European
IP Helpdesk

ec.europa.eu/ip-helpdesk

European IP Helpdesk

Stay ahead of the innovation game.

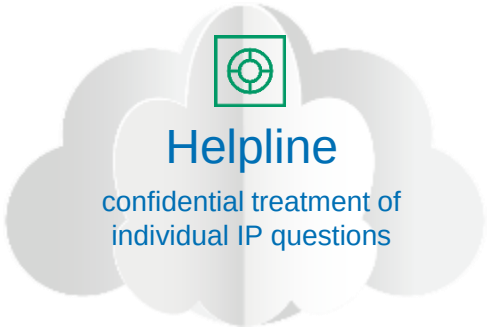
IP for future and emerging technologies

20.10.2023

European IP Helpdesk

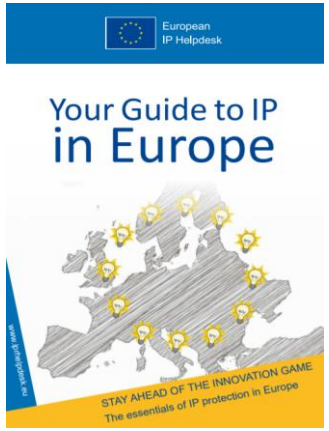
- Service initiative of the European Commission
- Addressing **current and potential beneficiaries of EU-funded projects, researchers and EU SMEs**
- Free-of-charge first-line support on intellectual property (IP)
- Hands-on IP and innovation management support
- International pool of IP experts from various thematic fields
- Unique cooperation scheme with the Enterprise Europe Network: 44 ambassadors from 27 EU countries

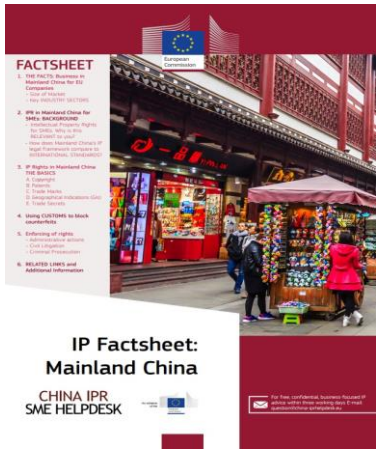
ec.europa.eu/ip-helpdesk

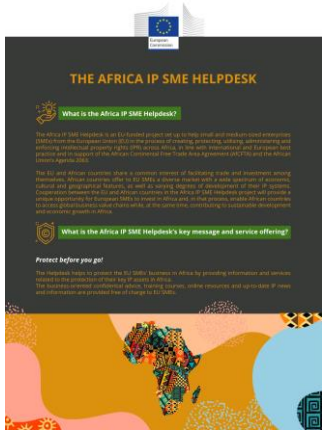


The EC IP Helpdesks

EC IP (SME) Helpdesk Hub – Gateway to Information







- E-learning modules & more
- Guides / Topic, country, sector-specific factsheets / Infographics
- Case studies

European
IP Helpdesk

ec.europa.eu/ip-helpdesk

European IP Helpdesk Training Calendar

19 OCT 2023 — Training and workshops
EU - Webinar: IP for Future and Emerging Technologies
Live streaming available

24 OCT 2023 — Training and workshops
EU - Webinar EPO Coop: Patent protection for EU funding beneficiaries - Digital communication
Live streaming available

25 OCT 2023 — Training and workshops
EU - Webinar: IP in Biotechnology
Live streaming available

26-27 OCT 2023 — Info days
Chem-Match: Corporates Meet Startups 2023 "Green & Digital"
Frankfurt am Main, Germany

02 NOV 2023 — Training and workshops
EU - Webinar: IPR and Software
Live streaming available

06 NOV 2023 — Training and workshops
EU - Webinar: IP in Business collaborations for SMEs and Start-ups
Live streaming available

07 NOV 2023 — Training and workshops
EU - Webinar: IP in EU funded projects with a special focus on MSCA
Live streaming available

13 NOV 2023 — Training and workshops
EU - Webinar & Horizon Results Platform: IP in Business Collaboration for SMEs and Start UPs
Live streaming available

14 NOV 2023 — Training and workshops
EU - Webinar: Effective IP and Outreach Strategies Help Increase the Impact of Research and Innovation
Live streaming available

15 NOV 2023 — Training and workshops
EU - Webinar EPO Coop: Patent protection for EU funding beneficiaries - Biotechnology
Live streaming available

16 NOV 2023 — Training and workshops
EU - Webinar: IP Management in ICT Projects
Live streaming available

21 NOV 2023 — Training and workshops
EU - Webinar:IP Commercialisation & Licensing - Advanced
Live streaming available

2023

Registration: www.ec.europa.eu/ip-helpdesk

Ambassador Scheme

- **Cooperation scheme** with the Enterprise Europe Network (EEN): 44 ambassadors – 27 countries
- **Building IP capacities** among European SMEs
- **Overcoming language barriers**
- Making the topic **more accessible**
- Exchange and feedback from ambassadors on **needs of SMEs**
- Local **awareness** and **training events**

Thank you!

- www.ec.europa.eu/ip-helpdesk

- helpline@iprhelpdesk.eu
- training@iprhelpdesk.eu

- Twitter @iprhelpdesk

- LinkedIn /european-ipr-helpdesk

About me

Consultant; bring worlds of STEMM and IP together.
EUIPO WIPO IP and SDGs
Innovation and IP Management Lab (*Cantab*)
Looooooooooooong time at European Patent Office (NL, AT)
Research manager, internet services manager, Espacenet, PATLIB, CARDS, RIPP, SLING Programmes (EU), ASEAN (EU), KSA EG SY ID (WIPO), IT manager, Patent examiner (electron and ion optics),
Royal Society of Chemistry, Institute of Physics, Science Council (UK),
HM Govt, X-ray, electron, laser beam microanalysis, PVD Coatings
Post Doc. Carbon Fibres (*Surrey* UK)
PhD Neutron Science (*Exon UK*) Harwell (UK), Rutherford Appleton (UK), ILL Grenoble (FR),
BSc (Physical) Chemistry, Maths, Physics (*Exon UK*)

Roadmap

- Some definitions – what are we talking about?
- Patent data and analytics
- Finding future and emerging technologies
- Quantum technology
- Graphene
- Blockchain

Definitions

- **Disruptive** [A technology] that creates a *new* market by providing a different set of values, which ultimately (and unexpectedly) *overtakes an existing market*
- **Emerging** technologies are those whose development, or practical applications are still largely unrealized. They are emerging from a background of nonexistence or obscurity. Emerging technologies are often perceived as capable of *changing the status quo.*

S - curve

Wikimedia commons

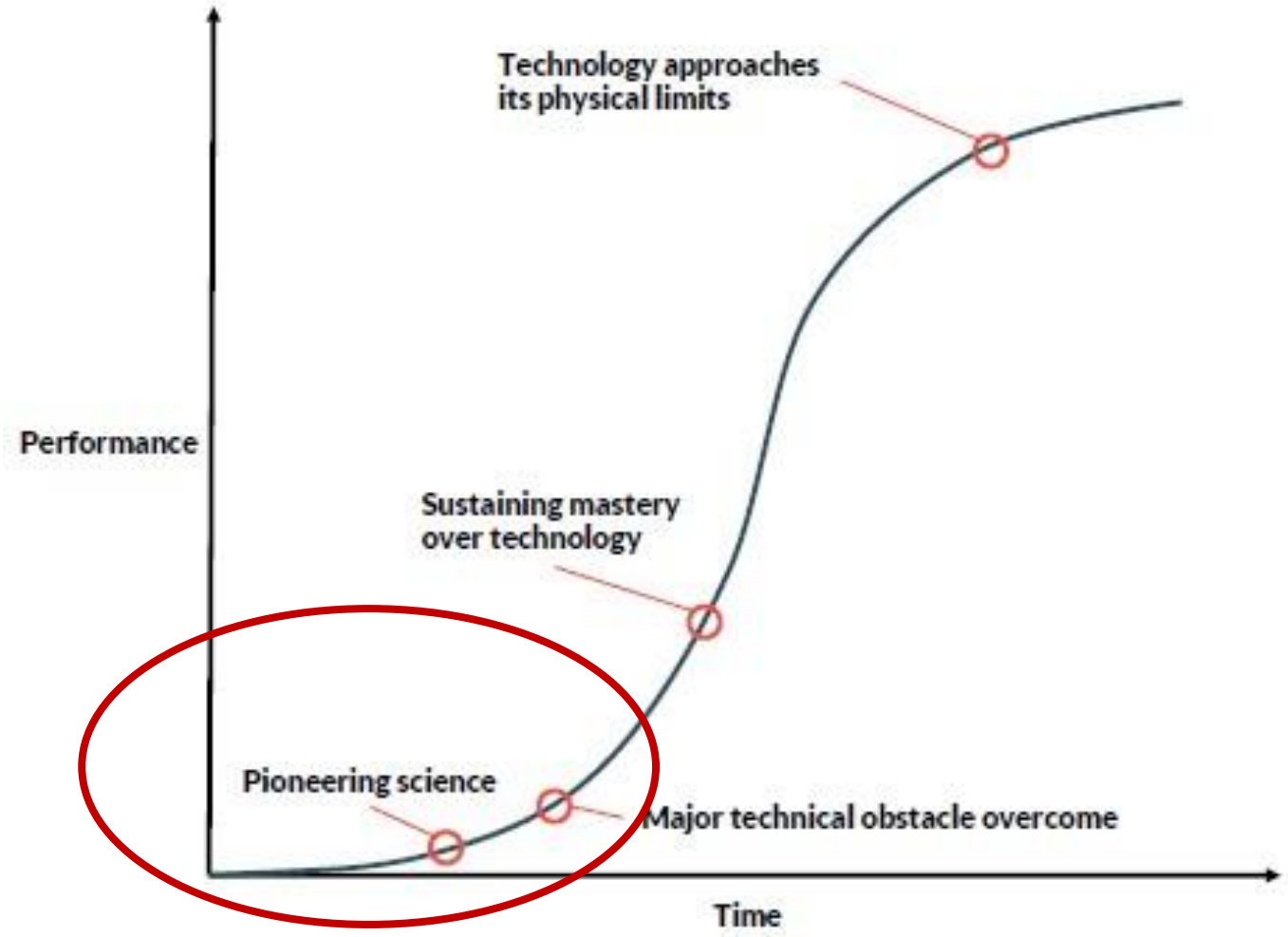
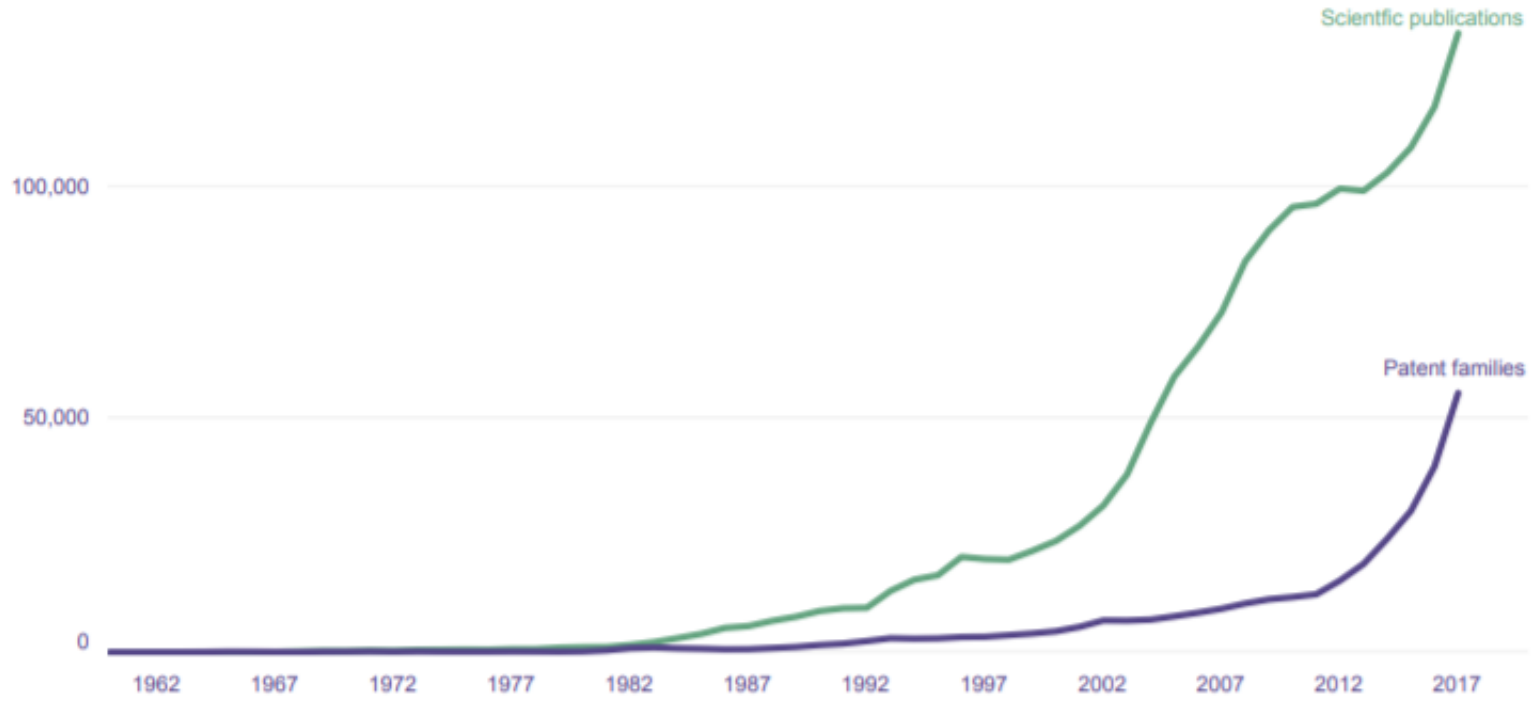


Figure 3.1. AI patent families and scientific publications by earliest publication year

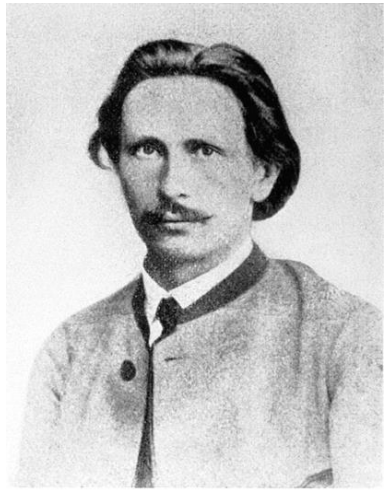
AI patent families grew by an average of 28 percent and scientific publications by 5.6 percent annually between 2012 and 2017



Source WIPO Technology Trends 2019 – Artificial Intelligence

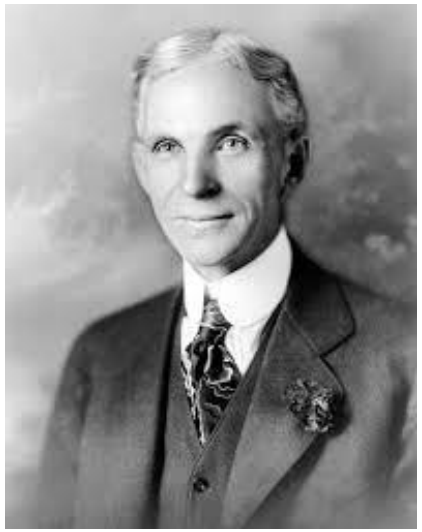
Bertha Ringer

https://en.wikipedia.org/wiki/Bertha_Benz



Carl Benz

Henry Ford



No 1

Model T

Images: wikipedia

Image: wikipedia

Camille Janetzy La Jamais Contente > 100km/h

Patented Oct. 6, 1942 2,297,691

UNITED STATES PATENT OFFICE

2,297,691

ELECTROPHOTOGRAPHY

Chester F. Carlson, Jackson Heights, N. Y.

Application April 4, 1939, Serial No. 265,925

27 Claims. (Cl. 95—5)

This invention relates to photography.

An object of the invention is to improve methods of photography and to provide improved means and devices for use in photography.

Other objects of the invention will be apparent from the following description and accompanying drawing taken in connection with the appended claims.

The invention comprises the features of construction, combination of elements, arrangement of parts, and methods of manufacture and operation referred to above or which will be brought out and exemplified in the disclosure hereinafter set forth, including the illustration in the drawing.

In the drawing:

Figure 1 is a section through a photographic plate according to my invention and illustrates a preferred method of applying an electric charge to it preparatory to photographic exposure;

Figures 2, 2a and 2b illustrate three methods of photographically exposing the plate;

Figures 3 and 4 show a method of developing the electrostatic latent image produced on the plate by the preceding steps;

Figure 5 shows a method of transferring the image to a sheet of suitable material such as paper;

Figures 6 and 7 illustrate methods of fixing the image onto the sheet;

Figure 8 illustrates a modified means for charging and exposing the photographic plate;

Figure 9 shows another method of developing the image; and

Figure 10 is an enlargement of a half-tone produced by the process.

A feature of the present invention resides in the use of photoelectric or photoconductive materials for photographic purposes. In its preferred form the invention involves the use of materials which are insulators in the dark but which become partial conductors when illuminated. These materials respond to light, being slightly conductive whenever they are illuminated and again becoming insulating when the light is cut off. They can be called photoconductive insulating materials.

In carrying out the invention the photoconductive insulating material is used to control electric charges in such a way as to produce an electrostatic latent image (so named by its analogy to the ordinary photographic latent image). The electrostatic latent image is then developed to make a visible picture as will be more fully described in the following detailed specification.

While a preferred embodiment of the invention is described herein, it is contemplated that considerable variation may be made in the method of procedure and the construction of parts without departing from the spirit of the invention. In the following description and in the claims, parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring to the drawing Figure 1 shows a cross-section of a photographic plate 20 according to the invention comprising a thin layer 21 of photoconductive insulating material bonded to a metal plate 22.

Any one of a variety of photoconductive insulating materials may be used for layer 21. Following are a few of the materials which I have found suitable: (1) sulfur, (2) anthracene, (3) anthraquinone, (4) melted mixtures of sulfur and selenium with the sulfur predominating, (5) melted mixtures of sulfur with up to a few percent of anthracene, (6) the compound formed by heating and melting together sulfur and anthracene in proportions of about 1 part sulfur to three parts anthracene by weight, the heating being continued until reaction is complete, (7) linseed oil boiled with sulfur and dried in a thin layer.

Other photoconductive materials having insulating characteristics in the dark may also be used.

The plate 22 may be of almost any suitable metal which does not deleteriously react with the photoconductor used. Zinc or aluminum plates are suitable for sulfur and anthracene layers. Brass may also be used. The surface of the metal may be etched to improve the adherence of the photoconductive layer.

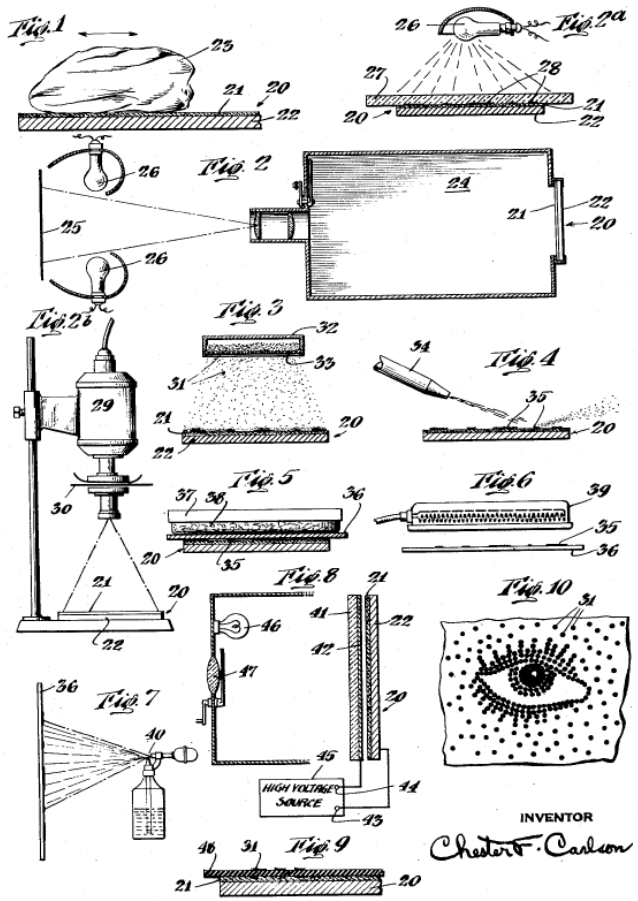
Sulfur coated plates may be prepared by placing a few crystals of pure sulfur onto the etched surface of the metal plate and heating the plate until the sulfur melts, then flowing the sulfur uniformly over the surface of the plate and allowing any excess to run off, and cooling the plate to solidify the layer. If desired the layer can be made thinner and smoothed with fine emery paper after it has solidified, finishing with a polishing powder such as chalk.

Anthracene and anthraquinone coated plates may be made by melting the material onto an etched metal plate and quickly cooling the plate in cold water, whereby a thin glossy layer is obtained on the plate. However, due to the strong tendency of these materials to sublime or evapo-

Oct. 6, 1942. C. F. CARLSON 2,297,691

ELECTROPHOTOGRAPHY

Filed April 4, 1939



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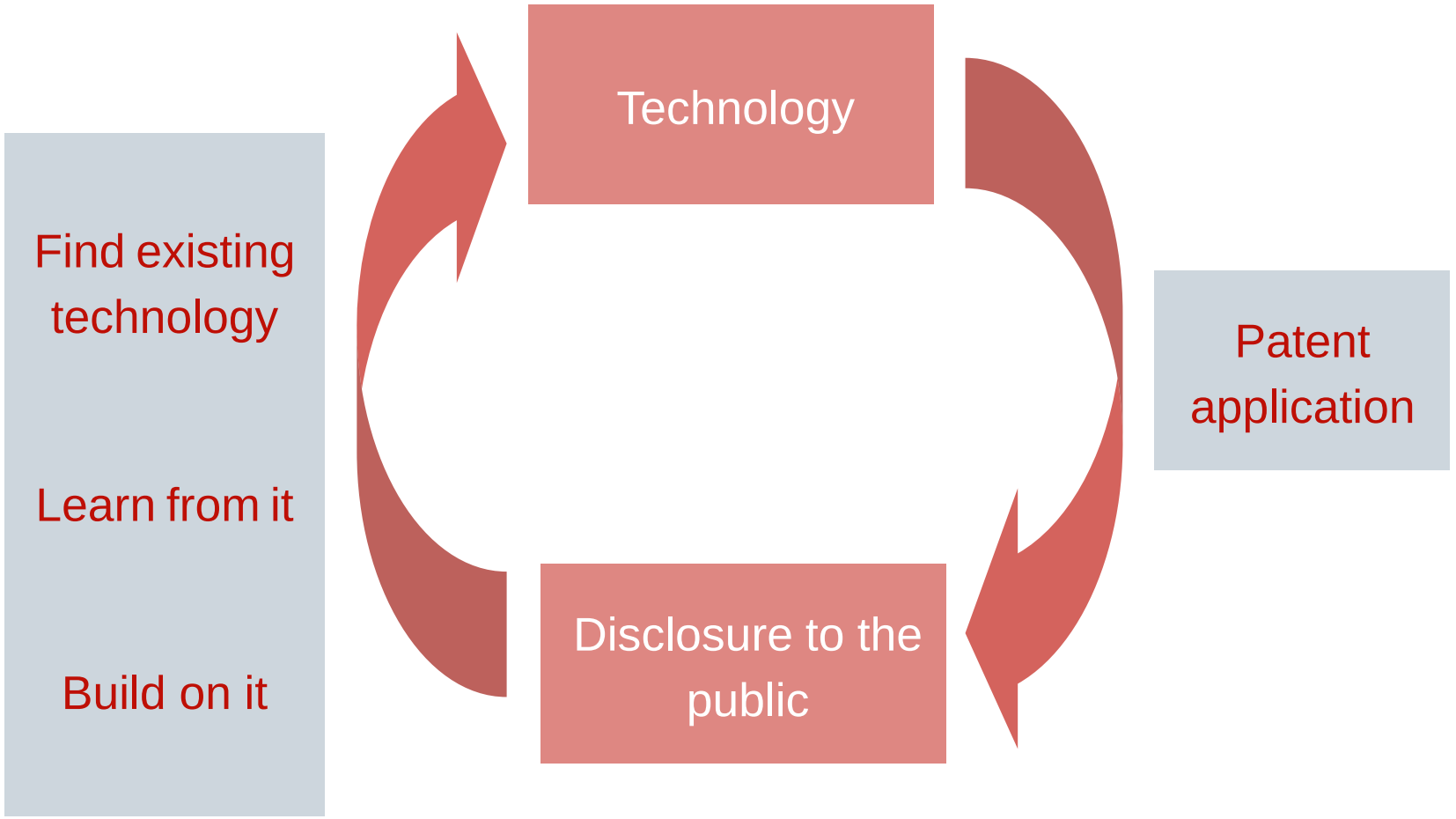
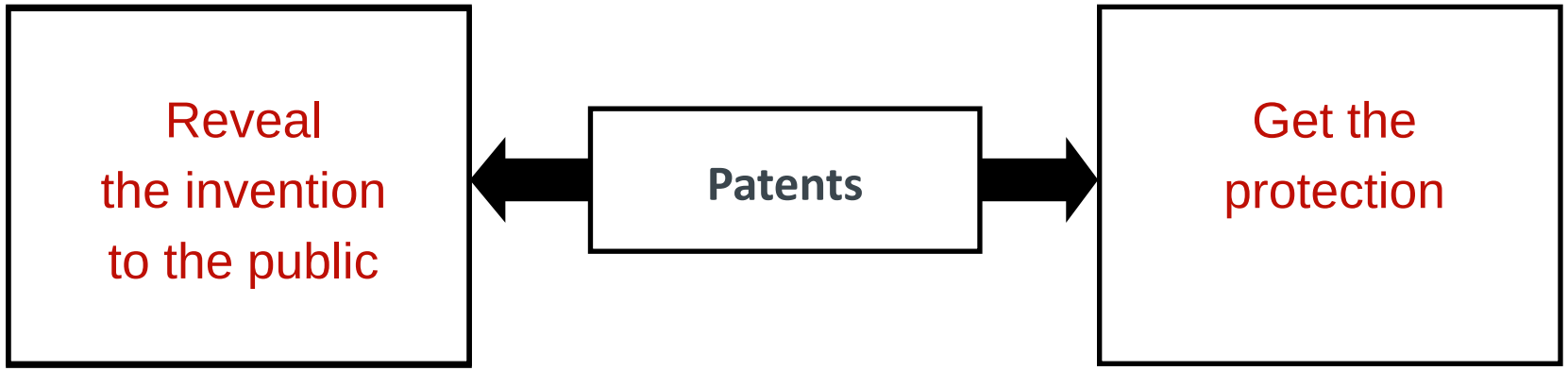

Find existing technology
Learn from it
Build on it
Technology
Disclosure to the public
Patent application


Reveal
the invention
to the public
Patents
Get the
protection

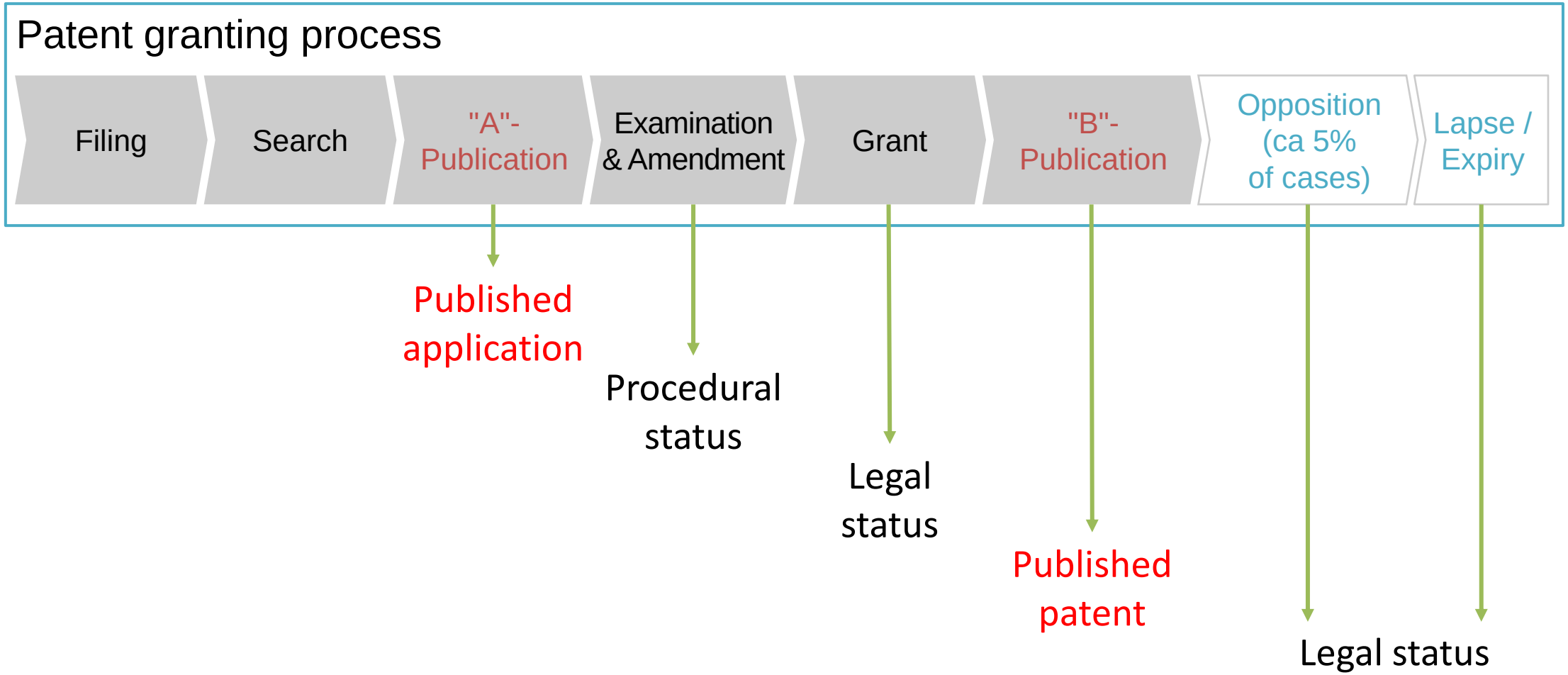
Patentability

Patents are granted for inventions in all fields of technology

To be patentable, inventions must

- be **new**
- involve an **inventive step**
- be **industrially applicable**

They must relate to a product, process, apparatus or use.


Patent granting process
Filing
Search
"A"- Publication
Examination & Amendment
Grant
"B"- Publication
Opposition (ca 5% of cases)
Lapse / Expiry
Published application
Procedural status
Legal status
Published patent
Legal status

Why patent data?

- indicators of innovation
- measure inventive activity such as scope, intensity, collaboration and impact
- all technology sectors
- individuals (inventors),
- institutions (applicants),
- countries and regions.
- source of data on innovation trends in science and technology.

How can we use patent information to analyse a technological field?

	Applicants	Inventors	Publication Year	Priority Country	Classes
Applicants	Collaboration between organisations	Where are the researchers working	Evolution of filing activity	Home market or most important market	Key technological areas of applicants
Inventors		Collaboration between researchers / inventors	Evolution of inventors patenting activity	Inventors country of origin	Research fields of the inventors
Publication Year			Evolution of the activity per country	Evolution of country patent output	Evolution of technology sector
Priority Country				Collaboration between countries	Key technological areas of countries
Classes					Relationships between technological domains

USPs

- EPO examiner input
- CPC classifications
- Family data
- Citation data
- EPO tools (Espacenet GPI Patstat....)
- 3rd Party tools – EPO data

- Patent analysis
- Idea (hot topics) Project definition

- Literature search
- Validation and search strategy (Examiner)

- Data set creation
- Data cleaning
- Data extraction
- Visualisation and reporting

Wikimedia commons

Keyword Type	Keyword	Truncation/ Synonyms / Name Variations	PRELIMINARY RESULTS (Patent families): Search in (TI/AB/CLAIMS) and priority 2008+ in combination with IPC & CPC list	PRELIMINARY RESULTS (Patent families): Search in (TI/AB) and priority 2008+ in combination with IPC & CPC list	Comments
Primary	BLOCKCHAIN	(BLOCKCHAIN+ OR BLOCK-CHAIN+ OR CHAINE-DE-BLOC+)	4000	3224	relevant results
Secondary	SMART CONTRACT	SMART-CONTRACT+ OR SMARTCONTRACT+	473	245	relevant results
Secondary	CRYPTO CURRENCY	CRYPTOCURRENC+ OR CRYPTO-CURRENC+ OR CRYPTOGRAPHIC-CURRENC+	339	185	relevant results
Secondary	BITCOIN	BITCOIN+ OR BIT-COIN+	326	160	relevant results
Secondary	DISTRIBUTED LEDGER	DISTRIBUTED-LEDGER	266	185	relevant results
Secondary	PROOF OF WORK	PROOF-OF-WORK	112	44	relevant results
Secondary	PUBLIC LEDGER	PUBLIC-LEDGER	65	20	relevant results
Secondary	CROSS CHAIN	CROSS-CHAIN+	54	35	relevant results
Secondary	ETHEREUM	ETHEREUM	50	22	relevant results
Secondary	PROOF OF STAKE	PROOF-OF-STAKE	22	7	relevant results
Secondary	P2SH	PAY-TO-SCRIPT-HASH OR P2SH	16	1	relevant results
Secondary	PRIVATE LEDGER	PRIVATE-LEDGER	15	8	relevant results
Secondary	LITECOIN	LITECOIN OR LITE-COIN	13	2	relevant results
Secondary	HASH KETTE	HASH-KETTE+	9	2	relevant results
Secondary	KEYLESS SIGNATURES INFRASTRUCTURE	KEYLESS-SIGNATURE+-INFRASTRUCTURE+	8	1	relevant results
Secondary	DOGECOIN	DOGECOIN OR DOGE-COIN	6	1	relevant results
Secondary	HASH CASH	HASH-CASH OR HASHCASH	3	0	relevant results
Secondary	ZEROCASH	ZEROCASH OR ZCASH	2	0	relevant results
Secondary	NON-KEY SIGNATURE INFRASTRUCTURE	NON-KEY-SIGNATURE+-INFRASTRUCTURE+	1	1	relevant results
Secondary	FACTOM	FACTOM	1	1	relevant results

Roadmap

- Some definitions – what are we talking about?
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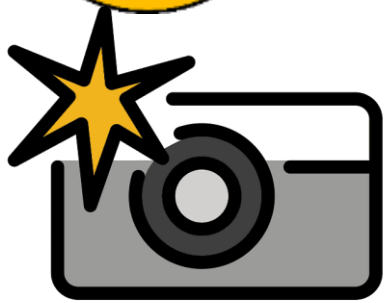
Not predictions

synthesis of past

snapshot of present

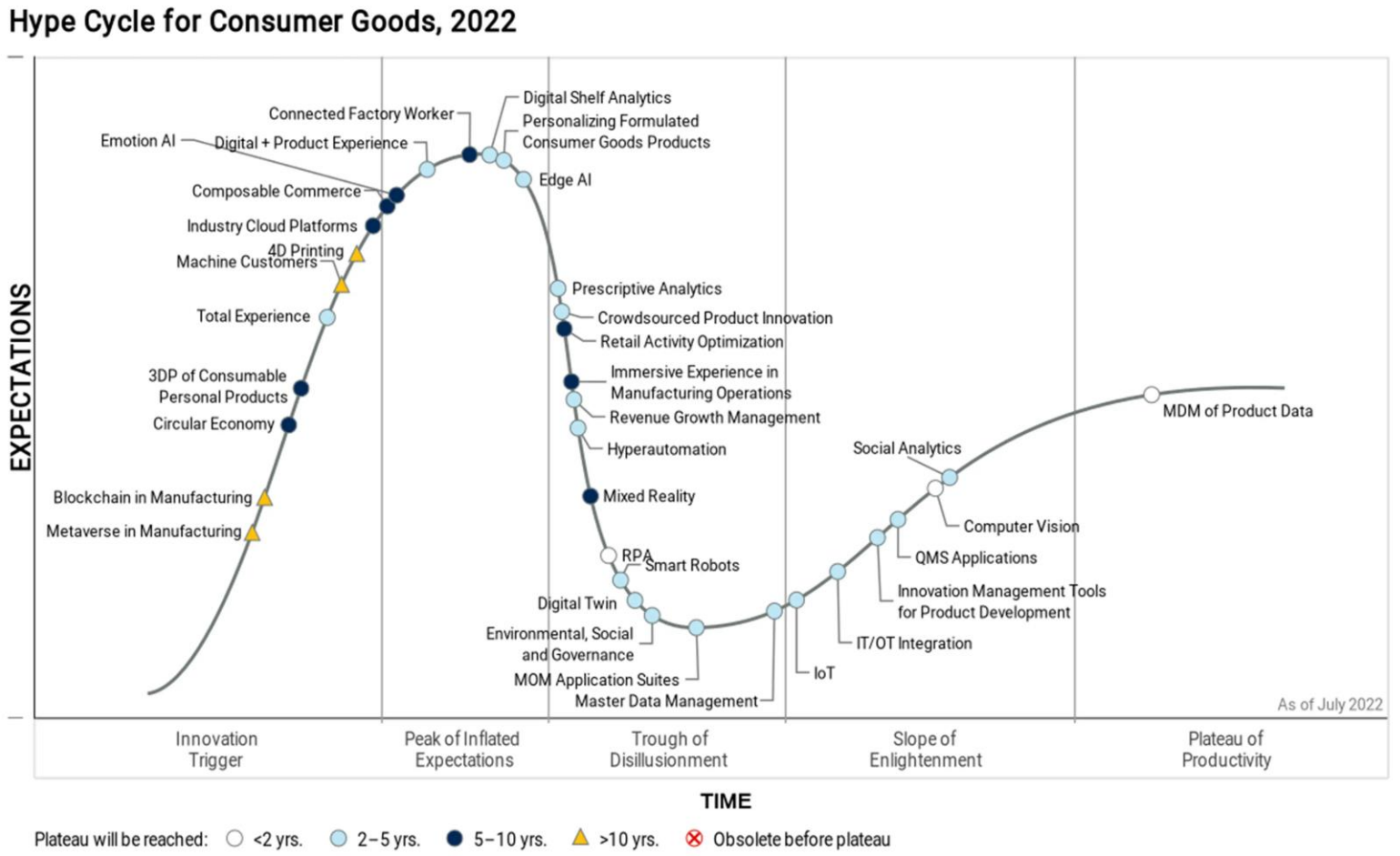
likely future ?



https://www.youtube.com/watch?v=w77zPAtVTuI

https://www.youtube.com/watch?v=w77zPAtVTuI

Figure 1: Hype Cycle for Consumer Goods, 2022



Source: Gartner (July 2022)

https://ec.europa.eu/info/sites/info/files/research_and_innovation/knowledge_publications_tools_and_data/documents/ec_rtd_radical-innovation_poster_052019.pdf

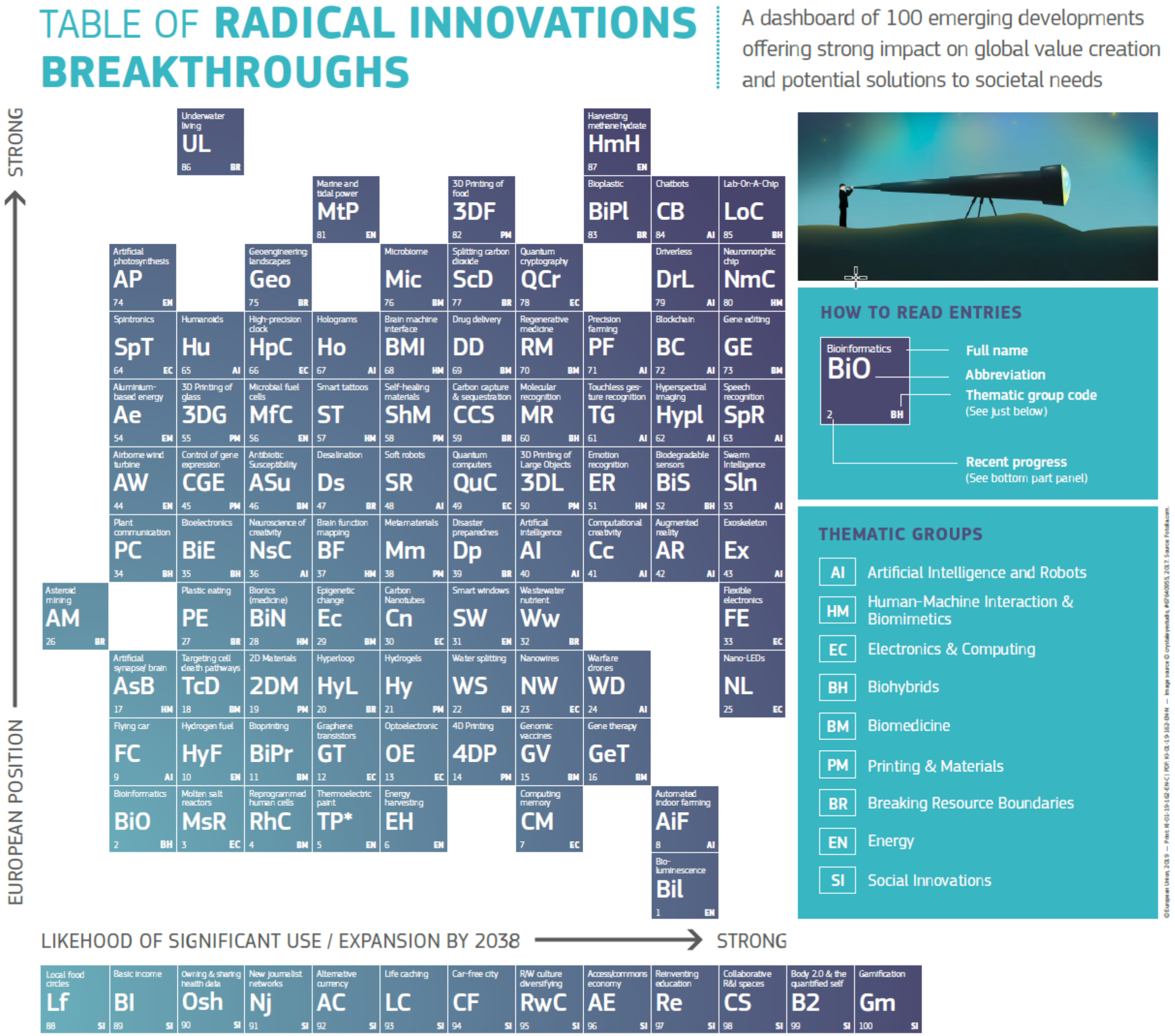


TABLE OF RADICAL INNOVATIONS BREAKTHROUGHS
A dashboard of 100 emerging developments offering strong impact on global value creation and potential solutions to societal needs
STRONG
EUROPEAN POSITION
LIKEHOOD OF SIGNIFICANT USE / EXPANSION BY 2038
STRONG
Underwater living UL 86 BR
Harvesting methane hydrate HmH 87 EN
Marine and tidal power MtP 81 EN
3D Printing of food 3DF 82 PM
Bioplastic BiPl 83 BR
Chatbots CB 84 AI
Lab-On-A-Chip LoC 85 BH
Artificial photosynthesis AP 74 EN
Geoengineering landscapes Geo 75 BR
Microbiome Mic 76 BM
Splitting carbon dioxide ScD 77 BR
Quantum cryptography QCr 78 EC
Driverless DrL 79 AI
Neuromorphic chip NmC 80 HM
Spintronics SpT 64 EC
Humanoids Hu 65 AI
High-precision clock HpC 66 EC
Holograms Ho 67 AI
Brain machine interface BMI 68 HM
Drug delivery DD 69 BM
Regenerative medicine RM 70 BM
Precision farming PF 71 AI
Blockchain BC 72 AI
Gene editing GE 73 BM
Aluminium-based energy Ae 54 EN
3D Printing of glass 3DG 55 PM
Microbial fuel cells MfC 56 EN
Smart tattoos ST 57 HM
Self-healing materials ShM 58 PM
Carbon capture & sequestration CCS 59 BR
Molecular recognition MR 60 BH
Touchless gesture recognition TG 61 AI
Hyperspectral imaging Hypl 62 AI
Speech recognition SpR 63 AI
Airborne wind turbine AW 44 EN
Control of gene expression CGE 45 PM
Antibiotic Susceptibility ASu 46 BM
Desalination Ds 47 BR
Soft robots SR 48 AI
Quantum computers QuC 49 EC
3D Printing of Large Objects 3DL 50 PM
Emotion recognition ER 51 HM
Biodegradable sensors BiS 52 BH
Swarm Intelligence Sln 53 AI
Plant communication PC 34 BH
Bioelectronics BiE 35 BH
Neuroscience of creativity NsC 36 AI
Brain function mapping BF 37 HM
Metamaterials Mm 38 PM
Disaster preparedness Dp 39 BR
Artificial intelligence AI 40 AI
Computational creativity Cc 41 AI
Augmented reality AR 42 AI
Exoskeleton Ex 43 AI
Asteroid mining AM 26 BR
Plastic eating PE 27 BR
Bionics (medicine) BiN 28 HM
Epigenetic change Ec 29 BM
Carbon Nanotubes Cn 30 EC
Smart windows SW 31 EN
Wastewater nutrient Ww 32 BR
Flexible electronics FE 33 EC
Artificial synapse/ brain AsB 17 HM
Targeting cell death pathways TcD 18 BM
2D Materials 2DM 19 PM
Hyperloop HyL 20 BR
Hydrogels Hy 21 PM
Water splitting WS 22 EN
Nanowires NW 23 EC
Warfare drones WD 24 AI
Nano-LEDs NL 25 EC
Flying car FC 9 AI
Hydrogen fuel HyF 10 EN
Bioprinting BiPr 11 BM
Graphene transistors GT 12 EC
Optoelectronic OE 13 EC
4D Printing 4DP 14 PM
Genomic vaccines GV 15 BM
Gene therapy GeT 16 BM
Bioinformatics BiO 2 BH
Molten salt reactors MsR 3 EC
Reprogrammed human cells RhC 4 BM
Thermoelectric paint TP* 5 EN
Energy harvesting EH 6 EN
Computing memory CM 7 EC
Automated indoor farming AiF 8 AI
Bio-luminescence Bil 1 EN
HOW TO READ ENTRIES
Bioinformatics BiO 2 BH
Full name
Abbreviation
Thematic group code
(See just below)
Recent progress
(See bottom part panel)
THEMATIC GROUPS
AI Artificial Intelligence and Robots
HM Human-Machine Interaction & Biomimetics
EC Electronics & Computing
BH Biohybrids
BM Biomedicine
PM Printing & Materials
BR Breaking Resource Boundaries
EN Energy
SI Social Innovations
Local food circles Lf 88 SI
Basic income BI 89 SI
Owning & sharing health data Osh 90 SI
New journalist networks Nj 91 SI
Alternative currency AC 92 SI
Life caching LC 93 SI
Car-free city CF 94 SI
R/W culture diversifying RwC 95 SI
Access/commons economy AE 96 SI
Reinventing education Re 97 SI
Collaborative R&I spaces CS 98 SI
Body 2.0 & the quantified self B2 99 SI
Gamification Gm 100 SI

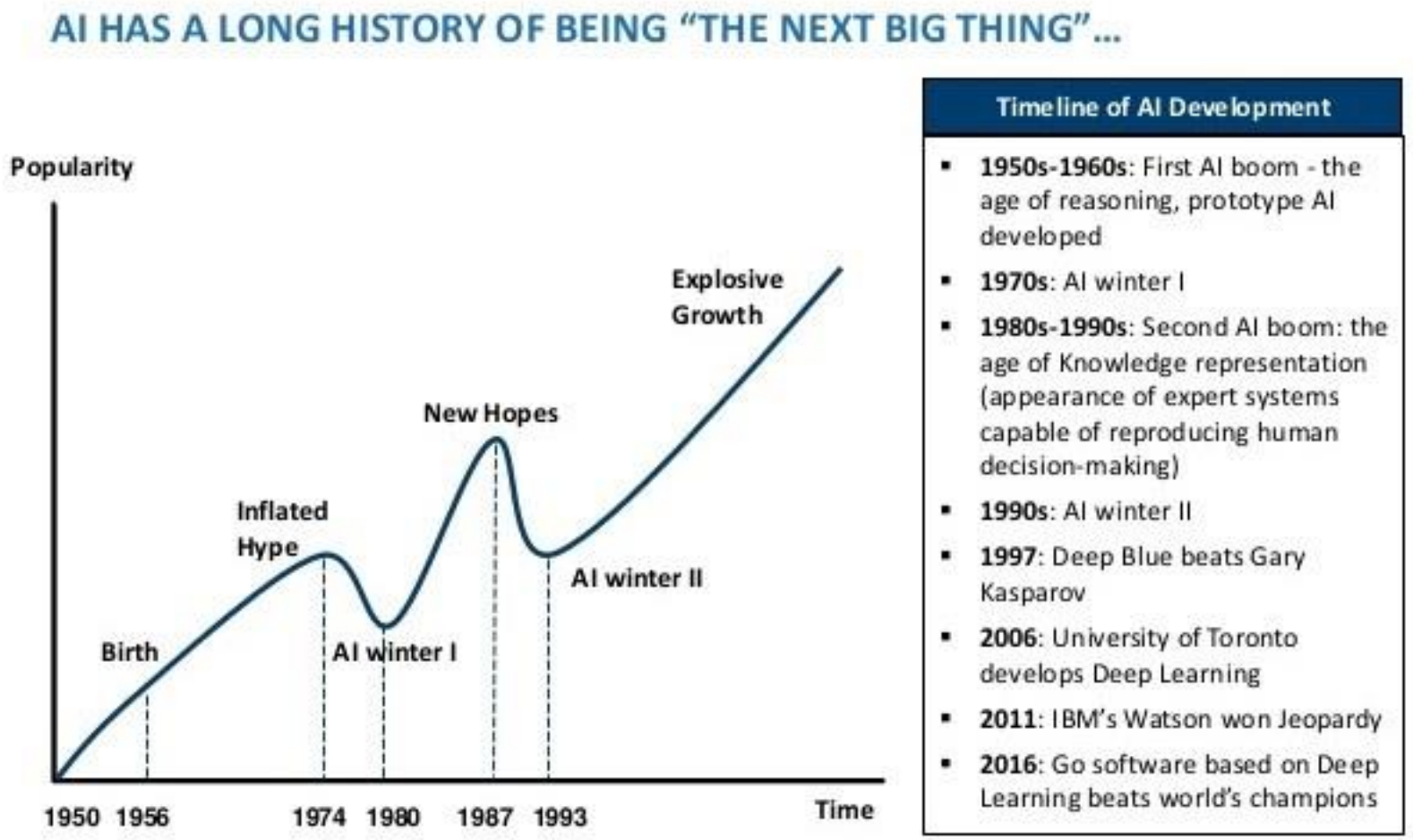

T10
10 Breakthrough Technologies 2023

MIT 10 breakthrough technologies 2023

1. CRISPr for cholesterol
2. AI for Images
3. RISC-V chips
4. Mass Market Military Drones
5. Abortion Pills by Telemedicine
6. Organs on Demand
7. Electric Vehicles
8. Data from James Webb Telescope
9. Ancient DNA Analysis
10. Battery recycling
11. Hydrogen powered planes

https://www.technologyreview.com/2023/01/09/1066394/10-breakthrough-technologies-2023/

AI winters



https://www.actuaries.digital/2018/09/05/history-of-ai-winters/

AI winters

My programming experience	
The experience job recruiters want	
The salary they give	

"development of a method

for genome editing"

The Nobel Prize in Chemistry 2020

© Nobel Media. Ill. Niklas Elmehed.

Emmanuelle Charpentier

Prize share: 1/2

© Nobel Media. Ill. Niklas Elmehed.

Jennifer A. Doudna

Prize share: 1/2

Citations – Hypothesis – to be tested retrospectively

CRISPr

NPL/patents > 1 early

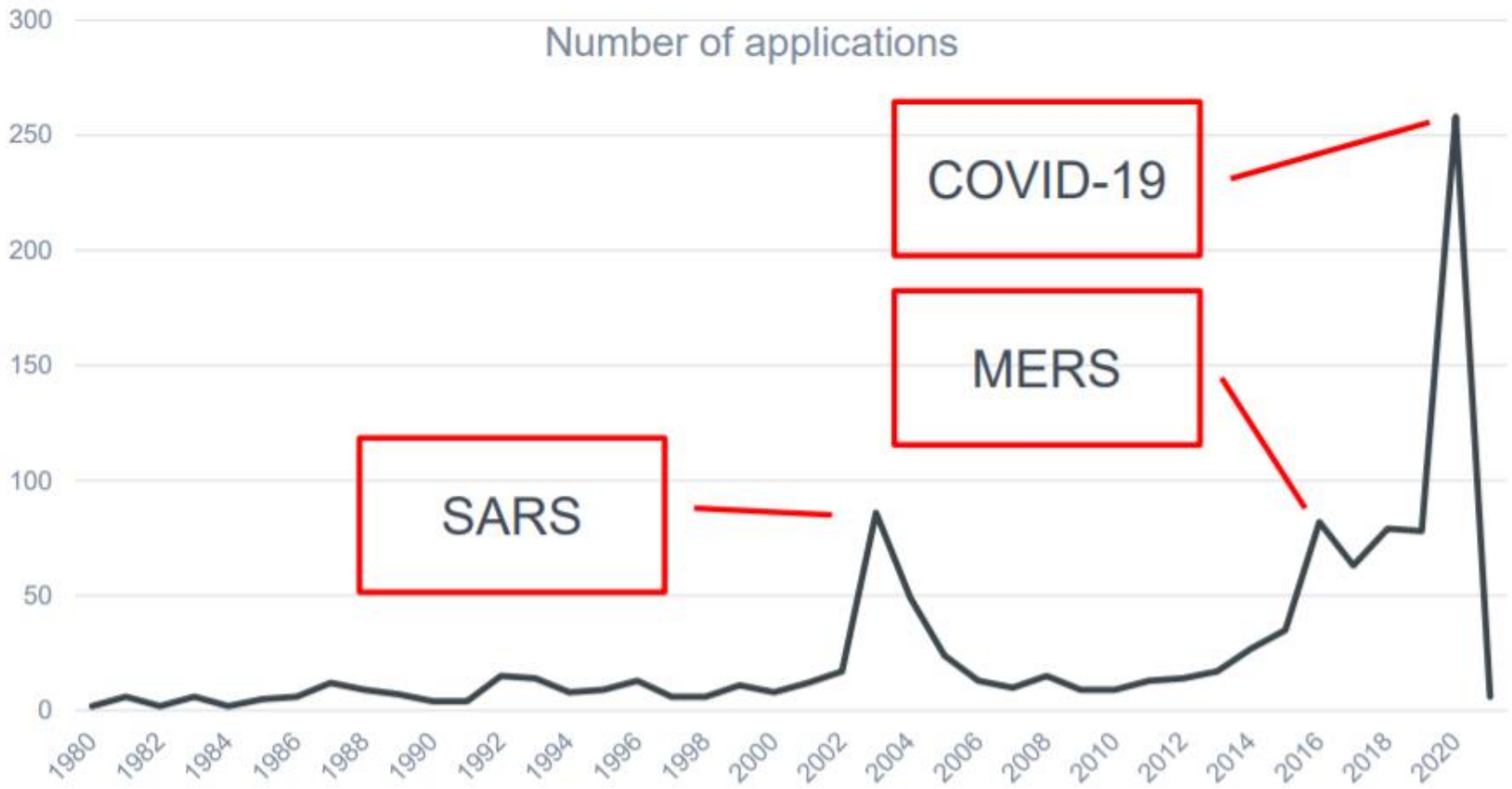
WO2007025097 (A3) 14 NPL 1 Patent

NPL/patents ~ 1 emerging

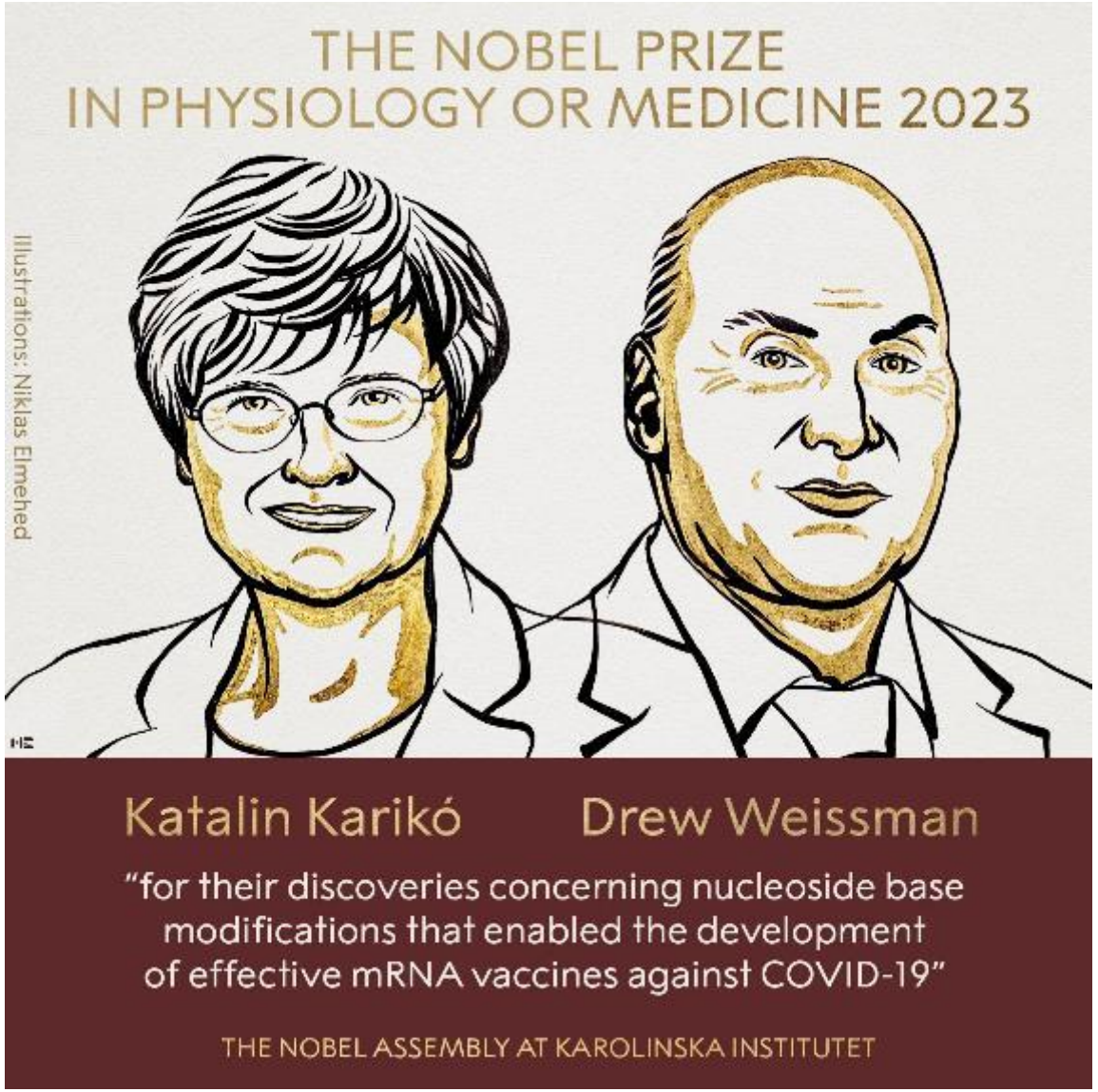
NPL/patents < 1 established

WO2020198675 (A1) 1 NPL 8 Patents

COVID-19 Timeline – Coronavirus Vaccines



Geert Boedt - EPO


THE NOBEL PRIZE
IN PHYSIOLOGY OR MEDICINE 2023
Illustrations: Niklas Elmehed
Katalin Karikó
Drew Weissman
"for their discoveries concerning nucleoside base modifications that enabled the development of effective mRNA vaccines against COVID-19"
THE NOBEL ASSEMBLY AT KAROLINSKA INSTITUTET

30 Industries Witnessing a Rise in Demand Due to COVID-19 - ResearchAndMarkets.com

RESEARCHANDMARKETS
THE WORLD'S LARGEST MARKET RESEARCH STORE

NEWS PROVIDED BY
Research and Markets →
Apr 06, 2020, 17:45 ET

SHARE THIS ARTICLE

DUBLIN, April 6, 2020 /PRNewswire/ -- COVID-19 is affecting the future of your industry. The pandemic, and the quarantine measures put in place to control it, have transformed the global economy in a matter of weeks. Although, many industries have been disrupted by the pandemic, many others are seeing a growth in demand.

As the world's largest online market research store, we have identified thirty areas seeing growth and investment opportunities:

https://www.prnewswire.com/news-releases/30-industries-witnessing-a-rise-in-demand-due-to-covid-19---researchandmarketscom-301036084.html

Roadmap

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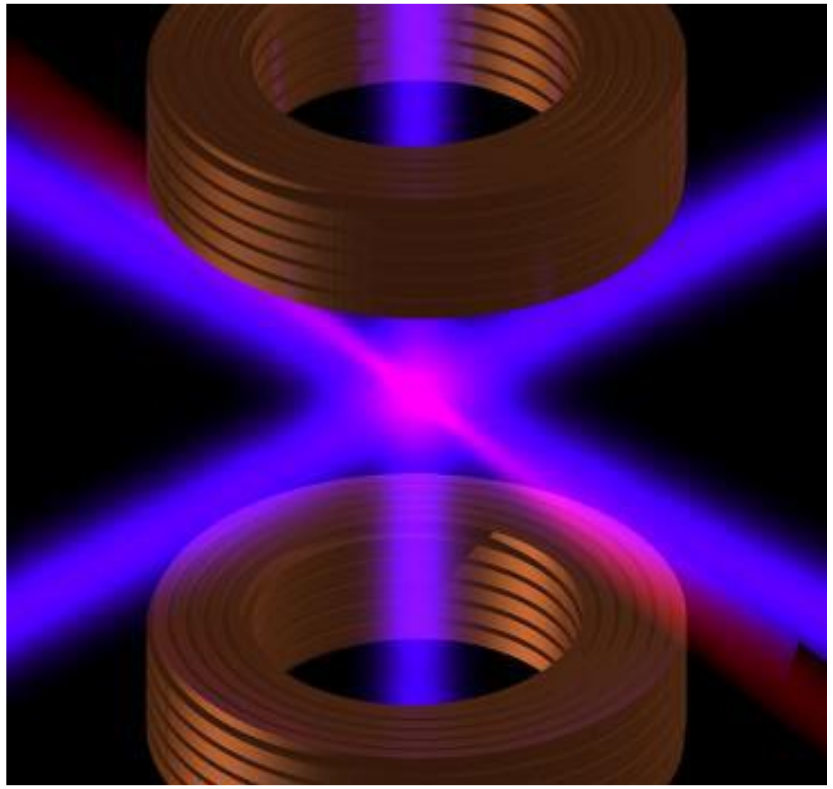
1b € 10+ yr 5000+ researchers

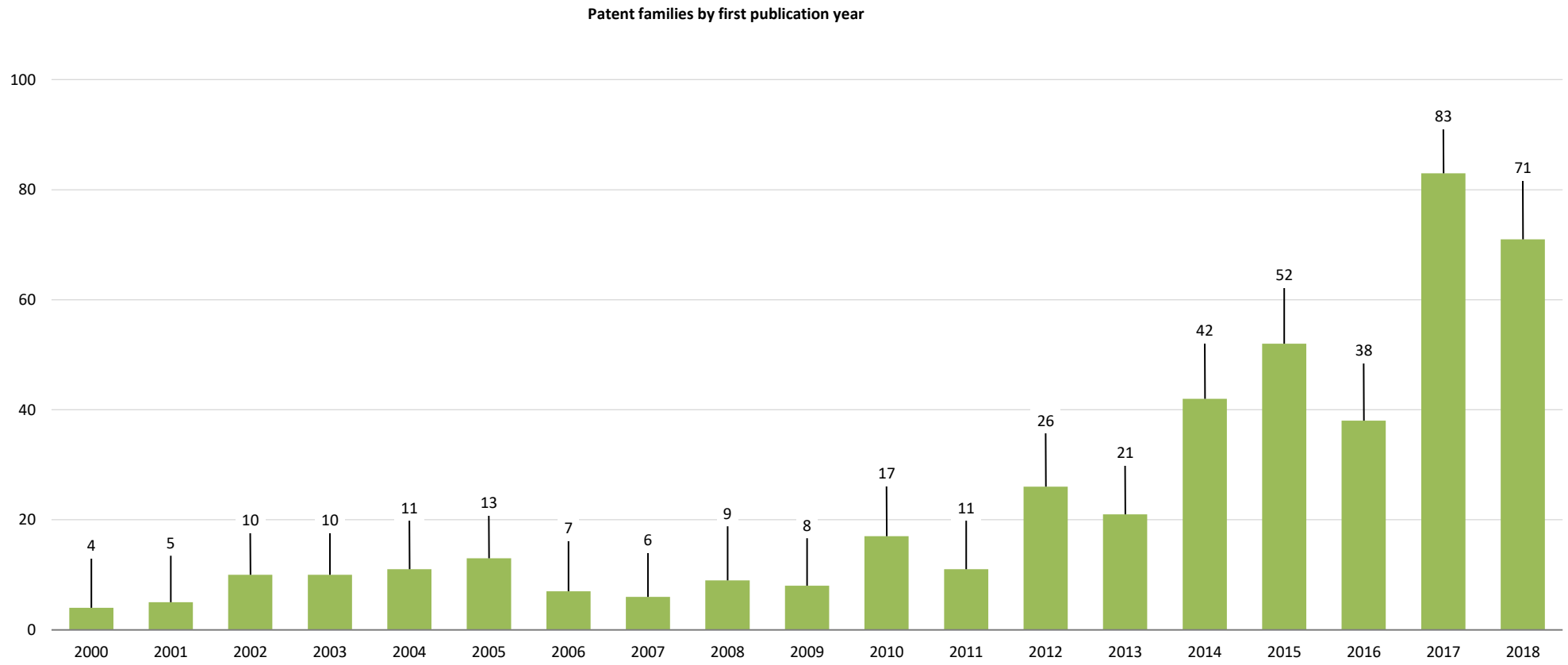
https://qt.eu/about-quantum-flagship/

Quantum Technology (Sensing and Metrology)

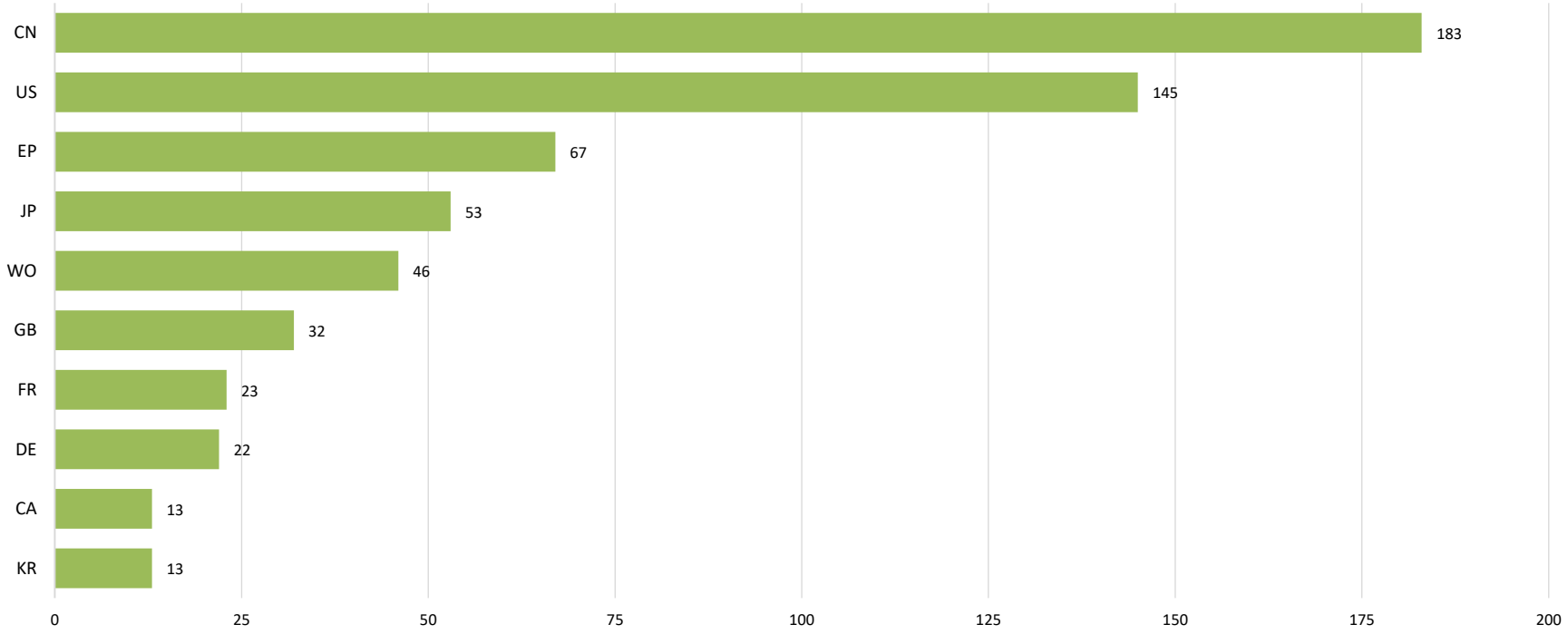


Optical atomic clock
uses two magnetic coils
(red rings)
and an optical lattice
(red laser beam)

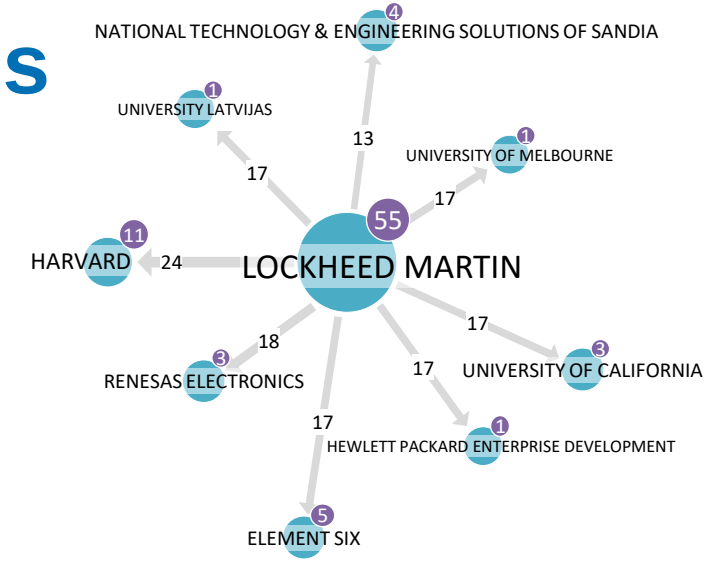
QT Sensing and metrology patent timeline

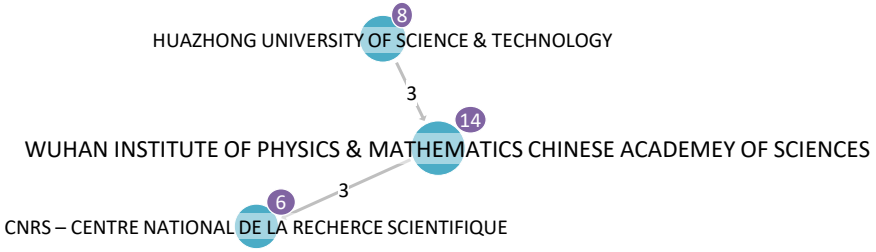


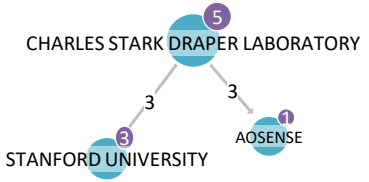
Origin of QT sensing and metrology patents



QT Patent citations Who influences whom?







Roadmap

- Some definitions – what are we talking about?
- Patent data and analytics
- Finding future and emerging technologies
- Quantum technology
- Graphene
- Blockchain

GRAPHENE
FLAGSHIP

Euro 1bn 10 years 170 research groups 22 countries

https://graphene-flagship.eu/collaboration/about-us/the-graphene-flagship/

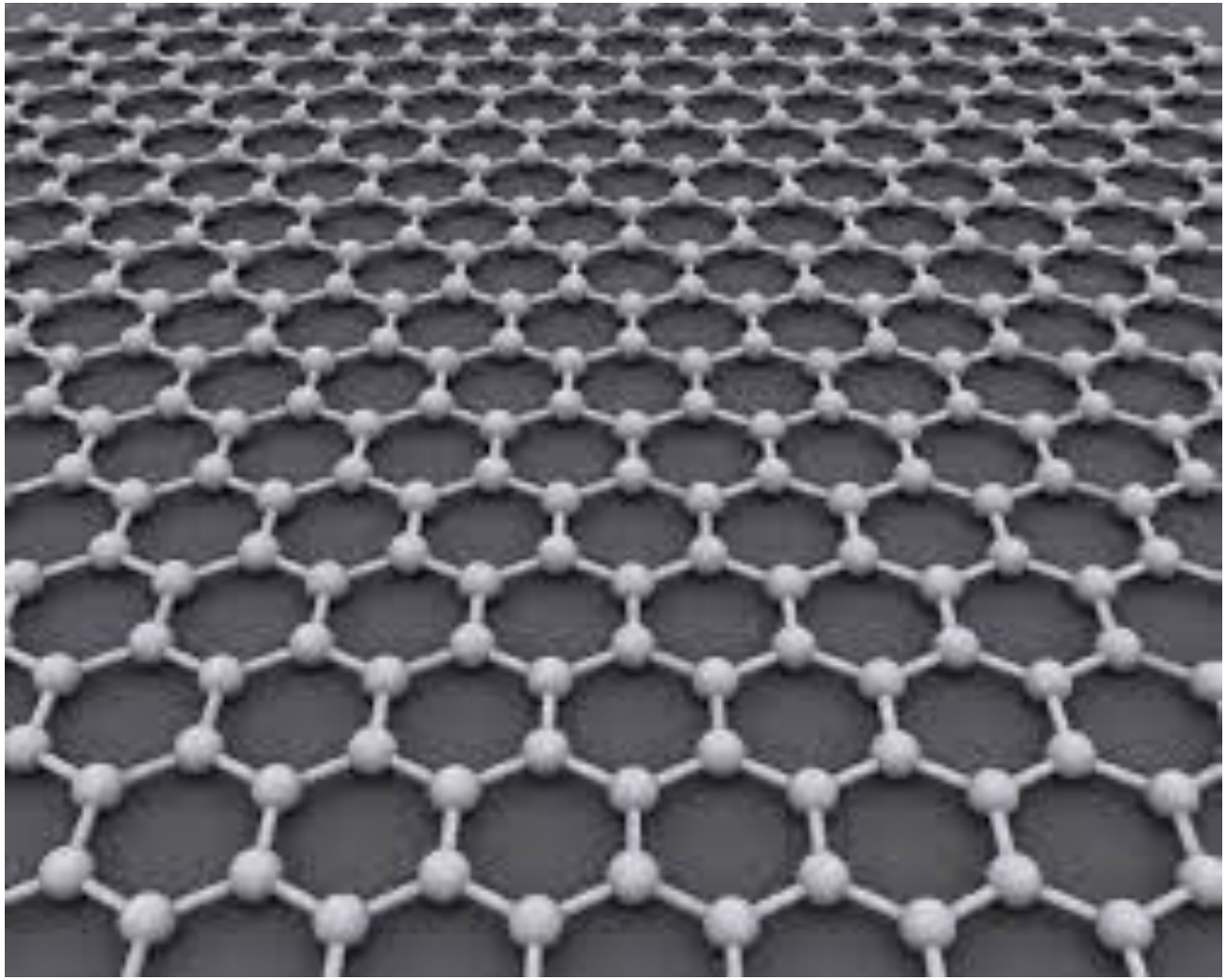
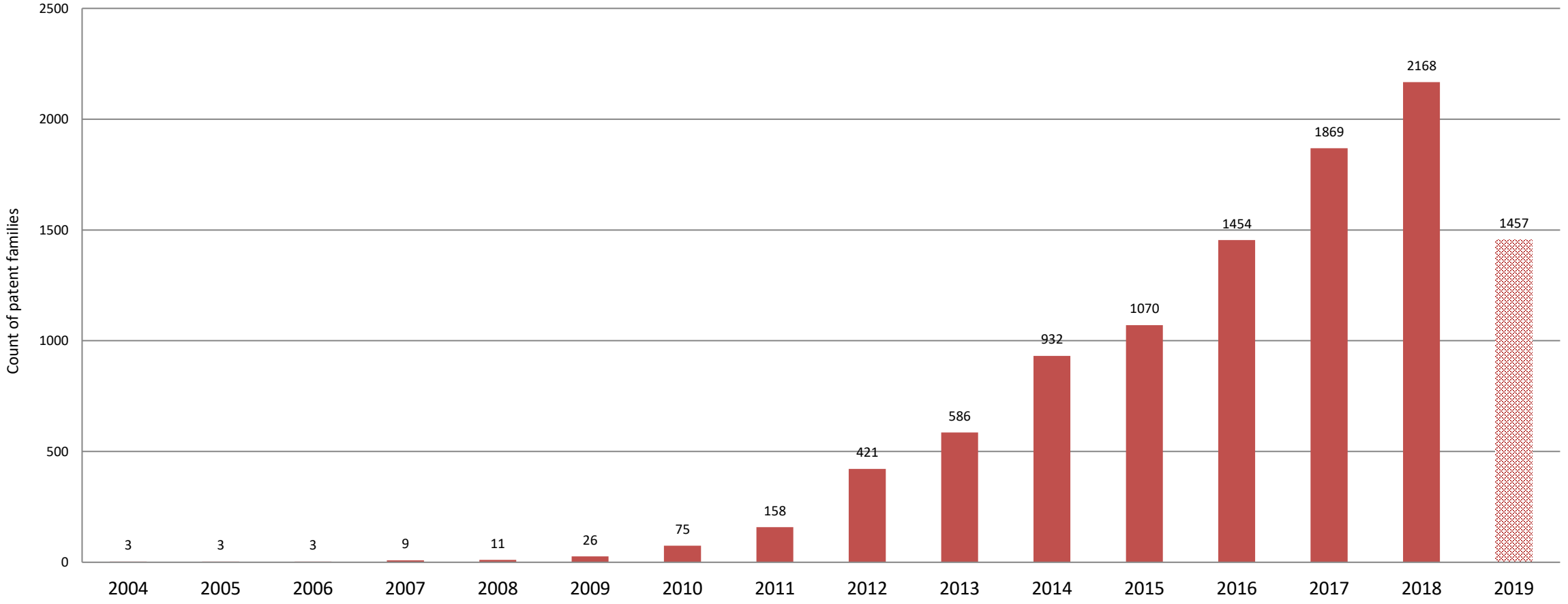


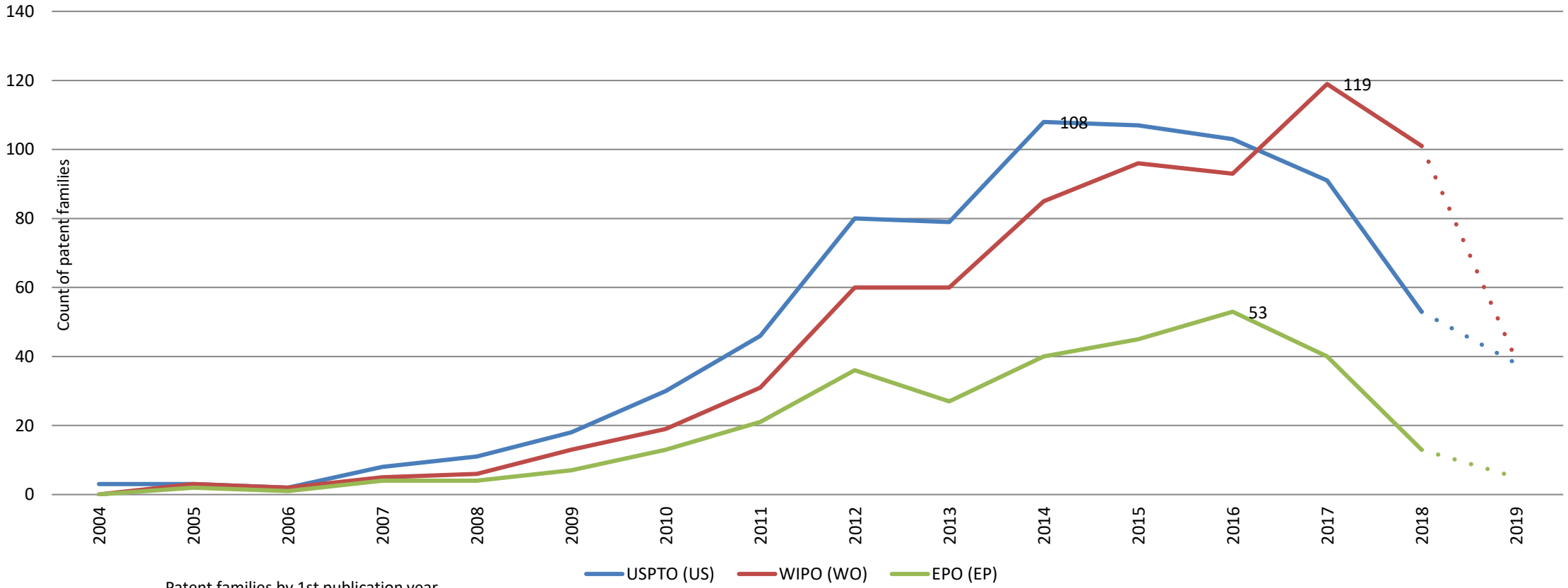
Image - wikipedia

Timeline - graphene composites patents



Patent families by 1st publication year
Note: 2019 data incomplete (publications until 08/2019)

Graphene composites patent filings at US EP WO

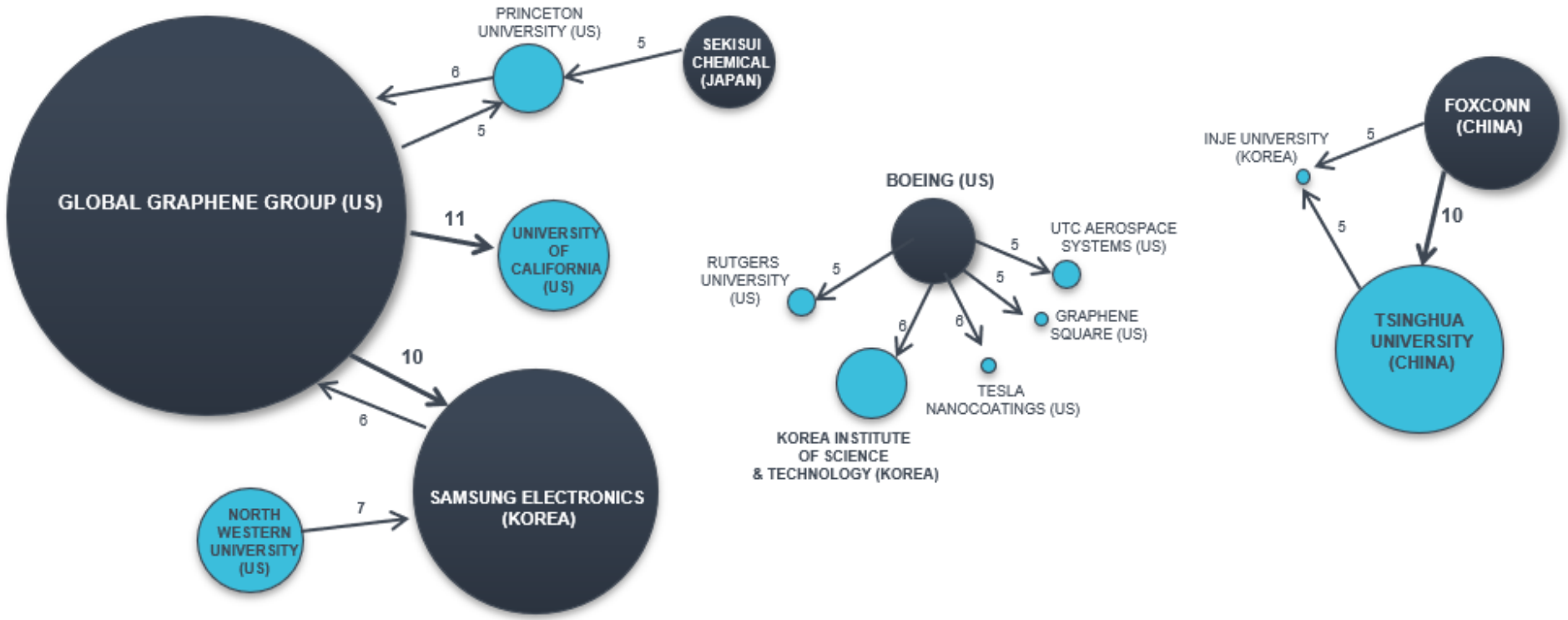


Patent families by 1st publication year
Note: 2019 data incomplete (publications until 08/2019)

Top 20 applicants at selected patent offices (US, WO, EP)

Rank	Applicant	Patent families	Type of applicant
1	GLOBAL GRAPHENE GROUP (US)	57	Company
2	SAMSUNG ELECTRONICS (KR)	35	Company
3	TSINGHUA UNIVERSITY (CN)	24	Research centre
4	FOXCONN / HON HAI PRECISION INDUSTRY (CN)	19	Company
5	UNIVERSITY OF CALIFORNIA (US)	16	Research centre
6	ARKEMA (FR)	15	Company
7	HANYANG UNIVERSITY (KR)	15	Research centre
8	NORTHWESTERN UNIVERSITY (US)	15	Research centre
9	LG ELECTRONICS (KR)	14	Company
10	EMPIRE TECHNOLOGY DEVELOPMENT (US)	13	Company
11	SEKISUI CHEMICAL (JP)	13	Company
12	BOEING (US)	12	
13	KOREA ADVANCED INSTITUTE OF SCIENCE & TECHNOLOGY (KR)	11	Research centre
14	KOREA INSTITUTE OF SCIENCE & TECHNOLOGY (KR)	10	Company
15	PRINCETON UNIVERSITY (US)	10	Research centre
16	INDIAN INSTITUTE OF TECHNOLOGY MADRAS (IN)	9	Research centre
17	MIT - MASSACHUSETTS INSTITUTE OF TECHNOLOGY (US)	9	Research centre
18	RICE UNIVERSITY (US)	9	Research centre
19	TORAY INDUSTRIES (JP)	9	Company
20	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (FR)	8	Research centre

Graphene composites – who influences whom



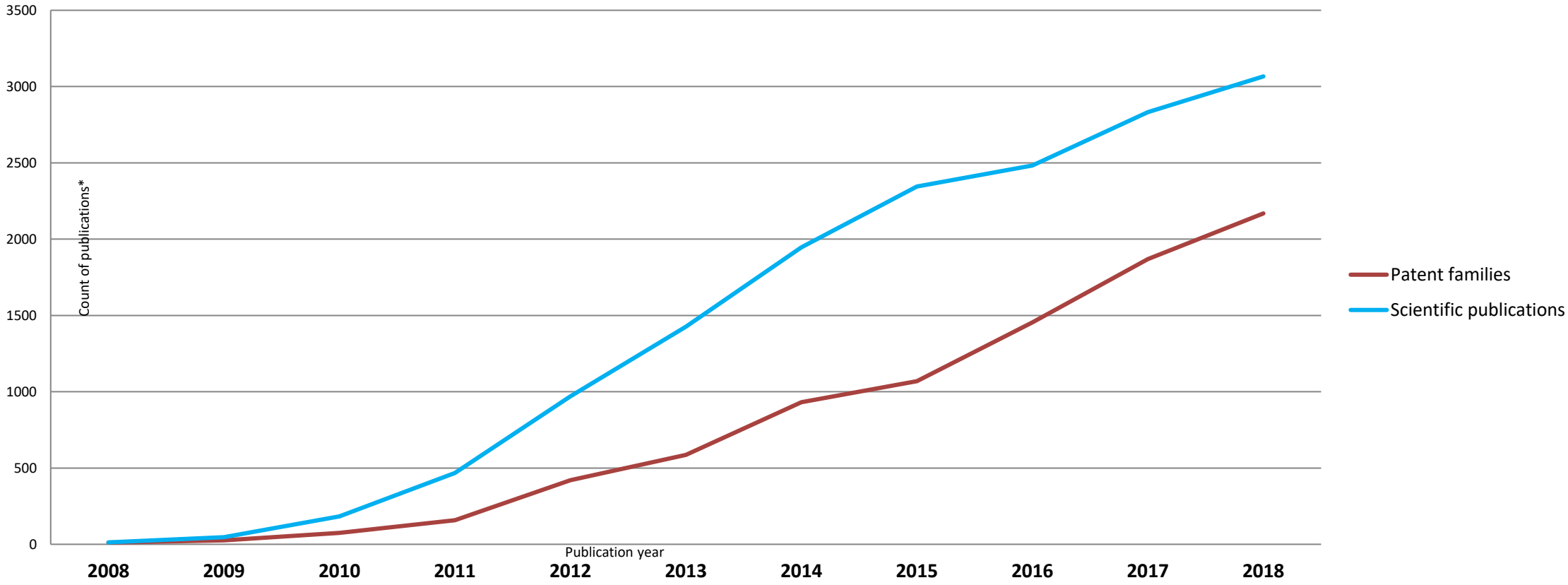
Graphene composites technology evolution heatmap

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Electrodes (H01M4)	0	0	0	2	0	1	4	3	12	10	115	141	228	260	314
Enabling technologies or technologies with a potential or indirect contribution to GHG emissions mitigation (Y02E60)	0	0	0	0	0	1	7	27	73	93	109	67	131	166	125
Carbon; Compounds thereof (C01B32)	0	0	0	0	0	2	6	7	9	23	19	21	23	46	109
Use of inorganic or non-macromolecular organic substances as compounding ingredients (C08K3)	0	0	0	0	0	1	3	7	7	10	15	22	38	59	39
Use of pretreated ingredients (C08K9)	0	0	0	0	0	1	0	1	2	1	17	16	33	45	55
Solid sorbent compositions or filter aid compositions (B01J20)	0	0	0	0	0	0	0	0	1	2	2	12	40	64	53
Manufacture of articles or shaped materials containing macromolecular substances (C08J5)	0	0	0	0	1	0	0	4	4	1	3	6	11	13	58
Hybrid capacitors, Electric double-layer capacitors (H01G11)	0	0	0	0	0	0	0	0	9	4	10	9	4	4	54
Investigating or analysing materials by the use of electric, electro-chemical, or magnetic means (G01N27)	0	0	0	0	0	0	0	0	1	2	2	3	23	40	31
Making alloys (C22C1)	0	0	0	0	0	0	0	1	0	0	0	1	19	35	35

Top graphene composite patents- by citation

Title and patent number*	Applicant(s)	Year of first filing**	Number of jurisdictions***	Number of citations received****
Thermally exfoliated graphite oxide (EP1934139)	PRINCETON UNIVERSITY (US)	2005	9 (EP, WO, US, JP, CA, TW, KR, IN, CN)	268
Nano graphene platelet-based composite anode compositions for lithium ion batteries (US2009117467)	SAMSUNG ELECTRONICS (KR)	2007	5 (WO, US, JP, KR, CN)	231
Nanocomposite of graphene and metal oxide materials (EP2318311)	BATTELLE MEMORIAL INSTITUTE (US);PRINCETON UNIVERSITY (US)	2009	7 (EP, WO, US, IN,CA, KR, CN)	147
Stable dispersions of polymer-coated graphitic nanoplatelets (US2011223405)	NORTHWESTERN UNIVERSITY (US)	2006	2 (WO, US)	132
Functional graphene-rubber nanocomposites (EP2070093)	PRINCETON UNIVERSITY (US)	2006	EP, WO, US, JP, CN, KR, IN	127
Synthesis of graphene sheets and nanoparticle composites comprising same (US2011186789)	UNIVERSITY OF NORTH CAROLINA (US)	2009	2 (WO, US)	121
Nanowire structures comprising carbon (EP1952467)	NANOSYS	2006	9 (EP, WO, JP, AU, CA, TW, KR, CN, AT)	118
Functional graphene-polymer nanocomposites for gas barrier applications (EP2067146)	PRINCETON UNIVERSITY (US)	2006	7 (EP, WO, US, JP, IN, KR, CN)	111
Preparation method of polymer/graphene composite material through in situ reduction (CN101864098)	SICHUAN UNIVERSITY (CN)	2010	1 (CN)	109
Method of producing exfoliated graphite, flexible graphite, and nano-scaled graphene platelets (US7824651)	GLOBAL GRAPHENE (US)	2007	1 (US)	108

Graphene composite patents vs. scientific articles – publication evolution



Patents vs. scientific articles – top countries

Rank	Country	Patent families
1	CHINA	8658
2	SOUTH KOREA	620
3	USA	445
4	JAPAN	91
5	TAIWAN	60
6	INDIA	48
7	UK	37
8	FRANCE	23
9	POLAND	19
10	GERMANY	18
11	AUSTRALIA	17
12	RUSSIA	17
13	ITALY	13
14	MEXICO	13
15	ROMANIA	11
16	SPAIN	6
17	BRASIL	6
18	FINLAND	6
19	MALAYSIA	5
20	MAROCCO	4

Rank	Country	Scientific articles*
1	CHINA	9684
2	INDIA	1864
3	USA	1536
4	SOUTH KOREA	1471
5	IRAN	973
6	AUSTRALIA	525
7	TAIWAN	473
8	UK	429
9	MALAYSIA	314
10	JAPAN	292
11	SAUDI ARABIA	282
12	SINGAPORE	280
13	SPAIN	260
14	CANADA	255
15	ITALY	255
16	GERMANY	233
17	TURKEY	226
18	FRANCE	204
19	RUSSIA	186
20	PAKISTAN	180

GREEN: Higher ranking than to the compared ranking RED: lower ranking than to the compared ranking WHITE: no change, same ranking BLUE: not present in the compared ranking

*Source: Web of Science core collection

Roadmap

- Some definitions – what are we talking about?
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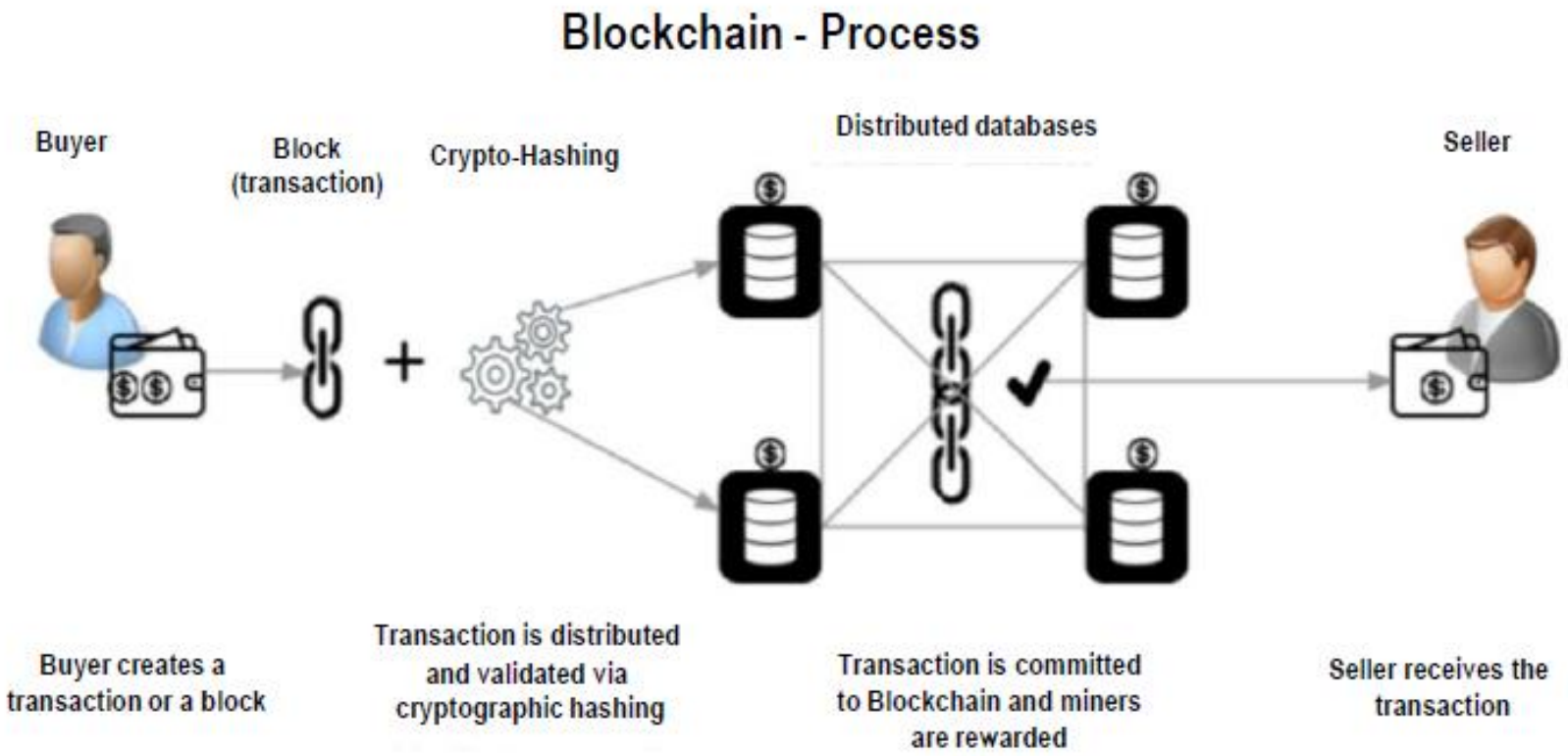
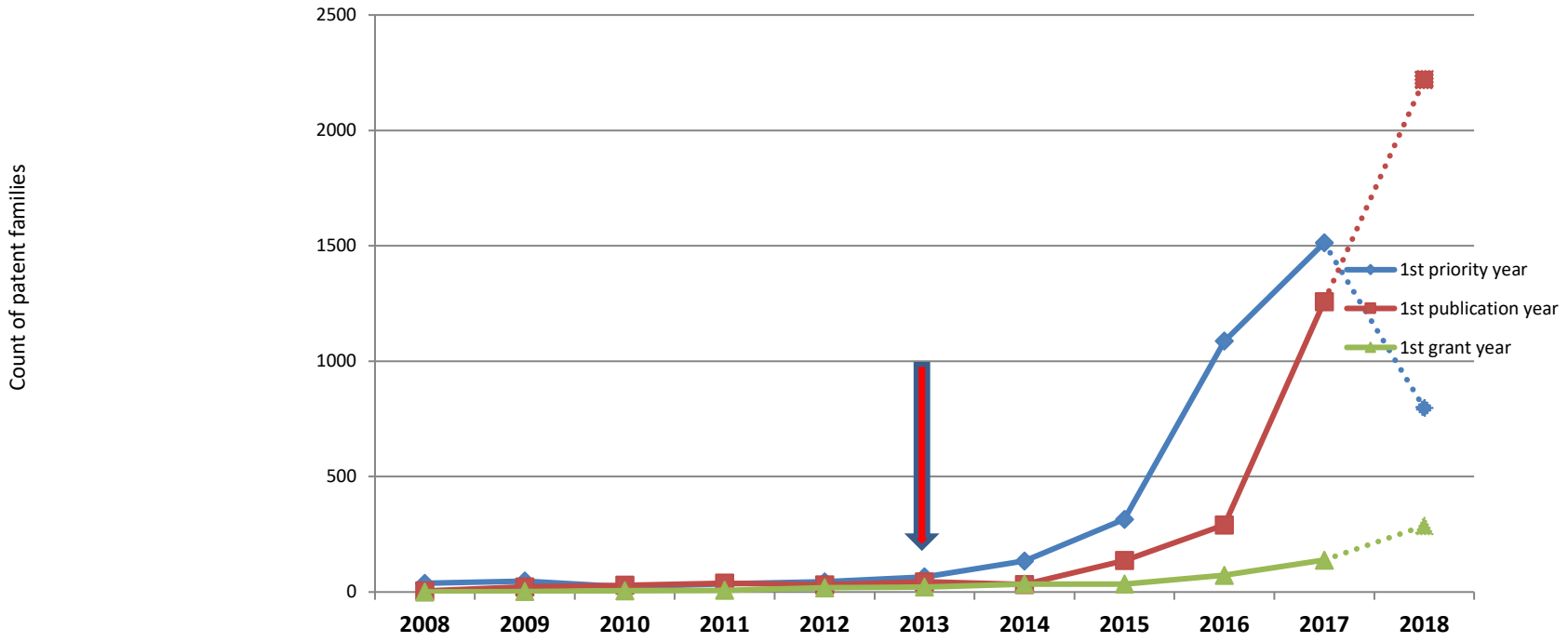
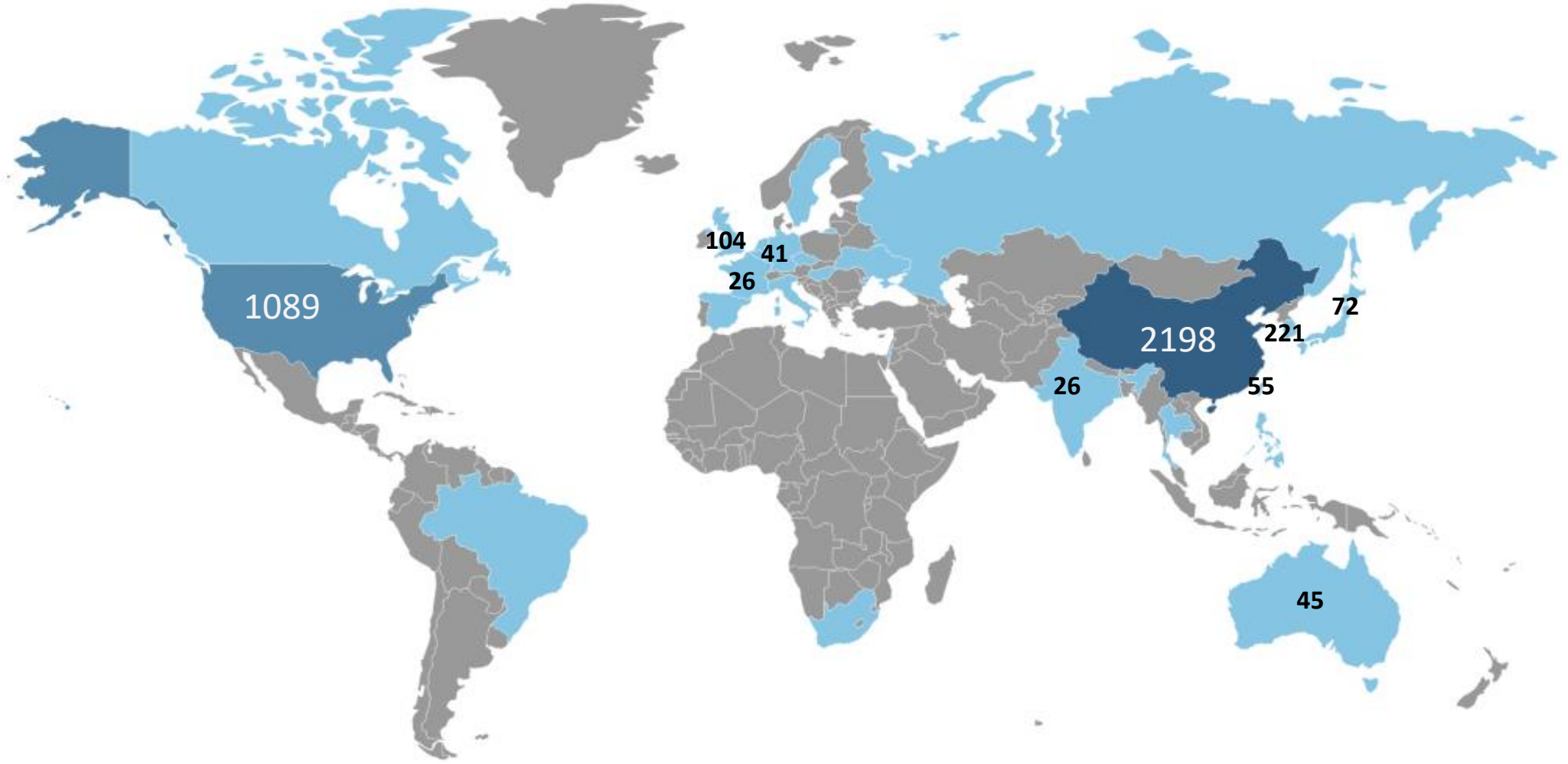
Example 3 Blockchain



Timeline Blockchain patents



Note: 2018 data incomplete (publications until 10/2018), decrease in priority filing in 2018 is due to 18 month time lag until publication.



CN	2198
US	1089
KR	221
GB	104
WO	104
EP	73
JP	72
TW	55
AU	45
DE	41
FR	26
IN	26
ZA	6
BE	4
CA	4
UA	4
RU	3
CZ	2
ES	2
IL	2
IT	2
LU	2
PH	2
SG	2
BR	1
EA	1
HK	1
HU	1
NL	1
SE	1

Mapamundi with priority country filings of all patents of the dataset (numbering +20 patent families, without EP and WO patents)

Blockchain Top Inventors (Worldwide, EP)

Top inventors worldwide

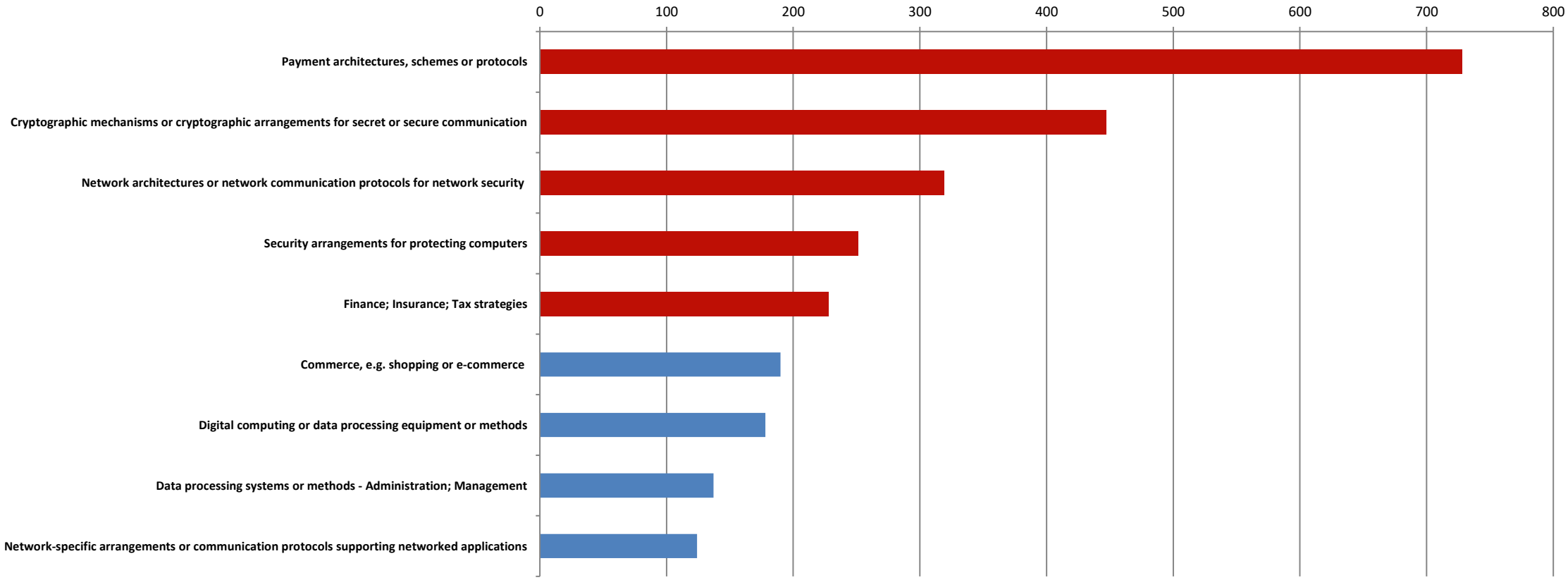
Inventor	Patent families	Affiliation*
HONG JAY WU	88	COINPLUG (KR)
UHR JOON SUN	85	COINPLUG (KR)
SONG JOO HAN	66	COINPLUG (KR)
TAN ZHIYONG	52	BEIJING EUROPE CHAIN TECHNOLOGY (CN) / BEIJING RUI ZHUO XITONG TECHNOLOGY DEVELOPMENT (CN)
LIU XIN	49	SHENZHEN GOLO CHELIAN DATA TECHNOLOGY (CN)
LIU JUN	39	SHENZHEN GOLO CHELIAN DATA TECHNOLOGY (CN)
ZHANG YONG	38	BEIJING RUI ZHUO XITONG TECHNOLOGY DEVELOPMENT (CN)
WU SIJIN	36	FUZAMEI TECHNOLOGY (CN)
HUANG BUTIAN	33	YUNPHANT (CN)
LU CHENGYE	31	CHINA CHAIN TECHNOLOGY (CN)

Top inventors EP

Inventor	Patent families	Affiliation*
FALK RAINER	11	SIEMENS (DE)
DAVIS STEVEN CHARLES	7	MASTERCARD (US)
DANIEL JOSHUA	6	BT (GB)
DUCATEL GERY	6	BT (GB)
GIORDANO GIUSEPPE	6	ACCENTURE (IE)
SAVANAH STEPHANE	6	NCHAIN (UK)
WRIGHT CRAIG STEVEN	6	NCHAIN (UK)
BULDAS AHTO	5	GUARDTIME (UK)
STÖCKER CARSTEN	5	INNOGY INNOVATION (DE)
VIALE EMMANUEL	5	ACCENTURE (IE)

*Inventors company affiliation by the time of the patent filing (may have changed over the time)

Blockchain Main technology fields (CPC)



Patent families by Top 10 Main CPC groups

EPO Blockchain Conference December 2018

https://www.epo.org/news-issues/news/2018/20181205.html

Clarivate Webinar May 2019

https://clarivate.com/webinars/blockchain-disruptive-technology-or-just-a-flash-in-the-ip-pan


RESTAURANT

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- European Patent Office – D542 Patent Information Promotion 2016-2021
- Björn Jürgens EEN Andalusia EEN Ambassador
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- Geert Boedt EPO
- Sonia Kaufmann EPO
- Thierry Bec EPO
- Marc Diepstraten EPO
- Lana Follens EPO
- Torsten Petelski EPO
- Julia Dias EPO

Some things to follow-up

- EPO Patent Insight reports
- https://www.epo.org/searching-for-patents/business/patent-insight-reports.html
- (including Quantum Sensing and Metrology, Graphene Composites, Blockchain Cosmonautics, Quantum Computing, Quantum In Space…..)

- Blockchain patent landscaping: An expert based methodology and search query World Patent Information 10.1016/j.wpi.2020.101964 2020 Vol 61
- Author(s): Nigel S. Clarke Björn Jürgens Victor Herrero-Solana

Over to Michele