

THE CORPORATE INNOVATION DATABASE (CIB)

- WHY WAS IT BUILT ?
- HOW WAS IT BUILT ?
- WHAT IS INSIDE ?
- WHAT CAN BE DONE WITH IT ?
- WHAT IS NEXT ?










- The Corporate Invention Board (CIB) database developed at Ifris since 2008 **collect patents applied for from 1986 to 2009 by more than 2000 large firms with the highest annual R&D investments.**
- It aims at characterizing **the nature and the extent of technological globalisation using patents as a proxy of corporate R&D output** and gives the possibility to track and analyze over time the transformation of global patents portfolios.
- It complements the “Industrial R&D Investment Scoreboard, an annual study of the European Commission that provides economic and financial data and analysis of the top corporate R&D investors
- It uses **consolidated perimeters of firms** (includes subsidiaries, affiliates, merged firms, acquisitions) to take into account the globalisation of R&D.
- It gives information related to applicants and inventors, application filing date, the patent office, type of patent, technology field categories, patent title and abstract, citations to other documents.
- The current version (but not the last one !) contains 16 224 135 applications (appln_id) of patents of invention (among which 8 218 645 are priority patent applications) – **50% of the patstat DB patents are in CIB**

WHY WAS IT BUILT ?

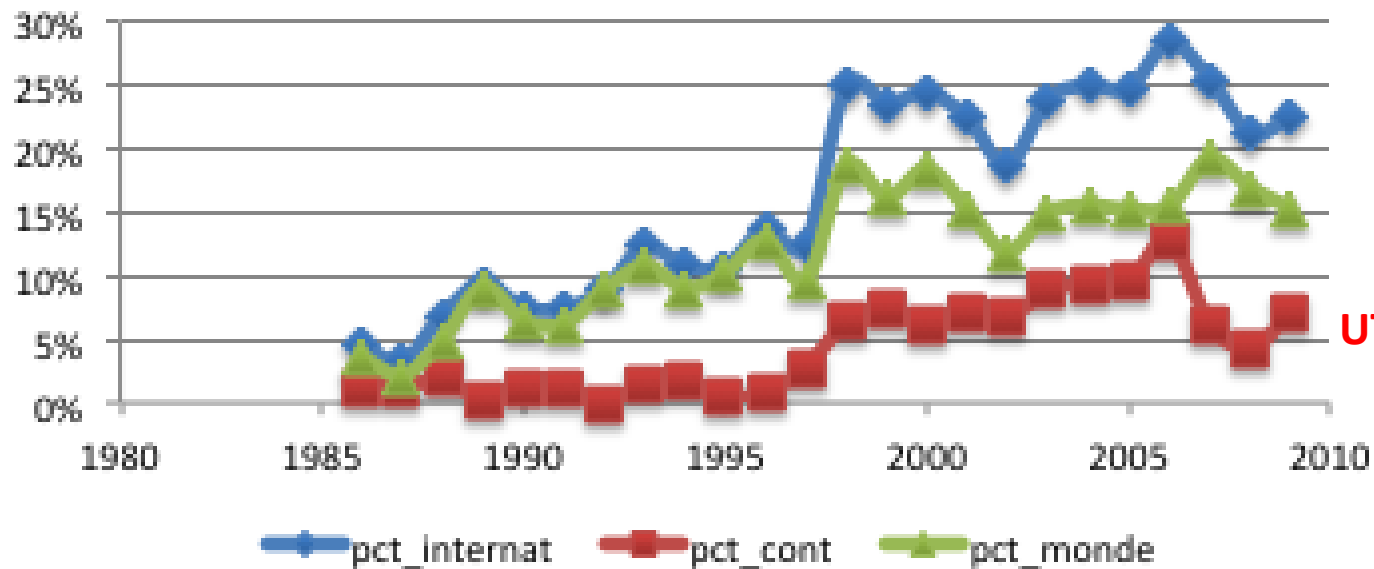
FIRM: UNITED TECHNOLOGY (US)

- United Technologies Corporation (UTC) is an American multinational conglomerate headquartered in US (CT) doing research, devpt & manufacturing in high tech products in numerous areas (aircraft, heating, elevators, fire protection, fuel cell ...)
- It started as an aircraft manufacturer (1934). Since 1975, growth & diversification through M&A (OTIS, CARRIER 1976, CHUBB 2003, PRATT&WITHNEY 2005, GOODRICH 2011)
- In 2014 ranked 59th in worldwide industrial R&D SB:
 - ❖ R&D 1.8 billions Euros (+6,7 %), R&D intensity: 6%
 - ❖ 215 000 employees (2/3 located out of the US)

FIRM: UNITED TECHNOLOGY (US)

Applicants' name	Nber of patents applied for
United Technologies Corporation	4311
CARRIER CORPORATION 	2229
Otis Elevator Company 	1709
Advanced Technology Materials, Inc. 	689
OTIS ELEVATOR CO 	623
Pratt & Whitney Canada Corp. 	590
Hamilton Sundstrand Corporation 	519
Sikorsky Aircraft Corporation 	324
UTC POWER CORPORATION	311
United Technologies Automotive, Inc.	260
UTC Fuel Cells, LLC	206
NIPPON OTIS ELEVATOR CO 	158
United Technologies Corp.	148
Otis Engineering Corporation 	138
LIFSON, ALEXANDER	129

United Technology % internationalisation

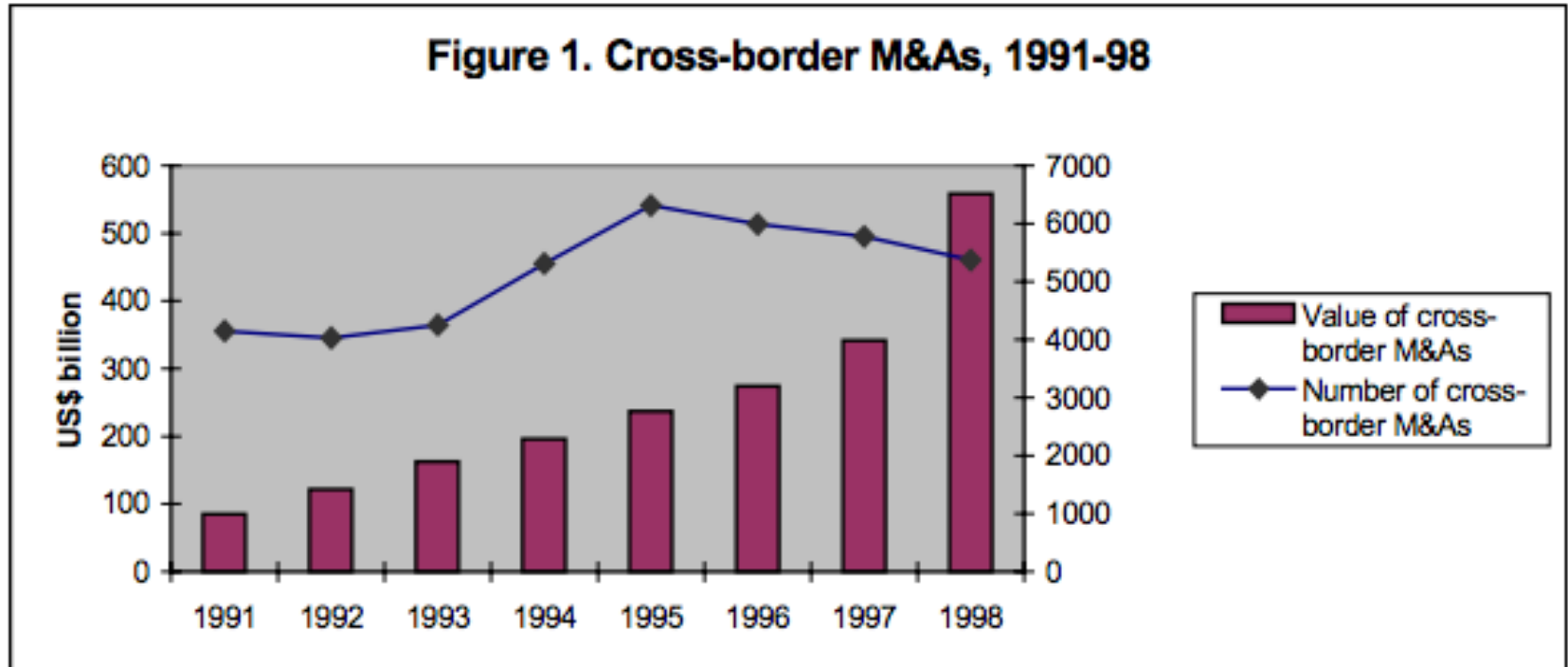


UT + Pratt&Witney

M&A in MNEs

- Start in the late 19th century in the US : consolidation of small firms with similar firms to build larger firms dominating their market (Du Pont, GE, US Steel ...)
- 1965–1990 : M&A more frequently bought into different industries. Sometimes this was done to smooth out cyclical bumps, to diversify, the hope being that it would hedge an investment portfolio.
- 1992–1998 and continuing today, companies are more likely to acquire in the same business, or close to it, firms that complement and strengthen an acquirer's capacity to serve customers. Cross border M&A.
- 2015 has been a boom year for mergers and acquisitions (M&A). Globally, M&A activity has reached a value of \$3.24 trillion year-to-date, just shy of the record \$3.43 trillion reached by this point in 2007. (Ex April 2015 update: Shell's £47bn (\$70bn) agreement to buy BG Group, GE/Alstom).
- Many companies are being bought for their patents, licenses, market share, name brand, research staff, methods, customer base, or culture.

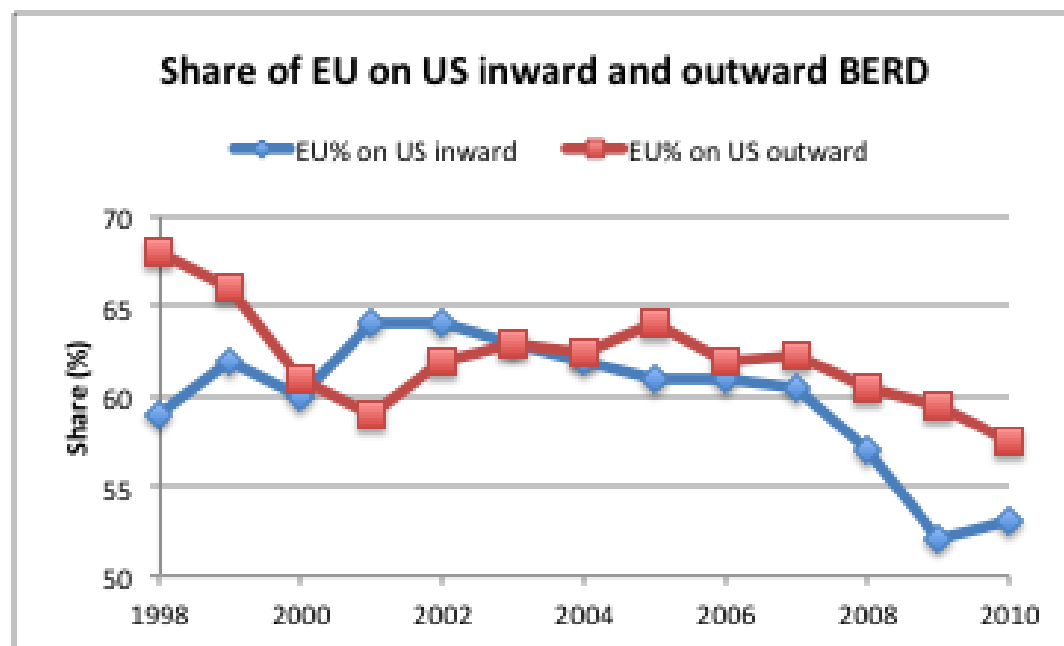
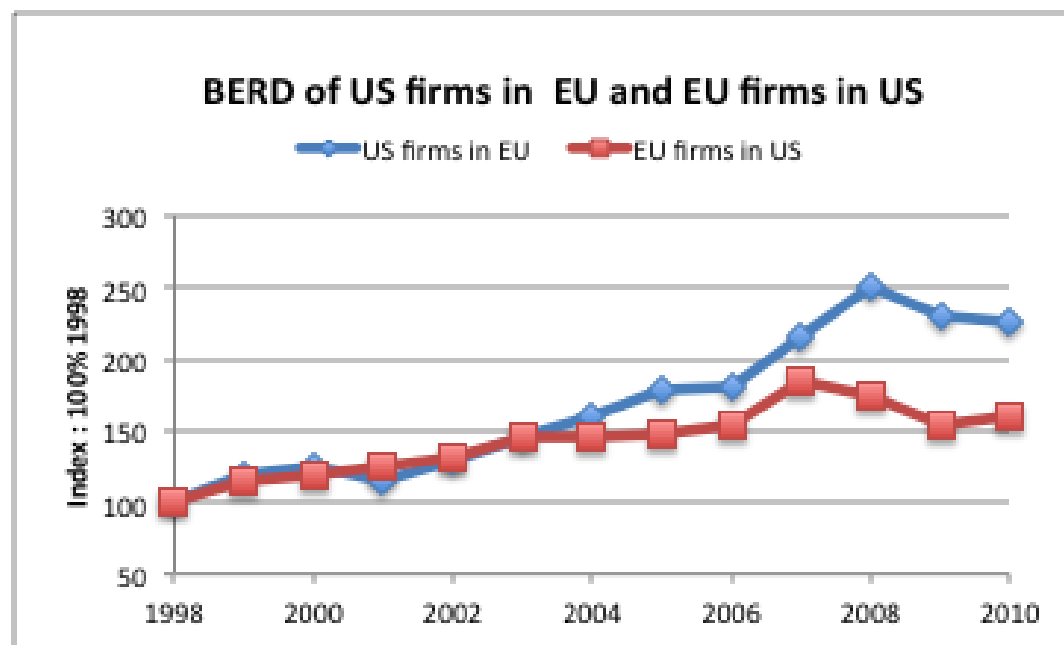
Cross M&A in MNEs



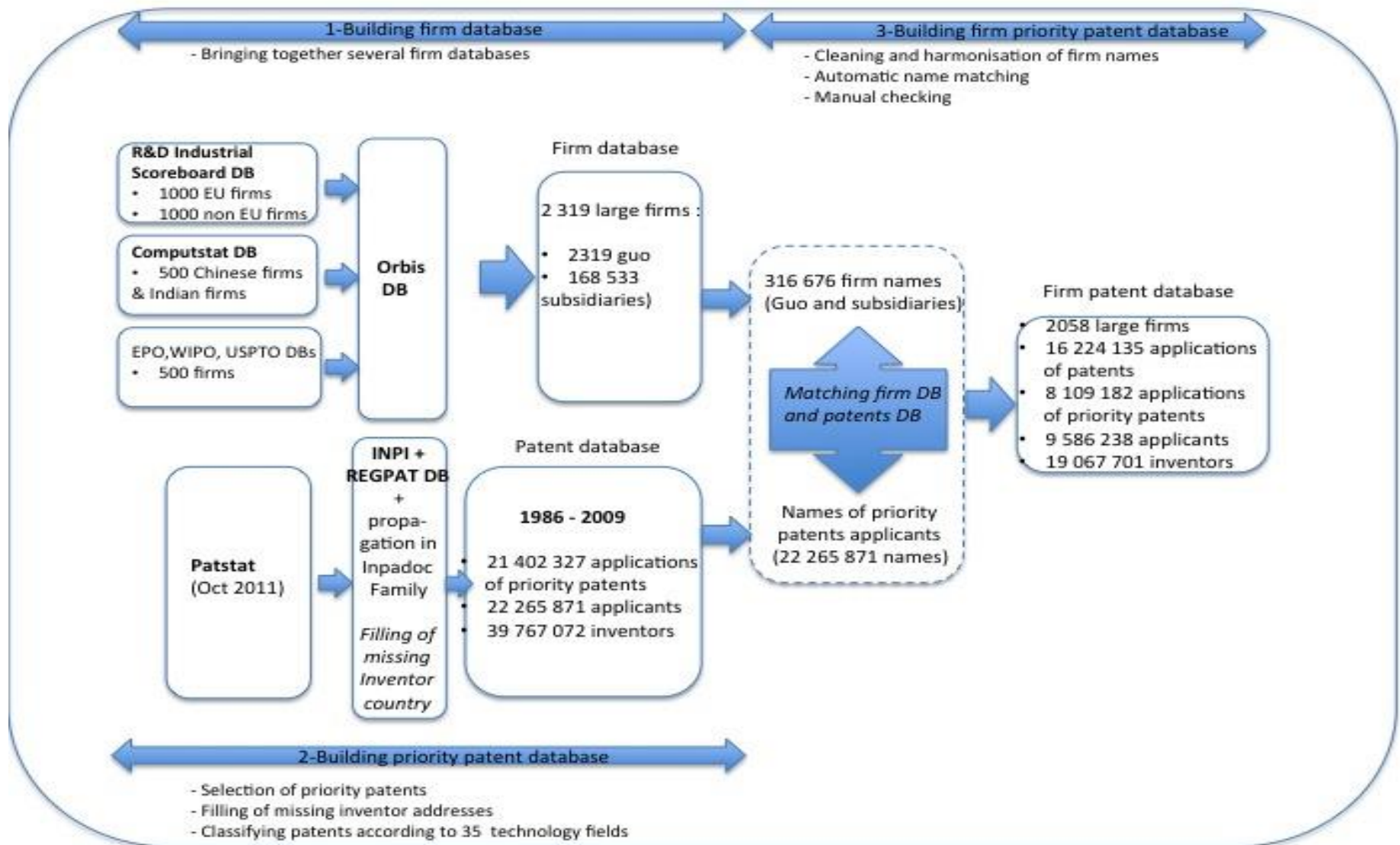
Source: KPMG Corporate Finance, 1999.

Internationalisation of corporate R&D

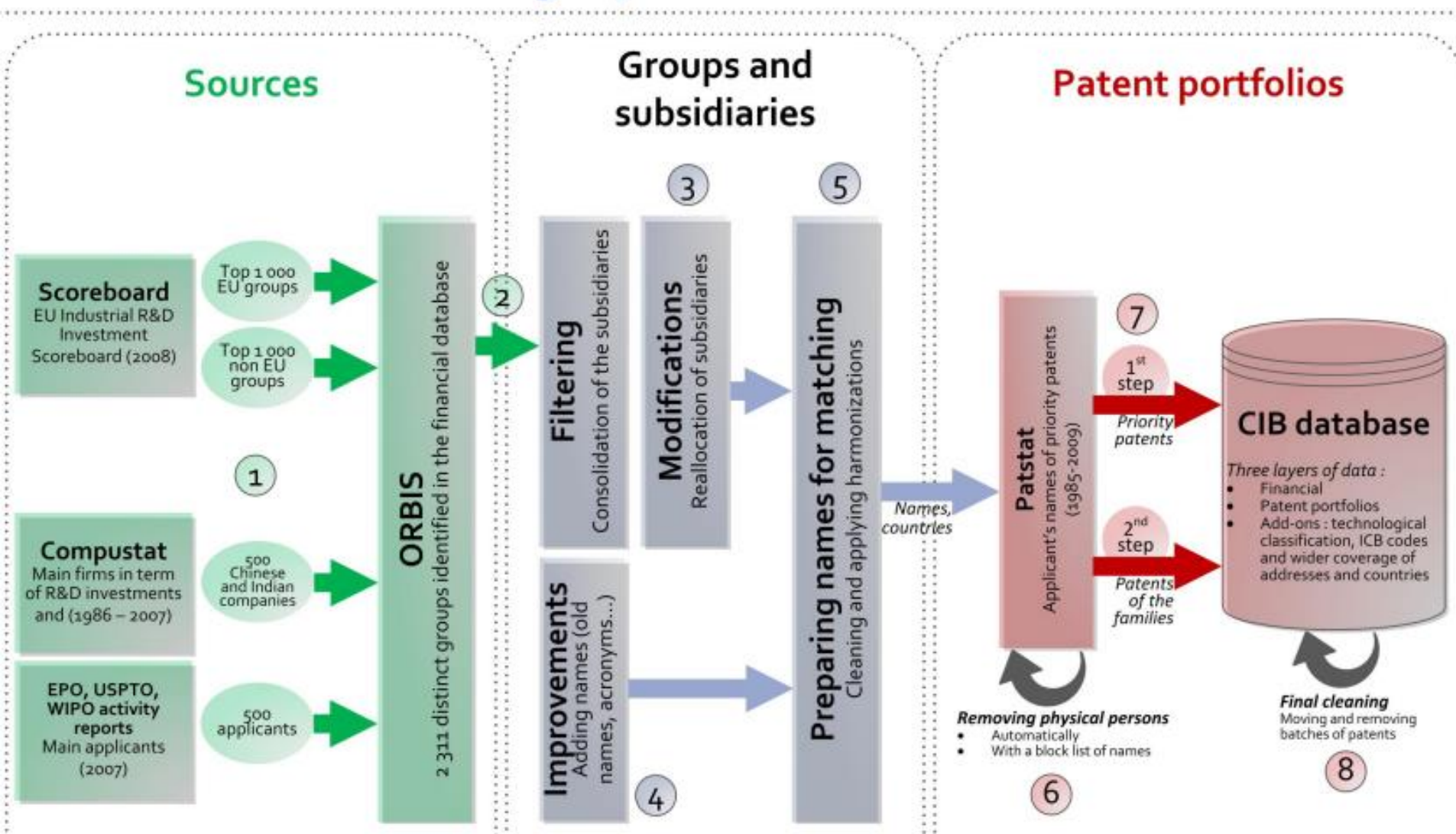
- In 1993, the R&D expenditure of companies through their foreign subsidiaries accounted for 10% of companies whole R&D expenditure. It reached 16% in 2002 (UNCTAD 2005, 125).
- Between 1995 and 2003, the share of the R&D budget spent outside the home country by European multinationals increased from 25% to 44% according to a survey (Reger, 2002)
- EU and US are the two main players in the internationalisation of corporate R&D as host and home countries but new players have come into play (BRICS, ...)



HOW WAS IT BUILT ?



Setting-up the CIB database



The sources

1- The EU Industrial R&D Investment Scoreboard DB

- The EU Industrial R&D Investment Scoreboard DB provides economic and financial data of the top corporate R&D investors from the EU and from abroad. It is based on company data extracted directly from each company's Annual Report.
- The figures are derived from the company accounts and indicate the R&D invested by companies' own funds, independently of the location of the R&D activity
- The Scoreboard is published annually in order to provide a reliable, up-to-date benchmarking tool for comparisons between companies, sectors, and geographical areas, as well as to monitor and analyse emerging investment trends and patterns.
- Our current CIB version uses the 2008 EU Industrial R&D Investment Scoreboard DB that comprises the top 1000 R&D investors whose registered offices are in the EU and the 1000 registered elsewhere.

The sources

EU Industrial R&D Investment Scoreboard DB –EU firm extract

Rank	Company	ICB Sector	Country	R&D Investment		Net Sales		Employees		R&D/Net Sales ratio		Operating Profit		R&D/Employees		Market Capitalisation		Capital Expenditures	
				2007	change 07/06	2007	change 07/06	2007	change 07/06	2007	2006	2007	2006	2007	2006	2007	change 07/06	2007	2006
				Cm	%	Cm	%	#	%	%	%	% of Net Sales	CK	CK	Cm	%	% of Net Sales	% of Net Sales	
Top 1000 Companies number of companies for calculation				126 358,38 1000	8,6 983	5 515 078 983	7,0 958	20 297 642 994	4,2 982	2,3 974	2,2 960	12,2 965	6,2 994	6,0 981	4 954 856 796	-9,0 707	7,2 858	7,1 846	
1	Nokia	Telecommunications equipmen	Finland	5 281,00	42,3	51 058	24,2	100 534	53,9	10,3	9,0	11,7	52,5	56,8	70 647	-14,7	1,3	2,0	
2	Volkswagen	Automobiles & parts (335)	Germany	4 923,00	16,1	108 897	3,3	307 589	-0,3	4,5	4,0	6,3	16,0	13,7	71 064	46,0	8,9	8,0	
3	Daimler	Automobiles & parts (335)	Germany	4 888,00	-6,6	129 436	-15,3	357 000	-2,4	3,8	3,4	6,8	13,7	14,3	45 749	-24,0	16,0	20,1	
4	Sanofi-Aventis	Pharmaceuticals (4577)	France	4 563,00	3,6	28 052	-1,1	99 495	-0,8	16,3	15,5	23,0	45,9	43,9	65 387	-13,5	4,8	4,4	
5	GlaxoSmithKline	Pharmaceuticals (4577)	UK	4 419,43	-6,1	30 928	-2,2	103 401	1,6	14,3	14,9	33,5	42,7	46,2	89 901	-9,7	7,0	6,4	
6	Robert Bosch	Automobiles & parts (335)	Germany	3 560,00	4,8	46 320	6,0	267 562	3,8	7,7	7,8	6,9	13,3	13,2			5,7	6,1	
7	AstraZeneca	Pharmaceuticals (4577)	UK	3 448,55	29,8	20 217	11,6	67 900	2,0	17,1	14,7	27,4	50,8	39,9	51 319	4,4	4,0	3,0	
8	Alcatel-Lucent	Telecommunications equipmen	France	3 368,00	69,4	18 005	25,2	76 410	-14,5	18,7	13,8	-24,4	44,1	22,2	9 859	-43,5	2,0	2,0	
9	Siemens	Electrical components & equipm	Germany	3 366,00	1,7	90 348	0,5	398 200	8,1	3,7	3,7	6,5	8,5	9,0	74 367	-3,4	3,3	4,6	
10	BMW	Automobiles & parts (335)	Germany	3 144,00	-2,0	56 018	14,3	97 922	0,7	5,6	6,5	7,1	32,1	33,0	19 448	-26,9	24,5	22,8	
11	Ericsson	Telecommunications equipmen	Sweden	2 911,03	2,4	19 872	5,6	73 345	13,7	14,6	15,1	16,2	39,7	44,1	23 558	-42,1	2,3	2,2	
12	EADS	Aerospace & defence (271)	The Netherl	2 701,00	-5,9	39 123	-0,8	116 493	-0,3	6,9	7,3	-0,3	23,2	24,6	12 459	-23,4	4,6	5,8	
13	Bayer	Chemicals (135)	Germany	2 645,00	7,7	32 631	2,6	105 622	9,3	8,1	7,7	9,4	25,0	25,4	42 752	5,2	4,8	5,0	
14	Renault	Automobiles & parts (335)	France	2 462,00	2,6	39 561	-2,4	133 854	-0,3	6,2	5,9	7,3	18,4	17,9	17 136	-35,9	8,3	8,8	
15	Peugeot (PSA)	Automobiles & parts (335)	France	2 074,00	-4,6	60 613	7,1	207 850	-1,8	3,4	3,8	1,8	10,0	10,3	8 167	-39,1	3,3	4,7	
16	Finmeccanica	Aerospace & defence (271)	Italy	1 955,00	4,6	11 916	2,5	58 700	3,6	16,4	16,1	8,5	33,3	33,0	8 559	2,5	5,3	4,9	
17	Fiat	Automobiles & parts (335)	Italy	1 741,00	8,9	58 529	14,9	179 601	3,4	3,0	3,1	5,2	9,7	9,2	14 374	-35,6	5,0	6,5	
18	Boehringer Ingelhei	Pharmaceuticals (4577)	Germany	1 730,00	9,9	10 952	3,6	39 800	3,6	15,8	14,9	19,2	43,5	41,0			6,0	5,6	
19	BT	Fixed line telecommunications	UK	1 704,60	11,9	28 188	2,4	108 500	3,1	6,0	5,5	11,1	15,7	14,5	18 699	-45,1	12,2	12,2	
20	Philips Electronics	Leisure goods (374)	The Netherl	1 604,00	-7,6	27 037	-12,4	125 656	-22,0	5,9	6,3	8,3	12,8	12,1	24 327	-20,6	2,4	2,3	

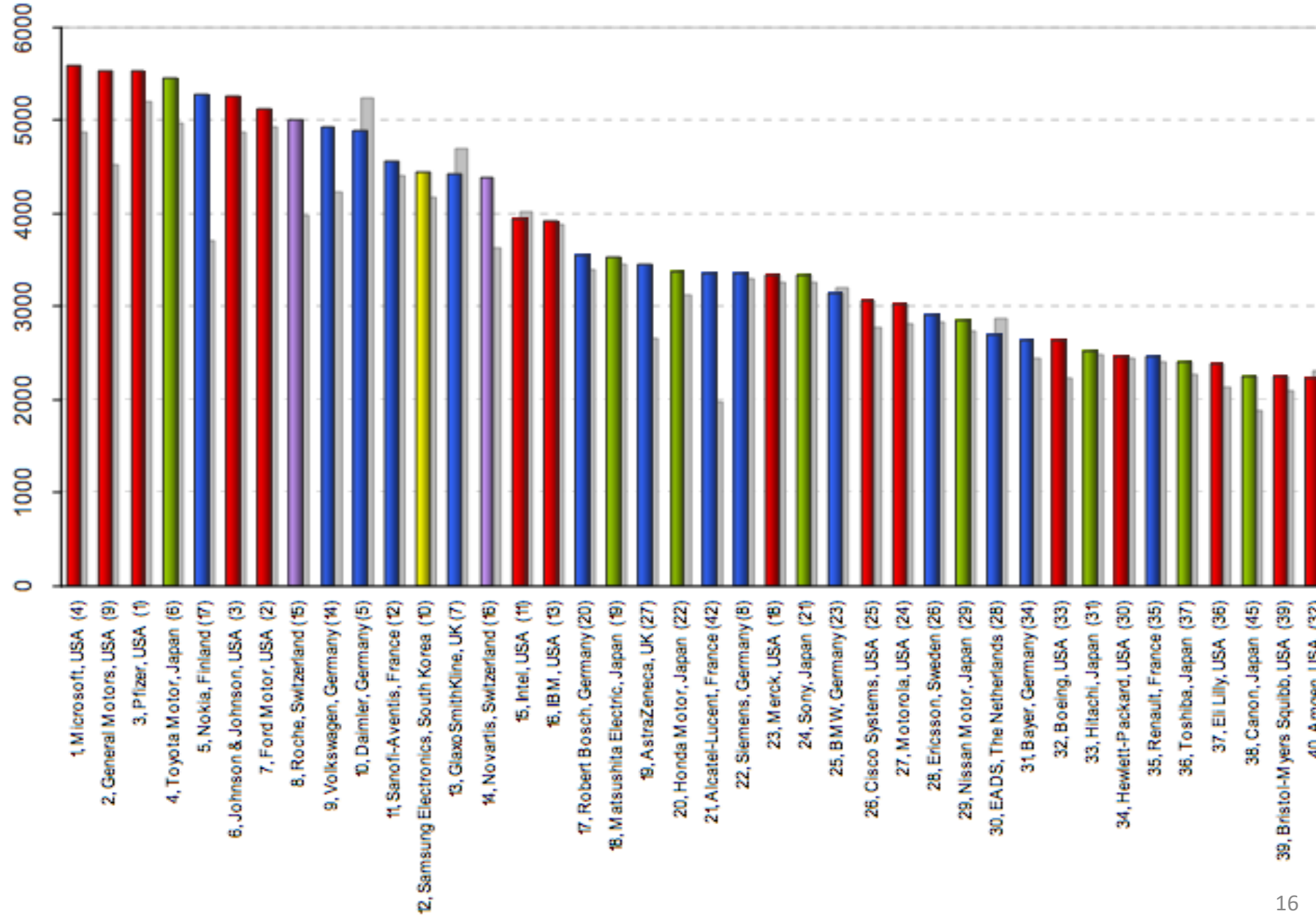
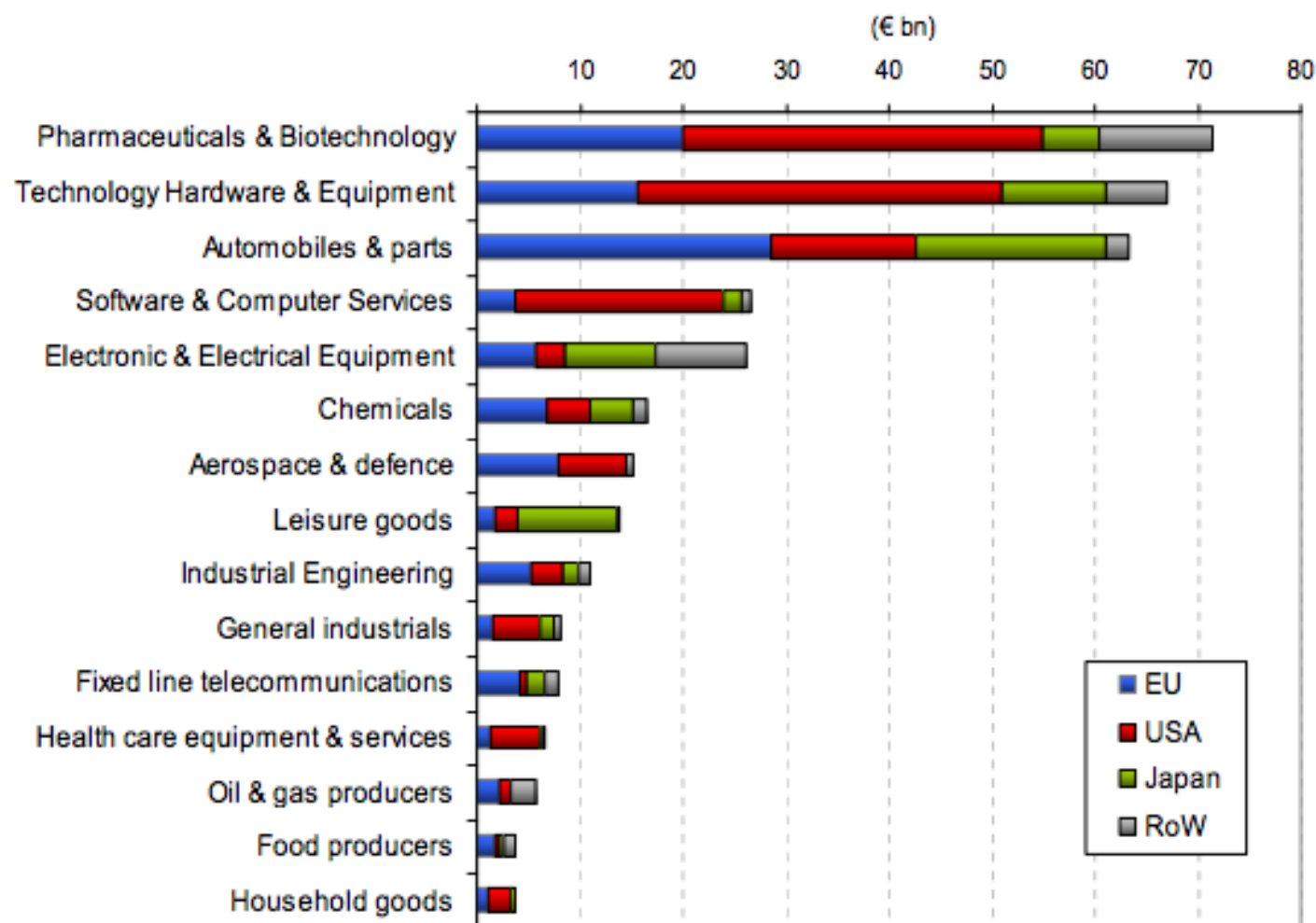
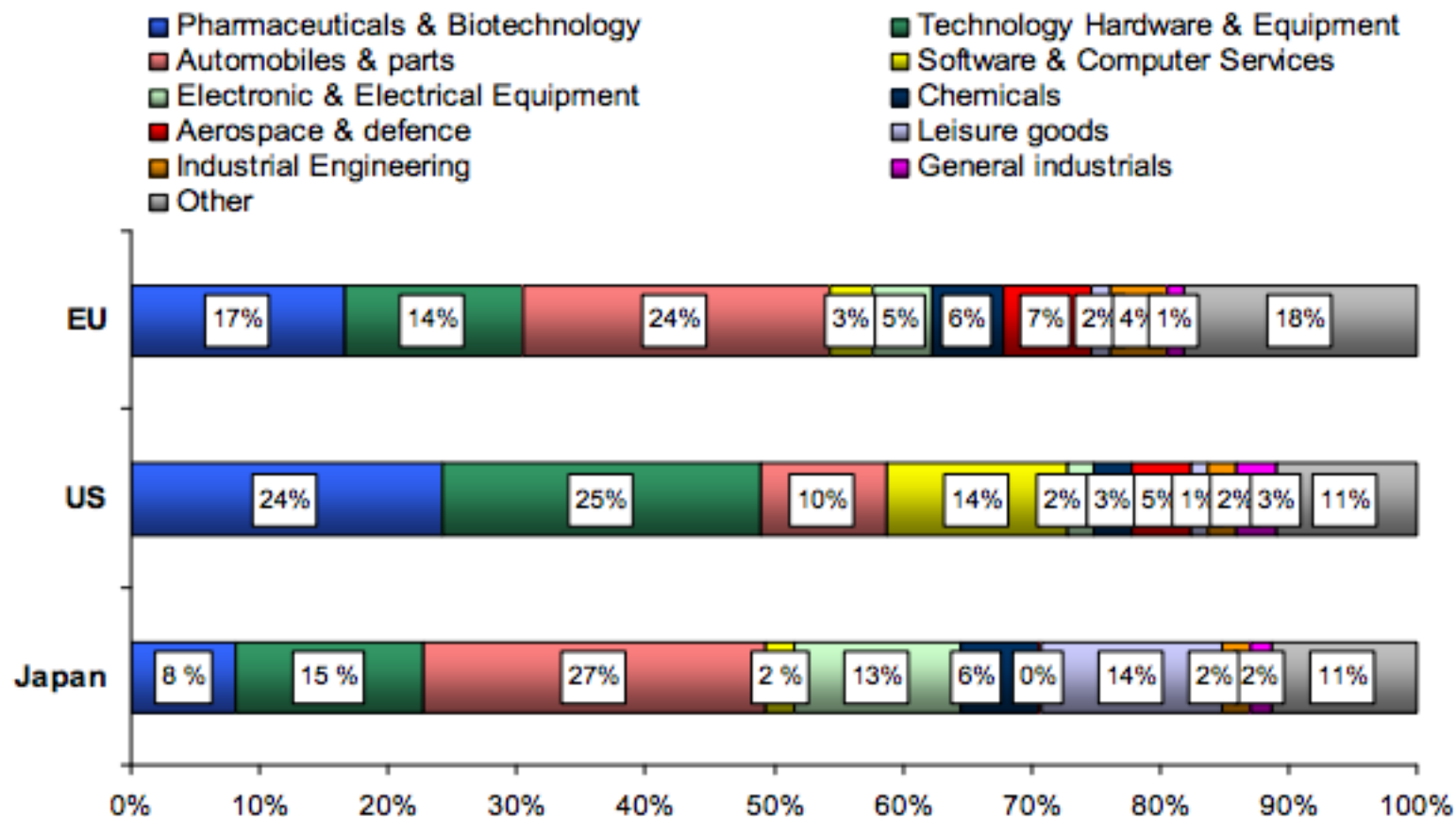


Figure 4. Ranking of industrial sectors by aggregate R&D by main world region for the world top 1402 companies in the 2008 Scoreboard (€ bn).



Note: Ranked by total worldwide R&D investment of the sector.
Source: The 2008 EU Industrial R&D Investment Scoreboard
 European Commission, JRC/DG RTD.

Figure 5. R&D shares of sectors of the main world regions.



Source: *The 2008 EU Industrial R&D Investment Scoreboard*
European Commission, JRC/DG RTD.

The sources

- **2 - The Computstat DB**

Addition of 433 Indian and Chinese companies, having declared R& D investments between 1999 and 2009.

- **3 – WIPO, EPO, USPTO main assignees DB**

Addition of the main assignees of patents identified in the management reports of the Worldwide Industrial Property Organization (WIPO), the European Patent Office (EPO), and the United States Patents and Trademark Office (USPTO).

The sources

APPLICANT'S NAME	COUNTRY OF ORIGIN	2008 PCT APPLICATIONS
HUAWEI TECHNOLOGIES CO., LTD.	CN	1 737
PANASONIC CORPORATION	JP	1 728
KONINKLIJKE PHILIPS ELECTRONICS N.V.	NL	1 559
TOYOTA JIDOSHA KABUSHIKI KAISHA	JP	1 364
ROBERT BOSCH CORPORATION	DE	1 274
SIEMENS AKTIENGESELLSCHAFT	DE	1 062
NOKIA CORPORATION	FI	1 007
LG ELECTRONICS INC.	KR	996
TELEFONAKTIEBOLAGET LM ERICSSON (PUB	SE	987
FUJITSU LIMITED	JP	972
QUALCOMM INCORPORATED	US	919
NEC CORPORATION	JP	825
SHARP KABUSHIKI KAISHA	JP	814
MICROSOFT CORPORATION	US	806
MOTOROLA, INC.	US	778
BASF SE	DE	773
INTERNATIONAL BUSINESS MACHINES CORP	US	669
3M INNOVATIVE PROPERTIES COMPANY	US	666
SAMSUNG ELECTRONICS CO., LTD.	KR	641
E.I. DUPONT DE NEMOURS AND COMPANY	US	518

APPLICANT'S NAME	COUNTRY OF ORIGIN	2014 PCT APPLICATIONS
HUAWEI TECHNOLOGIES CO., LTD.	CN	3 442
QUALCOMM INCORPORATED	US	2 409
ZTE CORPORATION	CN	2 179
PANASONIC CORPORATION	JP	1 682
MITSUBISHI ELECTRIC CORPORATION	JP	1 593
INTEL CORPORATION	US	1 539
TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)	SE	1 512
MICROSOFT CORPORATION	US	1 460
SIEMENS AKTIENGESELLSCHAFT	DE	1 399
KONINKLIJKE PHILIPS ELECTRONICS N.V.	NL	1 391
SAMSUNG ELECTRONICS CO., LTD.	KR	1 381
TOYOTA JIDOSHA KABUSHIKI KAISHA	JP	1 378
ROBERT BOSCH CORPORATION	DE	1 371
SHARP KABUSHIKI KAISHA	JP	1 227
NEC CORPORATION	JP	1 215
LG ELECTRONICS INC.	KR	1 138
TENCENT TECHNOLOGY (SHENZHEN) COMPANY	CN	1 086
FUJIFILM CORPORATION	JP	1 072
UNITED TECHNOLOGIES CORPORATION	US	1 013
HITACHI, LTD.	JP	996

Injection of firms' names in Orbis

- Orbis is DB that contains information on 60 million companies around the world. The information included descriptive, information, compagny financial, news, ownership and M&A data.
 - To define the global ultimate owner of firms (GUO criteria : share >50,01%)
 - To eliminate doublons among firms
 - To delineate the GUO perimeter (at a given time)

Injection of firms' names in Orbis

- Ex: ATOTECH as a WIPO applicant ---> Guo TOTAL : 419 direct subsidiaries and more than 10 000 related entities

Guo name	Code ISO	Level	Subsidiary name	Code ISO	% direct	Statut
TOTAL S.A.	FR	1.	ALWYN LIQUID EXPORT LINE	GB	100.00	UO+
TOTAL S.A.	FR	2.	CHARTERING & SHIPPING SERVICES S.A	US	100.00	UO+
TOTAL S.A.	FR	3.	COSDEN LLC	US	100.00	UO+
TOTAL S.A.	FR	4.	CRAY VALLEY SA	FR	100.00	UO+
TOTAL S.A.	FR	116.	ATOTECH (CHINA) CHEMICALS LTD.	CN	-	UO+
TOTAL S.A.	FR	117.	ATOTECH B.V.	NL	-	UO+
TOTAL S.A.	FR	117.1.	ATOTECH (CHINA) CHEMICALS LTD.	CN	100.00	UO
TOTAL S.A.	FR	117.2.	ATOTECH (MALAYSIA) SDN. BHD.	MY	100.00	UO
TOTAL S.A.	FR	117.3.	ATOTECH (THAILAND) CO LTD	TH	100.00	UO
TOTAL S.A.	FR	117.4.	ATOTECH CZ, A.S.	CZ	100.00	UO
TOTAL S.A.	FR	117.4.1.	ATOTECH SK, S.R.O.	SK	100.00	UO
TOTAL S.A.	FR	117.5.	ATOTECH DEUTSCHLAND GMBH	DE	100.00	UO
TOTAL S.A.	FR	117.5.1.	ATOTECH USA INC	US	>50.00	UO
TOTAL S.A.	FR	117.5.1.1.	ATOTECH	US	>50.00	UO
TOTAL S.A.	FR	117.5.1.2.	ATOTECH CANADA LTD	CA	>50.00	UO
TOTAL S.A.	FR	117.5.1.3.	ATOTECH USA	US	>50.00	UO
TOTAL S.A.	FR	117.5.1.4.	ATOTECH USA INC C	US	>50.00	UO
TOTAL S.A.	FR	117.5.2.	ATOTECH DE MEXICO	MX	20.00	UO
TOTAL S.A.	FR	117.5.3.	ATOTECH ISTANBUL KIMYA SANAYI TICARET LTD	TR	5.00	UO
TOTAL S.A.	FR	117.5.4.	ATOTECH-CHEMETA LIMITED LIABILITY COMPANY	RU	5.00	UO
TOTAL S.A.	FR	117.5.5.	ATOTECH DO BRASIL GALVANOTECNICA LTDA	BR	-	-
TOTAL S.A.	FR	117.6.	ATOTECH ESPAÑA SOCIEDAD ANONIMA	ES	100.00	UO
TOTAL S.A.	FR	117.7.	ATOTECH ITALIA S.R.L.	IT	100.00	UO
TOTAL S.A.	FR	117.8.	ATOTECH POLAND SP. Z O.O.	PL	100.00	UO
TOTAL S.A.	FR	117.9.	ATOTECH SLOVENIJA, PROIZVODNJA KEMICNIH	SI	100.00	UO
TOTAL S.A.	FR	117.10.	ATOTECH UK LIMITED	GB	100.00	UO
TOTAL S.A.	FR	416.	TOTAL FINA ELF GUINEE	GN	-	-
TOTAL S.A.	FR	417.	TOTAL HUNGARIA KERESKEDELMI KORLÁTOLT	HU	-	-
TOTAL S.A.	FR	418.	TOTAL MÁRÓC	MA	-	-
TOTAL S.A.	FR	419.	TOTAL PROJECTS INDIA PRIVATE LIMITED	IN	-	-

Injection of firms' names in Orbis

- United Technologies (49th non EU firm in SB)

---> Guo

176 subsidiaries
(first level)

UT

OTIS

PRATT & WHITNEY HOLDINGS

GOODRICH

...

Firm name	Code ISO	Level	Subsidiary name	Code ISO du pays	% direct
UNITED TECHNOLOGIES CORP	US	1.	AMSTERFORD TREASURY SERVICES B.V.	NL	100.00
UNITED TECHNOLOGIES CORP	US	2.	NORD-MICRO VERWALTUNGS AG	DE	100.00
UNITED TECHNOLOGIES CORP	US	3.	OTIS ELEVATOR COMPANY	ES	100.00
UNITED TECHNOLOGIES CORP	US	4.	OTIS SCS	n.d.	100.00
UNITED TECHNOLOGIES CORP	US	5.	UNITED TECHNOLOGIES HOLDINGS B.V.	NL	100.00
UNITED TECHNOLOGIES CORP	US	18.	GOODRICH CORPORATION	US	-
UNITED TECHNOLOGIES CORP	US	19.	HAMILTON SUNDSTRAND INTERNATIONAL HOLDINGS	LU	-
UNITED TECHNOLOGIES CORP	US	20.	KIDDE DE MEXICO	MX	>50.00
UNITED TECHNOLOGIES CORP	US	21.	NSI, INC.	US	>50.00
UNITED TECHNOLOGIES CORP	US	25.	SIKORSKY INTERNATIONAL OPERATIONS, INC.	US	>50.00
UNITED TECHNOLOGIES CORP	US	26.	UNITED TECHNOLOGIES CANADA, LTD.	CA	>50.00
UNITED TECHNOLOGIES CORP	US	27.	UNITED TECHNOLOGIES HOLDINGS SAS	FR	-
UNITED TECHNOLOGIES CORP	US	28.	UNITED TECHNOLOGIES RESEARCH CENTER	US	>50.00
UNITED TECHNOLOGIES CORP	US	29.	UTC CANADA CORPORATION	CA	>50.00
UNITED TECHNOLOGIES CORP	US	49.	CARRIER COMMERCIAL REFRIGERATION	US	-
UNITED TECHNOLOGIES CORP	US	50.	CARRIER ENTERPRISE LLC	US	MO
UNITED TECHNOLOGIES CORP	US	57.	CHUBB GROUP LIMITED	GB	-
UNITED TECHNOLOGIES CORP	US	58.	CHUBB GROUP SECURITY LIMITED	GB	-
UNITED TECHNOLOGIES CORP	US	78.	GOODRICH AEROSPACE CANADA LTD.	CA	-
UNITED TECHNOLOGIES CORP	US	116.	PRATT & WHITNEY AERO ENGINES INTERNATIONAL SERVICES	CH	-
UNITED TECHNOLOGIES CORP	US	117.	PRATT & WHITNEY AUTOMATION, INC.	US	MO
UNITED TECHNOLOGIES CORP	US	118.	PRATT & WHITNEY CANADA CORP	CA	-
UNITED TECHNOLOGIES CORP	US	123.	PRATT & WHITNEY HOLDINGS LLC	KY	MO
UNITED TECHNOLOGIES CORP	US	124.	PRATT & WHITNEY MATERIALS INTERNATIONAL SÀRL	CH	-
UNITED TECHNOLOGIES CORP	US	125.	PRATT & WHITNEY MILITARY AFTERMARKET SERVICES, INC.	US	MO
UNITED TECHNOLOGIES CORP	US	126.	PRATT AERO LIMITED PARTNERSHIP	CA	MO
UNITED TECHNOLOGIES CORP	US	138.	UNITED TECHNOLOGIES AUSTRALIA HOLDINGS LIMITED	AU	MO
UNITED TECHNOLOGIES CORP	US	139.	UNITED TECHNOLOGIES CANADA LIMITED	CA	MO
UNITED TECHNOLOGIES CORP	US	140.	UNITED TECHNOLOGIES CORPORATION	US	MO
UNITED TECHNOLOGIES CORP	US	175.	UNITED TECHNOLOGIES FAR EAST LIMITED	HK	-
UNITED TECHNOLOGIES CORP	US	176.	UTC AEROSPACE SYSTEMS - AEROSTRUCTURES	US	-

Injection of firms' names in Orbis

We end with a list of :

- **2319** GUO (parent firms)
- **168 533** different subsidiaries, affiliates, ...

Matching firms' name and patent applicant

- More than **170 000** names to match
- Challenge:
 - To retrieve as many firm patent as possible
 - To limit the retrieval of erroneous patents
(high retrieval rate, low noise)

Matching firms' name and patent applicant

- Using the data cleaning and harmonizing methodology developed by Magerman et al. (2006), we prepared a list of cleaned GUO and subsidiaries names that was further enriched by adding firm acronyms, firm old names and standardized names from the Pastat database.
- The final list of firm names contained **316 676 different names**.
- The next issue was to define the home country of the firm. Following the practice of the “Industrial R&D Investment Scoreboard”, the home country of the firm (GUO and all its subsidiaries) was defined according to the location of the GUO headquarters.

Examples of rules for standardizing the ORBIS cleaned names

-> UNIV
UNIVERSITET
universidad
universitat
universite
university

-> TECH
technology
technologie
technologies

-> PHARMA
pharmacy
pharmaceutica
pharmaceuticals

-> INST
Institute
Institut
INSTITUTO

-> IND
Industry
Industrial
Industries

-> INF
Information
Informatique

Autres transformations		
Medical (MED)	National (NAT)	CHEMICAL (CHEM)
<u>Precision</u> (PREC)	Scientific (SCIENT)	<u>Materials</u> (MAT)
<u>development</u> (DEV)	Instruments (INSTR)	Equipment (EQUIP)
<u>computer</u> (COMP)	Services (SERV)	<u>Electronic</u> (ELECTRON)
Research (RES)	Software (SOFT)	COMMUNICATION (COMM)
Product (PROD)	Engineering (ENG)	SYSTEM (SYST)
<u>Biologic</u> (BIOLOG)	Manufacturing (MFG)	

Examples of cleaning with Mangerman (2006)

Suppression peu importe la place (expressions régulières php)

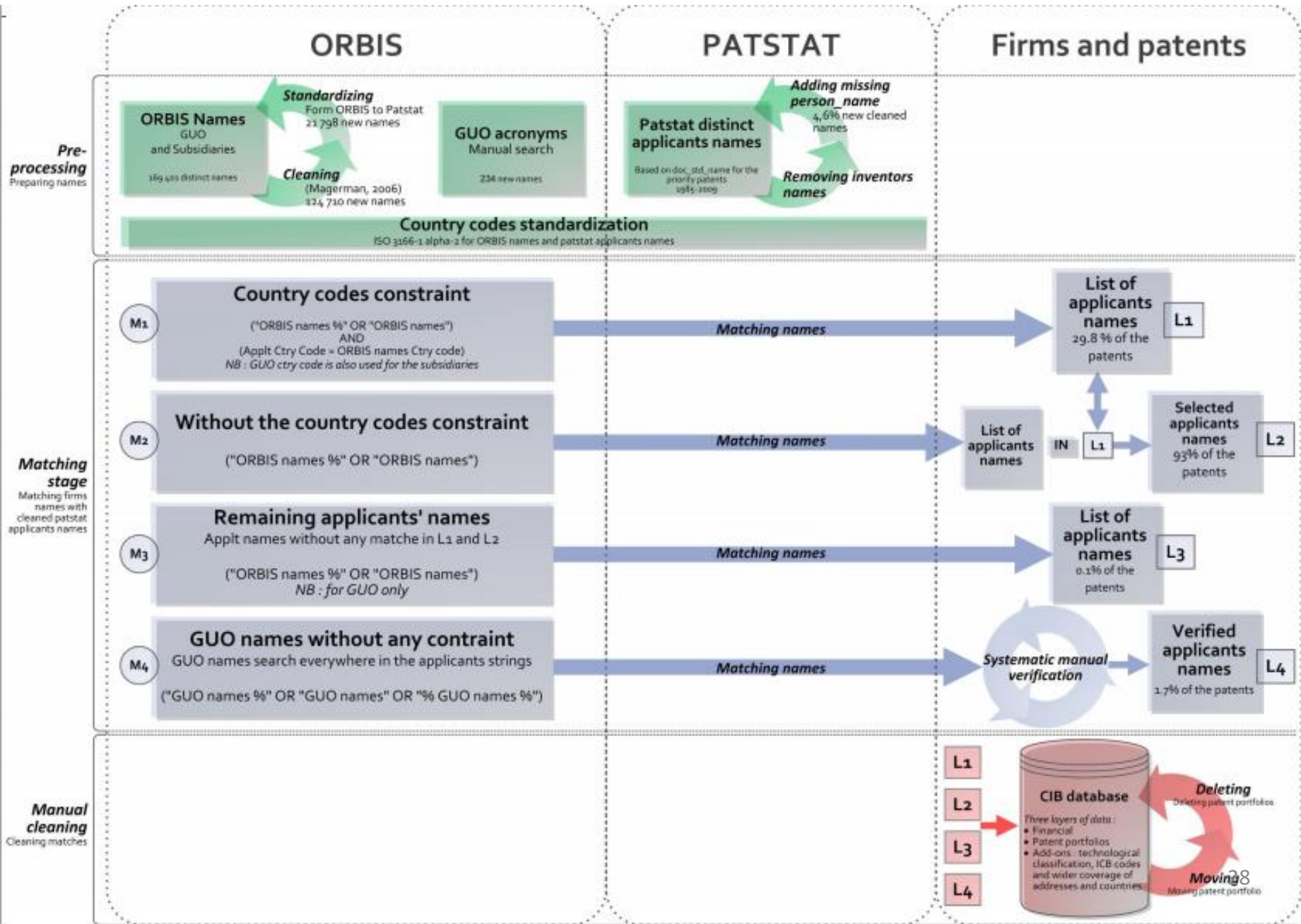
GMBH & CO\.	K\.	G\.	GMBH + CO\.	KG	GMBH + CO
GMBH & CO\.	KG\.		GMBH & CO\.		GMBH + CO\.,)', ", \$text);
GMBH & CO\.	KG		GMBH & CO		GMBH + CO,)', ", \$text);
GMBH & CO\.	K\.	G\.	GMBH & CO\.,)', ", \$text);		GMBH,)', ", \$text);
GMBH & CO\.	KG		GMBH & CO,)', ", \$text);		GMBH
GMBH & CO	KG		GMBH + CO\.		

Suppression des terminaisons (expressions régulières php)

MFG\.	CO\., INC\.	INT'L, INC\.	CO\., CO\.	LTD\.
MFG	CO\., INC\.	INT'L INC\.	CO\., CO\., LTD\.	
MFG	CO, INC	INTL, INC\.	, CO\., LTD\.	
MFG\.	CO\.	INTL\.	CO\.	LTD\.

More than 1 200 different rules and 300 new rules built specifically for the CIB projet

Matching process



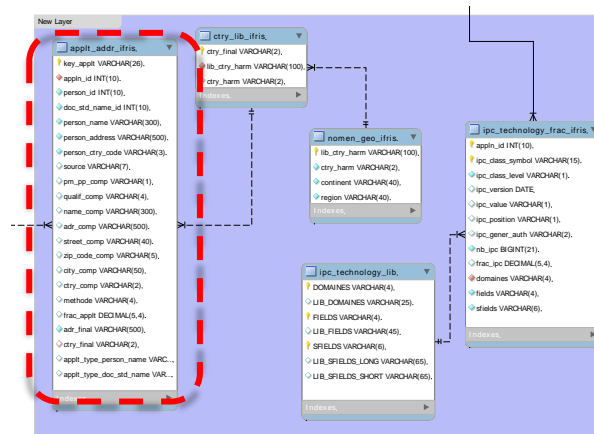
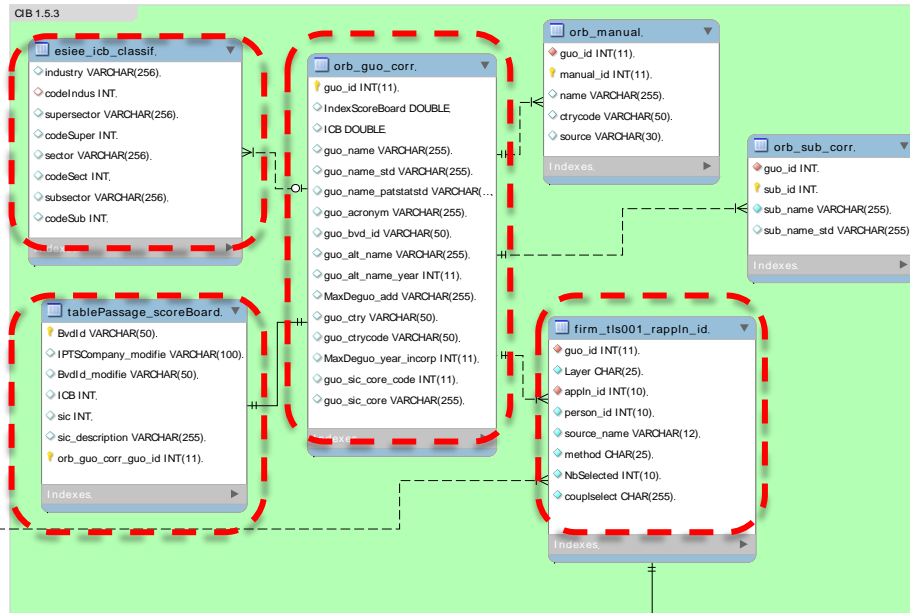
WHAT IS INSIDE ?

[illegible]

The diagram illustrates a complex database schema with the following tables and their attributes:

- enr_kb_classif**: industry VARCHAR(256), codeclass INT, supersector VARCHAR(256), codeSgpc INT, sector VARCHAR(256), codeSct INT, subsector VARCHAR(256), codeSub INT.
- enr_gso_corr**: gso_id INT(11), indexScorecard DOUBLE, kb DOUBLE, gso_name VARCHAR(255), gso_name_abl VARCHAR(255), gso_name_published VARCHAR(255), gso_lang_id VARCHAR(30), gso_abl_name VARCHAR(255), gso_abl_name_year INT(11), MacDgpc_abl VARCHAR(255), gso_ctry VARCHAR(30), gso_ctrycode VARCHAR(30), MacDgpc_year_bscap INT(11), gso_atc_code INT(11), gso_atc_code VARCHAR(255).
- enr_manual**: gso_id INT(11), manual_id INT(11), name VARCHAR(255), ctrycode VARCHAR(30), source VARCHAR(30).
- enr_sub_corr**: gso_id INT, sub_id INT, sub_name VARCHAR(255), sub_name_abl VARCHAR(255).
- tablePassage_scorecard**: table VARCHAR(30), PISCompany_name VARCHAR(200), tableid VARCHAR(30), kb INT, wk INT, var_description VARCHAR(255), enr_gso_corr_gso_id INT(11).
- firm_sub01_supplie_id**: gso_id INT(11), Layer CHAR(25), Appl_id INT(10), person_id INT(10), source_name VARCHAR(127), modified CHAR(25), ABSelected INT(10), CoupledAct CHAR(255).
- appl_addr_fris**: key_appl VARCHAR(20), appl_id INT(10), person_id INT(10), doc_abl_name_abl INT(10), person_name VARCHAR(30), person_address VARCHAR(200), person_ctry_code VARCHAR(25), source VARCHAR(7), gso_jo_comp VARCHAR(1), appl_comp VARCHAR(1), name_comp VARCHAR(30), abl_comp VARCHAR(200), abl_comp VARCHAR(10), rfp_code_comp VARCHAR(1), ctry_comp VARCHAR(2), ctrycode VARCHAR(1), var_appl DECIMAL(5,4), abl_fris VARCHAR(30), ctry_fris VARCHAR(2), appl_type_person_name VARCHAR(1), appl_type_doc_abl_name VARCHAR(1).
- ctry_lib_fris**: ctry_fris VARCHAR(2), lib_ctry_name VARCHAR(100), ctry_name VARCHAR(2).
- ncomen_gso_fris**: lib_ctry_name VARCHAR(100), ctry_name VARCHAR(2), continent VARCHAR(10), region VARCHAR(10).
- tpc_technology_fris_fris**: appl_id INT(10), tpc_desc_appl VARCHAR(15), tpc_desc_lang VARCHAR(1), tpc_version DATE, tpc_value VARCHAR(1), tpc_probleme VARCHAR(1), tpc_gpc_abl VARCHAR(2), tpc_gpc_desc(121), lib_gpc DECIMAL(5,4), derivatives VARCHAR(1), fields VARCHAR(4), fields VARCHAR(1).
- tpc_technology_lib**: COMINES VARCHAR(1), LIB_COMINES VARCHAR(21), FIELDS VARCHAR(1), LIB_FIELDS VARCHAR(15), FIELDS VARCHAR(1), LIB_FIELDS_LONG VARCHAR(15), LIB_FIELDS_SHORT VARCHAR(15).

Relationships are shown with dashed lines and crow's foot notation. A red arrow points from the top section to the bottom section.



For each firm (aggregation of the guo and its subsidiaries), the database gives:

Name of the firm using various spellings (guo_name, guo_name_std, guo_name_patstatstd in Table orb_guo_corr),

Acronym of the firm (guo_acronym in Table orb_guo_corr),

Database id of the firm (guo_id in Table orb_guo_corr and Table firm_tls0018rappln_id and Table firm_tls0018rappln_id_group),

IndexScoreBoard of the firm (IndexScoreBoard in Table orb_guo_corr). This is the firm's id in the Industrial R&D investment Scoreboard,

Industry Classification of the firm (ICB in Table orb_guo_corr). It give the sector of the firm according to ICB categories (see below),

Country where the firm's headquarters is located (guo_ctry in Table orb_guo_corr),

Country code where the firm's headquartes is located (guo_ctrycode in Table orb_guo_corr) following the international two letter country code (ISO alpha-2),

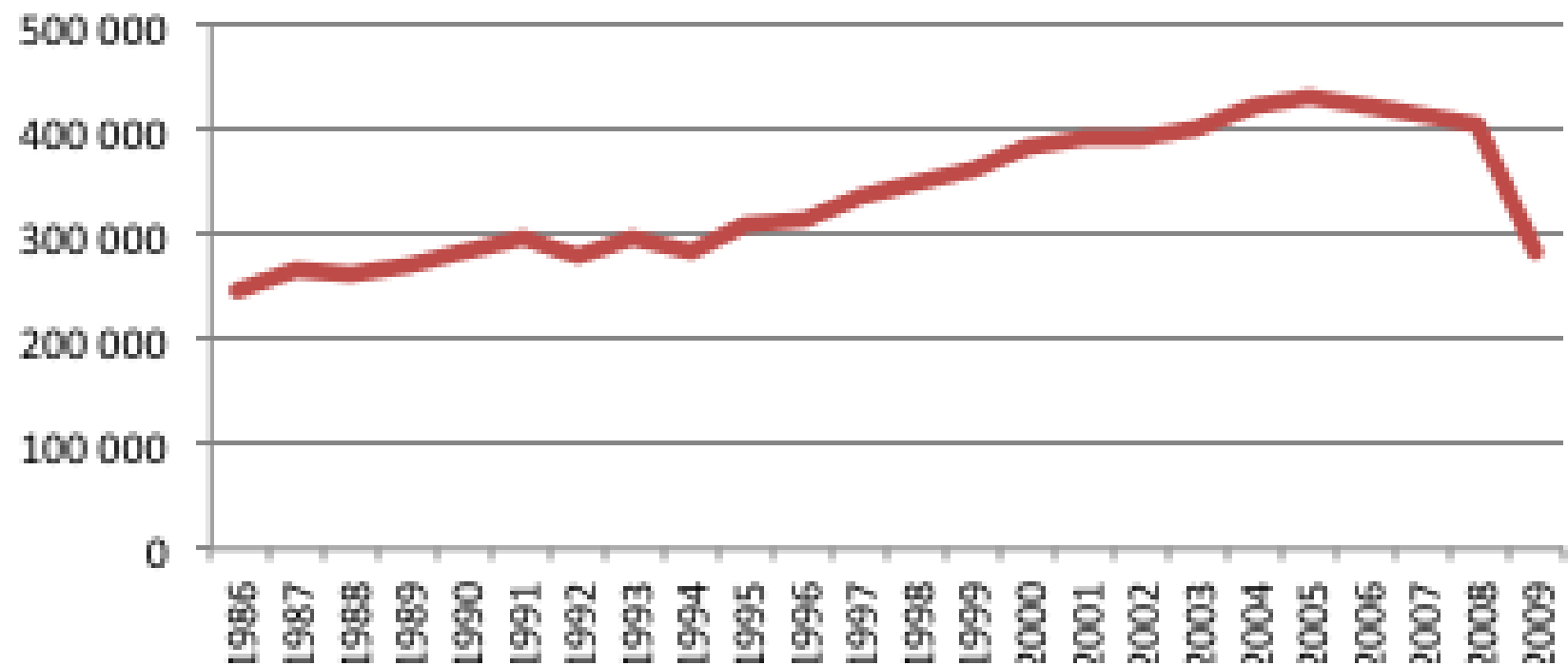
Standard Industrial Classification (SIC) codes of the firms (guo_sic_core_code and guo_sic_core in Table orb_guo_corr). It is the business classification codes that the U.S. government assigns to businesses. SIC coding is used primarily to classify a company's main industry and line of business.

http://www.ehow.com/facts_7277558_primary-sic-code_.html#ixzz33qksBG58

CIB data

- 2319 large firms (guo_id in Table orb_guo_cor)
- 2058 of them had applied for priority patents between 1986 and 2009
(guo_id in Table orb_guo_cor and firm_tls001_rappln_id)
- 16 224 135 applications of patents of invention
- 8 218 645 are priority patents
- 9 586 238 applicants
- 19 067 701 inventors

Number of priority patent applications



Continent	Number of firms	Number of priority patents
Africa	1	329
Asia	734	6 062 207
Europe	1024	995 002
Latin America and the Caribbean	11	2 740
Northern America	538	1 072 068
Oceania	11	3 640
Total	2319	8 135 986

Harmonized country name	Harmonized country code	Number of firms	Number of priority patents
JAPAN	JP	245	5 418 369
UNITED STATES	US	513	1 053 152
SOUTH KOREA	KR	18	492 731
GERMANY	DE	182	397 198
FRANCE	FR	109	152 648
NETHERLANDS	NL	49	98 262
UNITED KINGDOM	GB	260	89 416
TAIWAN	TW	41	75 198
SWITZERLAND	CH	41	73 733
CHINA	CN	80	60 965
SWEDEN	SE	77	51 140
FINLAND	FI	59	34 277
BERMUDA	BM	11	20 383
CANADA	CA	25	18 916
ITALY	IT	51	17 311
DENMARK	DK	43	15 783
BELGIUM	BE	39	14 161
INDIA	IN	326	7 220
NETHERLANDS ANTILLES	AN	1	6 755
CAYMAN ISLANDS	KY	5	6 433
AUSTRIA	AT	25	5 511
HONG KONG	HK	6	3 970
AUSTRALIA	AU	9	3 042
NORWAY	NO	8	2 895
ISRAEL	IL	10	2 714
SPAIN	ES	21	2 259
IRELAND	IE	11	2 167
LIECHTENSTEIN	LI	1	2 033
BRAZIL	BR	9	1 618
LUXEMBOURG	LU	5	1 119
PANAMA	PA	1	1 090
SINGAPORE	SG	5	999
HUNGARY	HU	2	743
NEW ZEALAND	NZ	2	598

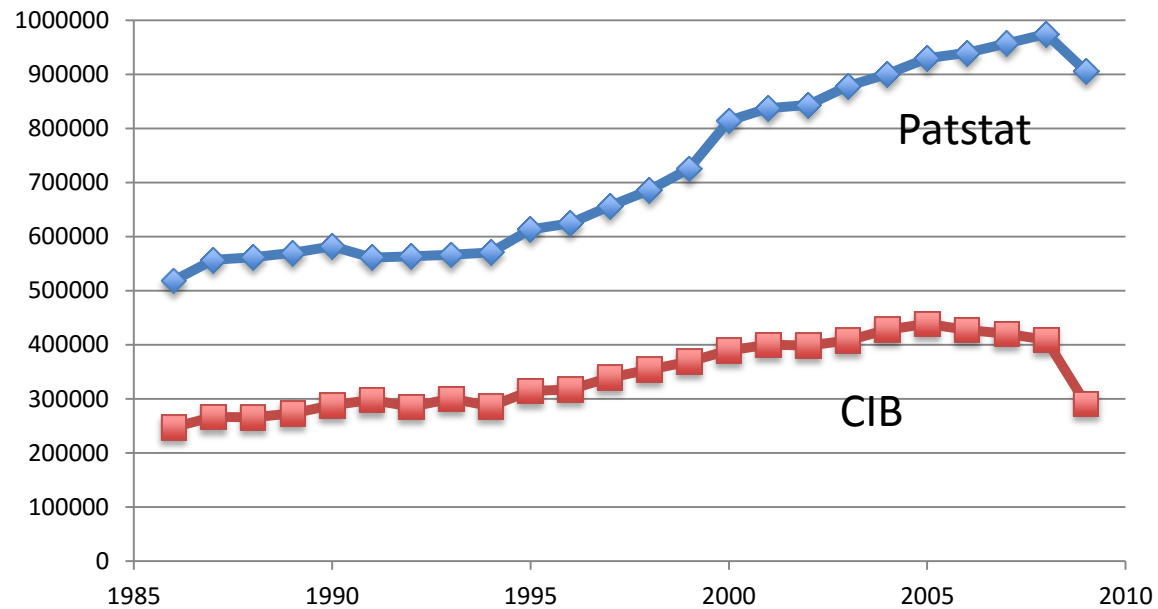
Country of the patent office (appln_auth)	Number of priority applications	Country of the patent office (appln_auth)	Number of priority applications	Country of the patent office (appln_auth)	Number of priority applications
JP	5 319 006	LU	683	CR	22
US	1 252 880	TR	589	TH	20
KR	488 898	DO	433	BX	18
DE	383 434	ID	419	TJ	14
EP	130 561	YU	355	GT	13
GB	117 300	HK	340	BA	10
CN	112 929	XH	336	MD	9
FR	102 821	PT	291	EE	7
TW	31 725	MY	268	MW	7
SE	23 992	CS	246	VE	7
IT	15 885	HR	230	MC	6
FI	15 452	EG	220	MT	6
AU	14 204	GR	193	PK	6
IN	11 592	CU	188	NI	5
CH	11 566	RO	183	VN	5
CA	8 515	SU	182	BD	4
NL	8 121	PH	156	SM	4
DK	7 314	MA	128	BH	2
AT	4 184	IS	105	BY	2
IE	4 074	PE	90	KP	2
BR	4 058	CL	77	KZ	2
NO	3 282	SI	72	MK	2
ES	3 278	SK	71	OM	2
CZ	3 112	BG	69	SY	2
IB	2 964	LV	53	TN	2
ZA	2 911	SV	47	AE	1
SG	2 794	AP	45	AM	1
EM	2 222	OA	44	AZ	1
HU	1 928	PA	42	CY	1
BE	1 615	LT	40	IR	1
IL	1 503	DZ	38	JO	1
RU	1 418	EC	38	LB	1
NZ	1 381	UA	31	LK	1
AR	1 028	GC	29	NG	1
MX	1 019	ZW	29	PY	1
PL	974	EA	26	SB	1

CIB data

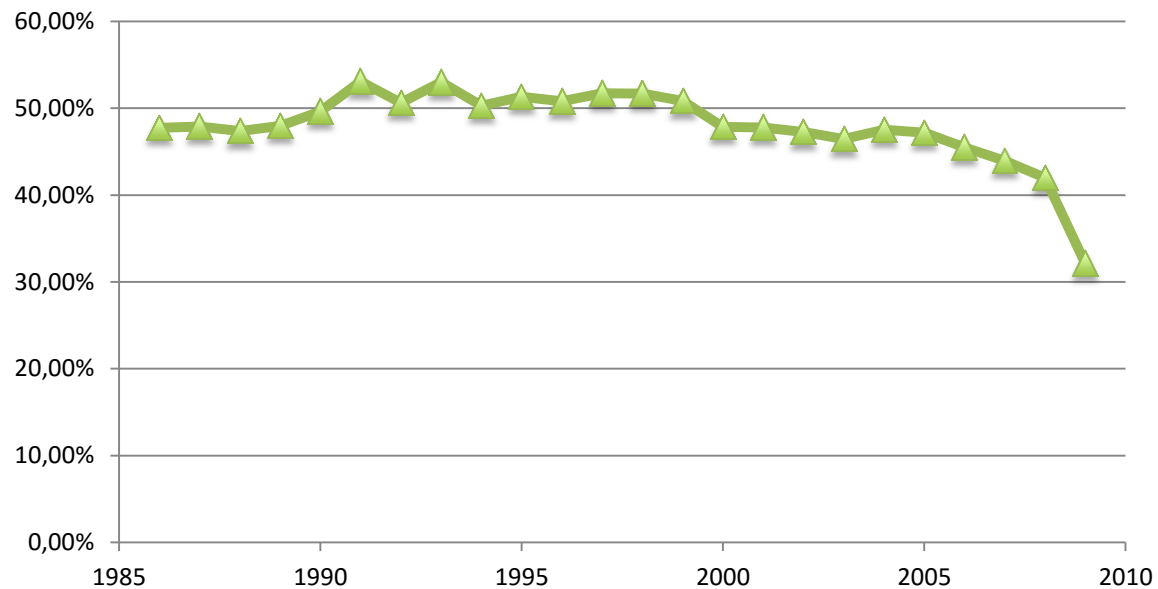
Industry	Nber of firms	Nber of first filings
Basic Materials	241	992 950
Consumer Goods	330	2 123 837
Consumer Services	81	105 594
Financials	58	19 392
Health Care	354	284 444
Industrials	596	2 172 644
Oil & Gas	52	84 868
Technology	532	2 261 313
Telecommunications	27	124 757
Utilities	48	56 755
Total	2319	8 226 554

Domain_code	Domain_name	Number of priority patent applications
TD01	Electrical engineering	3 886 482
TD02	Instruments	1 776 426
TD03	Chemistry	1 539 908
TD04	Mechanical engineering	2 262 804
TD05	Other fields	486 957

Nber of priority patents - CIB and Patstat



Priority patents - CIB/Patstat



Drawbacks in CIB

- Missing info on techno field (1,5%)
- Missing info inventors (even after enriching steps/propagating info)

Patents with no inventors reported : 110 000 (1,5 %)

Patents with partial info on inventors'address:

- ✓
- ✓ 30% of priority patents inventors have info on address, 20% for applicants
- ✓ 42% of priority patents inventors or applicants have info on the country

PB with JP inventors

WHAT CAN BE DONE WITH IT ?

- Studies linked to the output of R&D in large firms:
 - Internationalisation of inventions in large firms
 - Contribution of the large firms' R&D to the overall R&D in greentech

Internationalisation of R&D in large firms - 1

- Can we confirm the general dominant view assuming a growing trend in the internationalisation of technology creation?
- Does the “home-base-augmenting” strategy still dominate as observed in the 1990s?

Methods:

- Level of R&D internationalisation: share of patents with inventors located in a country different from the country of the large firm headquarters.
- Motivation for internationalisation: Comparing the Relative Technology Advantages (RTA) of firm in their home country and in inventor’s country compared to the world allows to define four internationalisation strategies: home-base-augmenting, home-base-exploiting, technology-seeking and market-seeking.

Corporate R&D internationalisation does not spread continuously in search of new markets and/or new competences and the continent attractiveness as hosting place for corporate R&D has evolved.

- At **world level**, the large firm **R&D internationalisation in 2003-2005 remains similar** to that observed one decade ago: 7% (and just over 20% when excluding Asian countries).
- Three diverging continental trends over time:
 - **Internationalisation level of US firms almost doubled** (17%)(but stays below EU firm level),
 - **Impressive growth in Asian firm patenting** but no significant increase of their internationalisation level (below 3% and centred on Asia),
 - **Refocusing of the inventive activities of European firms in** their home country in other European countries – Movement of ‘organisational consolidation’ (as emphasised by Gammeltoft, 2006).
- **BUT the patterns of internationalisation have widely changed in the decade:**
 - The role of **US as a host country has been halved** (from 45% to 22%) and their attractiveness for technology sourcing has declined,
 - The hosting **attractiveness of Europe is maintained** (45%). It is based on the reinforced technological attractiveness of European countries,
 - China has emerged as a major inventors’ location for international patents (20%) mostly for firms from Asia.

Market coverage of inventions and R&D location in large firms - 2

- Do the geographic patterns of the patent families, a proxy for their market coverage and thus for their patent value, depend on the R&D internationalisation (national vs continental or international inventions) for large multinational enterprises?

Methods:

- Level of R&D internationalisation: share of patents with inventors located in a country different from the country of the large firm headquarters.
- Filings of transnational priority patents in large national or regional patent offices: USPTO, large Asian patent offices (in Japan, Korea or China) for Asian market coverage. The geographic family pattern of the firm is given by its shares of patents taken in single large countries or combinations of countries or regions

- **High market value patents (covering US,EU,Asia)**

- US & JP firms: 18% of corporate patents portfolios
- EU firms: 13% (from 10% (DE firms) to 22% (FR firms))

- **Effect of internationalisation**

US firms: - higher market value of national inventions

JP firms: - higher market value of intercontinental inventions (US inventors)
 - lower market value of continental inventions

EU firms: - higher market value of international inventions (US inventors)
 - lower market value of continental inventions (except in France)

Commitment of R&D in large firms to greentech

- Qualification of the trends in the contribution of large firms to the global greentech innovative production across countries from the pre-Kyoto to the post-Kyoto periods
- Method:
 - Delineation of energy greentech patents using a classification set up by EPO in 2010 (Y02E)
 - Simple indicators:
 - share of firms in greentech,
 - share of corporate greentech patents
 - firm specialisation in greentech

Evolutions from the pre- to the post Kyoto period

- Diversification of corporate patent portfolios in favour of green technologies is a global trend shared worldwide.
- The patent portfolios of firms became greener in the post-Kyoto period. However its taint remained “light green” in western countries as it turned comparatively to “intense green” in Japan.
- On average, European firms were more prone to diversification than US ones but they still lag far behind Japanese firms that strongly diversified much earlier.
- Compared to Japan, highly specialized in energy greentech and still reinforcing it in the post Kyoto period, EU firms and even more US firms are losing ground in the battle for green from the pre- to the post- Kyoto period.
- This apparent relative decreasing specialization of US and EU firms has to be considered with care. It results mainly from the decommitment from Nuclear energy and Combustion in many (but not all) countries. Signals of an early commitment to Renewable energy and Energy storage is evident in most western countries in the post Kyoto period. Its intensity is more pronounced in the US compared to EU. However EU mixes diverging trends and small EU countries adapt faster.

WHAT IS NEXT ?

A new CIB DB: CIB 2 (end of 2016)

Using the methodology that is now stabilized we are expanding the CIB to a larger set of firms (4500 firms)

Actualisation of the firm perimeter (2014)

Actualisation of the Patstat version (Patstat 2014) → Applications up to 2011.

THAT' S ALL

NEXT STEP: TEST IT TOMORROW