1/00 » . The first letter represents the "section" consisting of a letter from A ("Human Necessities") to H ("Electricity"). Combined with a two-digit number, it represents the "class" (class A01 represents "Agriculture; forestry; animal husbandry; trapping; fishing"). The final letter makes up the "subclass" (subclass A01B represents "Soil working in agriculture or forestry; parts, details, or

<sup>10</sup> https://www.wipo.int/classifications/ipc/en/





accessories of agricultural machines or implements, in general"). The subclass is followed by a one-to-three-digit "group" number, an oblique stroke and a number of at least two digits representing a "main group" or "subgroup"

(reference https://en.wikipedia.org/wiki/International\_Patent\_Classification)

**For each classification symbol we have** concatenated the description of all levels, rebuilding the IPC hierarchy. Each patent receives the concatenated description of different levels of its IPC codes.

A01B 1/00 will be described as: Soil working in agriculture or forestry; parts, details, or accessories of agricultural machines or implements, in general. Agriculture; forestry; animal husbandry; trapping; fishing. Human Necessities.

Details on the used methodology is given in: https://gitlab.com/cortext/patents/patstat//tree/version-2021/nomenclatures/ipc descriptions

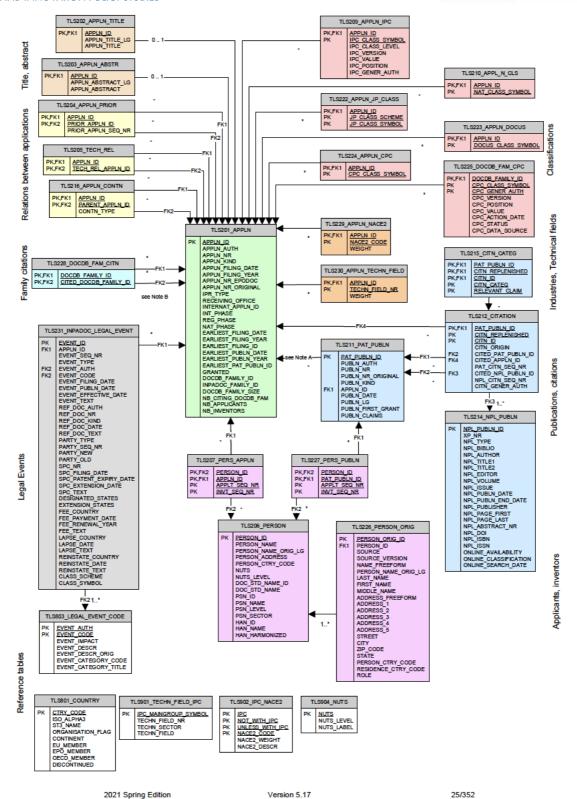




## Appendix 5: Data model of PATSTAT2021

The data model shown below is the model of the PATSTAT 2021 database. The Patstat documentation is available in https://gitlab.com/cortext/patents/patstat//blob/version-2021/version\_2021/DataCatalog\_Global\_v5.17.pdf





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