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European IP Helpdesk
IP for Future and Emerging Technologies

15.04.2025





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: 43 ambassadors from 26 EU countries



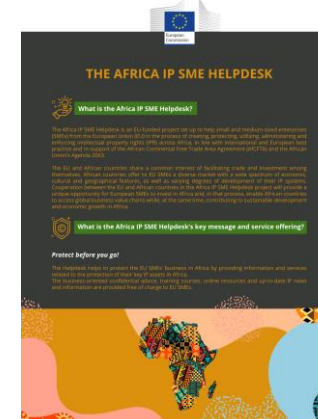
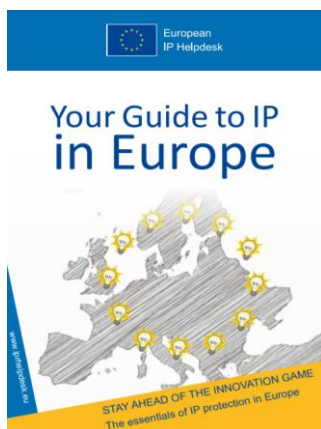


The EC IP Helpdesks





EC IP (SME) Helpdesk Hub – Gateway to Information



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



Upcoming events



Europa - Upcoming events

09
APR
2025

Training and workshops

EU - Webinar: IP and Artificial Intelligence

(••) Live streaming available

10
APR
2025

Training and workshops

Transaction Based Growth SUMMIT: "Build-to-Sell"

(••) Live streaming available

15
APR
2025

Training and workshops

EU - Webinar: IP for Future and Emerging Technologies

(••) Live streaming available

23
APR
2025

Training and workshops

EU - Webinar: IP and Artificial Intelligence - Advanced

(••) Live streaming available

29
APR
2025

Training and workshops

EU - Webinar: IP Commercialisation and Licensing

(••) Live streaming available

06
MAY
2025

Training and workshops

EU - Webinar: IP Commercialisation & Licensing - Advanced

(••) Live streaming available

13
MAY
2025

Training and workshops

EU - Webinar: Patents and Innovation

(••) Live streaming available

20
MAY
2025

Training and workshops

EU - Webinar: Freedom to Operate

(••) Live streaming available



Thank you!

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IP and Future and Emerging Technologies



About me

BSc (Physical) Chemistry (*Exon UK*)

PhD Neutron Science (*Exon UK*)

Harwell (UK), Rutherford Appleton (UK), ILL Grenoble (FR)

Royal Society of Chemistry, Institute of Physics,
Science Council (UK)

HM Govt, X-ray, electron, laser beam microanalysis

Looooooooooooooooong time at European Patent Office (NL, AT)

Patent examiner (electron and ion optics) IT manager, internet
services Espacenet et al, manager, research manager

Consultant; bring worlds of STEM and IP together IPHelpdesk,
EUIPO, WIPO, EPO tutor.

Cambridge University Technology Management teaching and
research (*Cantab UK*) Visiting Fellow





IP is vital for emerging technologies

Emerging technologies have got to start somewhere

Emerging technologies can become disruptive

AI isn't the only technology



Definitions

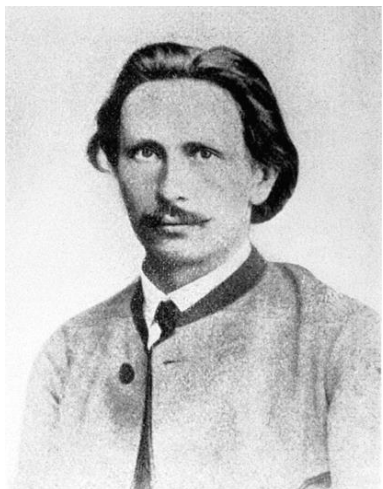
- **Emerging** technologies are those whose development, or practical applications are still largely unrealized. They are emerging from a background of nonexistence or obscurity. Emerging technologies are often perceived as capable of *changing the status quo*.
- **Disruptive** [A technology] that creates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



Bertha Ringer



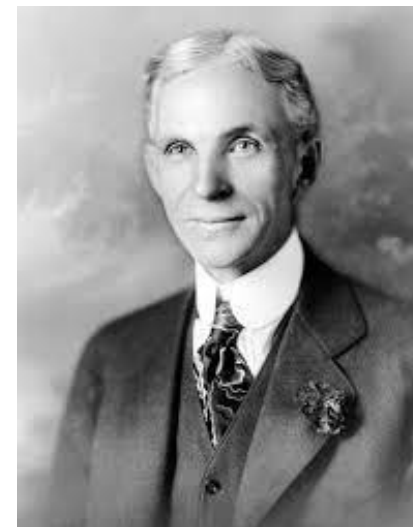
https://en.wikipedia.org/wiki/Bertha_Benz



Carl Benz



No 1
1885
16km/h



Henry Ford



Model T
1908
70km/h



Image: wikipedia

Camille Jenatton La Jamais Contente 1899 > 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 drawings.

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 23 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 deteriorate 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-

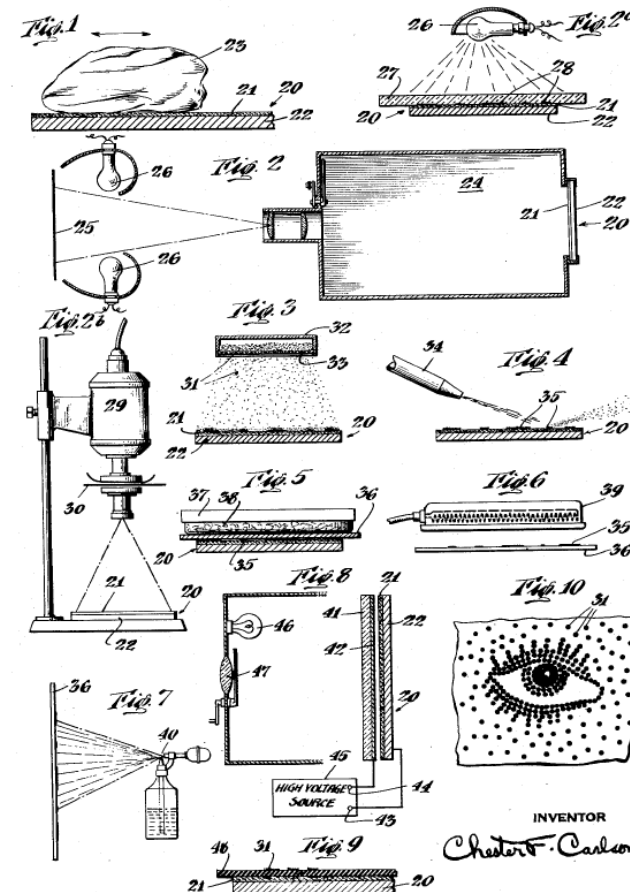
Oct. 6, 1942.

C. F. CARLSON

ELECTROPHOTOGRAPHY

Filed April 4, 1939

2,297,691



INVENTOR

Chester F. Carlson



Some Characteristics of Emerging Technologies





S - curve

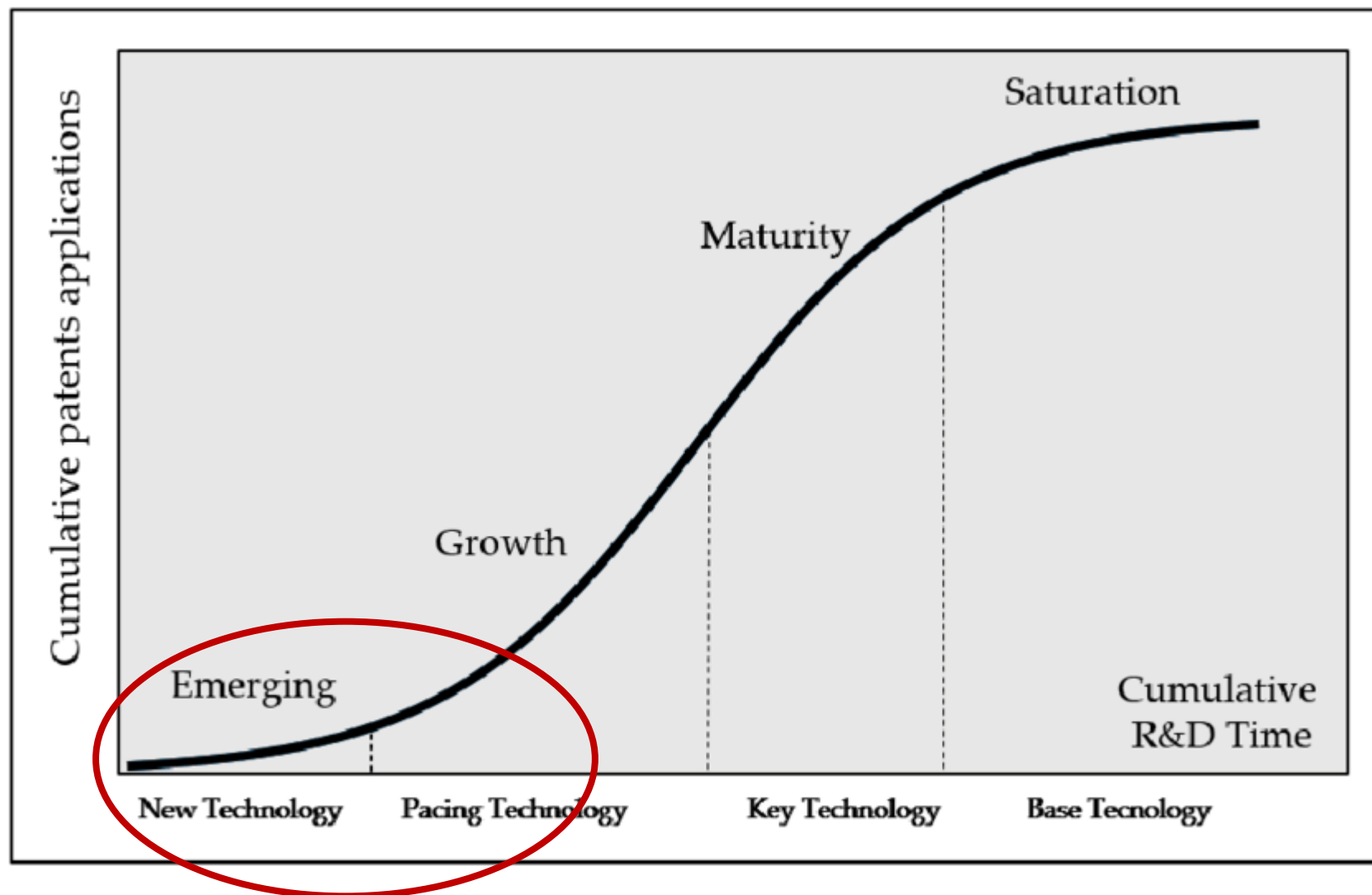
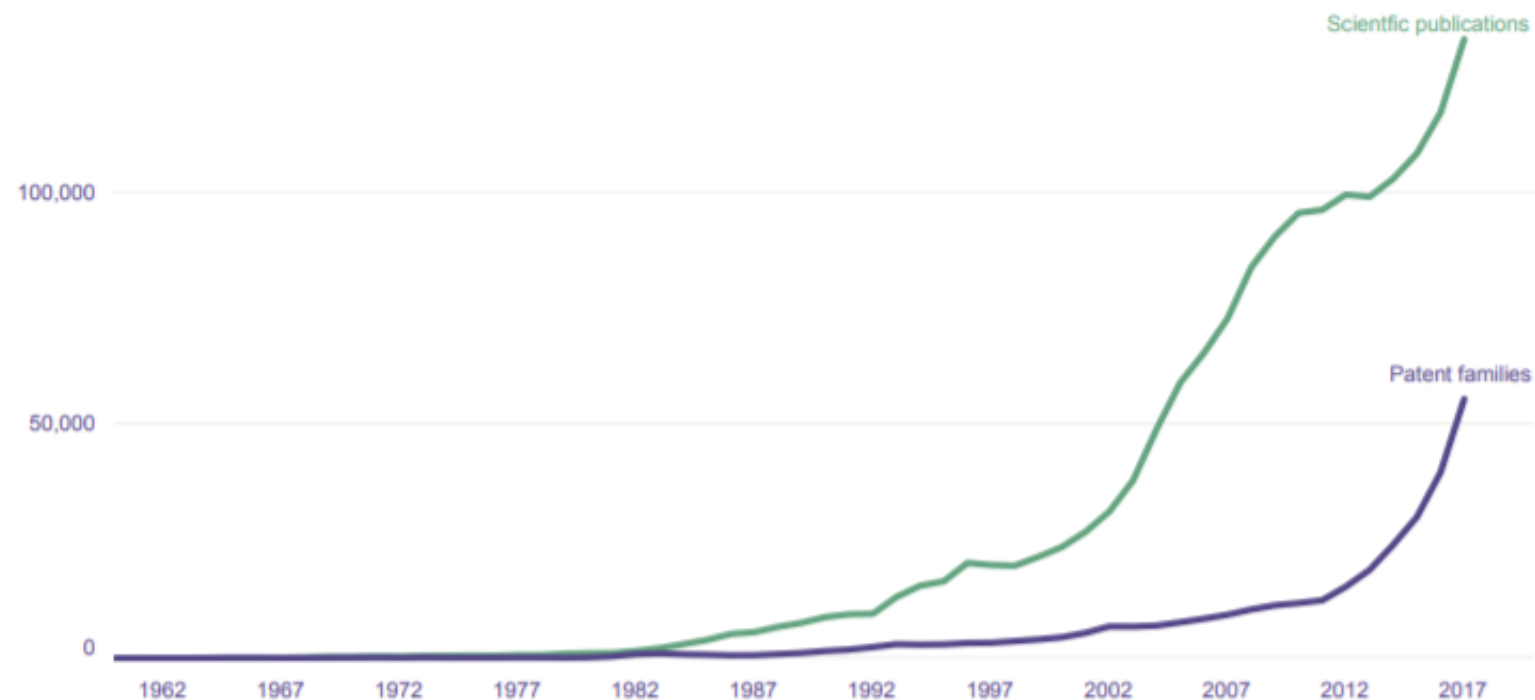




Figure 3.1. AI patent families and scientific publications by earliest publication year

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



World Patent Information 61 (2020) 101964



Contents lists available at ScienceDirect

World Patent Information

journal homepage: <http://www.elsevier.com/locate/worpatin>



Blockchain patent landscaping: An expert based methodology and search query

Nigel S. Clarke^{a,*}, Björn Jürgens^b, Victor Herrero-Solana^c

^a European Patent Office, Patent Information Research, Vienna, Austria

^b Agency of Innovation and Development of Andalusia, CITPIA Patlib Centre, Seville, Spain

^c University of Granada, SCImago-UGR (SEJ036), Granada, Spain

Nigel S. Clarke, Björn Jürgens, Victor Herrero-Solana,
Blockchain patent landscaping: An expert based methodology and search query,
World Patent Information, Volume 61,2020, 101964, ISSN 0172-2190,
<https://doi.org/10.1016/j.wpi.2020.101964>.



EPO Blockchain Conference December 2018

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

Δ Families 100%



**Clarivate Webinar
May 2019**

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





feature

PATENTS

Evolution of CAR T-cell immunotherapy in terms of patenting activity

An analysis of published patent applications in chimeric antigen receptor (CAR) T-cell immunotherapy allows insight into the development of this emerging technology.

Over the past several years new cancer therapies have been developed that strengthen the power of a patient's immune system to attack tumors: cancer immunotherapy. One of the most promising techniques is CAR T-cell therapy^{1,2}. This therapy is based on altering T cells to fight cancer by genetically reprogramming them to express on their surface chimeric antigen receptors (CARs), which are proteins that allow the T cells to specifically find and destroy cancer cells. The reprogrammed cells are introduced to the body, where the CARs enable the modified T cells to engage and kill tumor cells³.

T-cell-mediated cytotoxicity has an extensive scientific history dating back at least to the early 1960s (ref. ⁴). It was not until the late 1980s that CAR T cells began to be reported as showing efficacy against some hematological malignancies. These and subsequent scientifically and clinically significant observations were, and continue to be, reported in the scientific literature⁵⁻⁷. However, it was not until the mid-2000s that CAR T-cell immunotherapy as a technology became commercially established and began to be exploited, as relevant patent publications began to appear.

Patents essentially cover technical inventions, and the associated patent publications are an obvious and unique source of data regarding technical change. Especially in emerging and

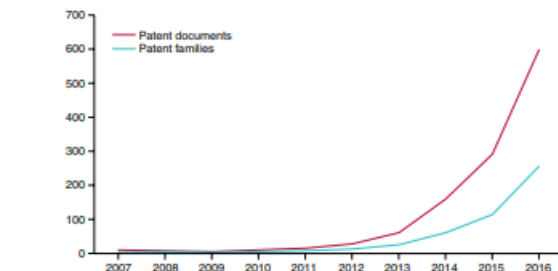


Fig. 1 | The number of CAR T-cell patents started increasing markedly in 2013.

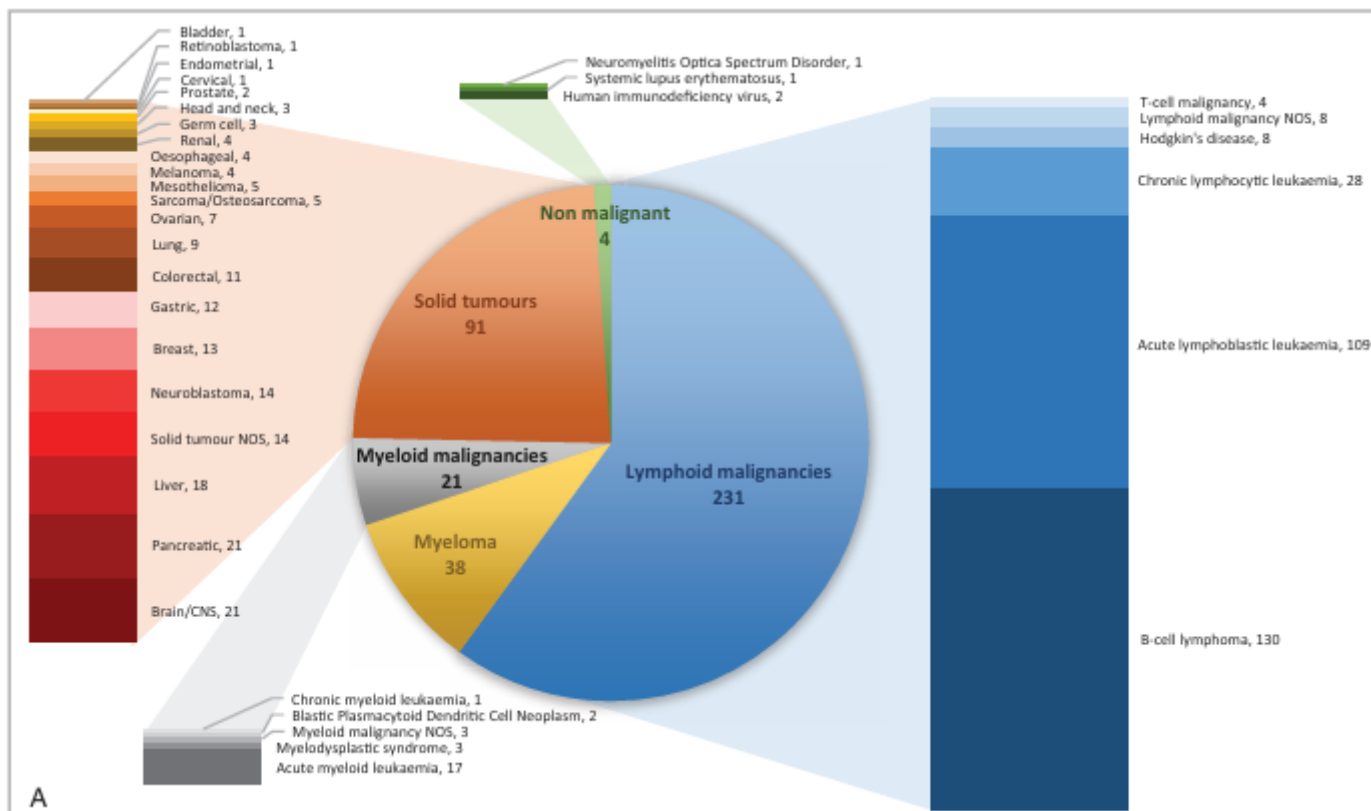
research-intensive sectors, patent information offers a basis for analysis where other data are limited^{8,9}. Taking advantage of structured formats, statistical analyses can be conducted on an appropriately chosen set of bibliographic patent references with bibliometric techniques. Those most commonly used are single-field and cross-reference analysis. Single-field analysis of a bibliographic patent field generates a list or ranking whereas cross-reference analysis combines two fields and generates a matrix (Table 1) that can reveal valuable information for monitoring the evolution^{10,11} of an emerging technology like CAR T-cell therapy.

Our literature review regarding studies that could have used patents to analyze CAR T-cell development found very few such studies. With one exception, none specifically analyzed CAR T-cell therapy. A generalized study of anticancer patents¹² did not identify instances of CAR T-cell therapy. There is an analysis of cancer immunotherapy-related patents granted by the US Patent and Trademark Office in the past decade (2006–2016)¹³ and a mapping exercise of publications and patents in breast cancer immunotherapy¹⁴. A recent but very restricted study retrieved only ten CAR T-cell patent publications from the US Patent and Trademark Office¹⁵.

Jürgens B, Clarke NS. Evolution of CAR T-cell immunotherapy in terms of patenting activity. *Nat Biotechnol.* 2019 Apr;37(4):370-375. doi: 10.1038/s41587-019-0083-5. PMID: 30940940.

1. Autologous

2. Blood malignancies



3. Allogenic

4. Solid tumours

5. Other malignancies

6. Non-oncological

7. Non-human (animal)

8. NK cells



QUANTUM
FLAGSHIP

1b € 10+ yr 5000+ researchers

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



Euro 1bn 10 years 170 research groups 22 countries

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



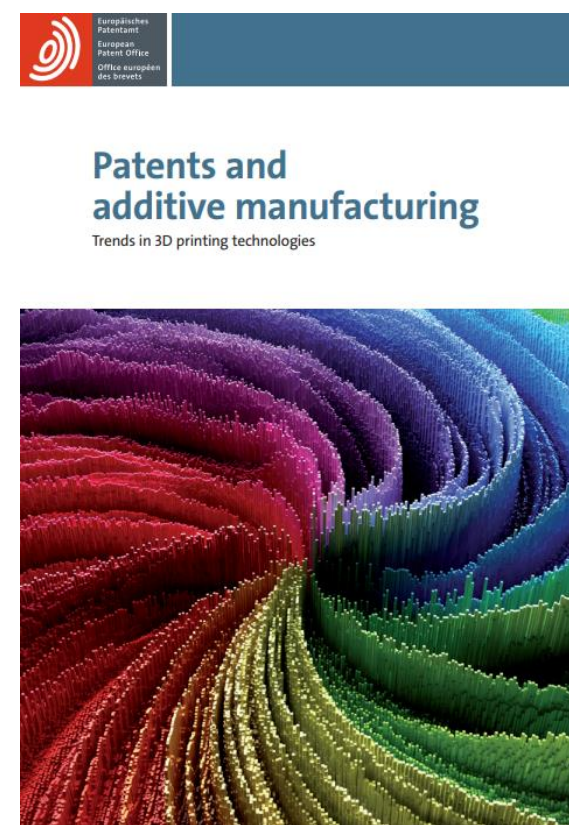
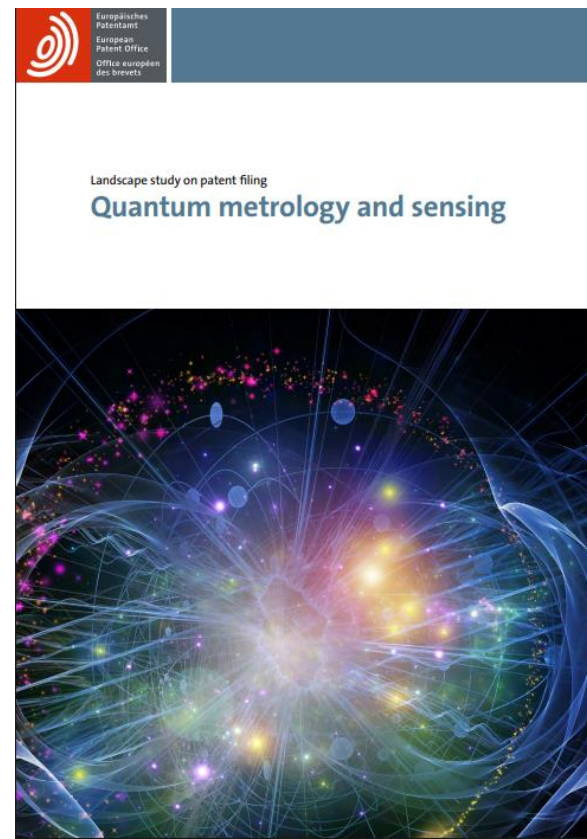
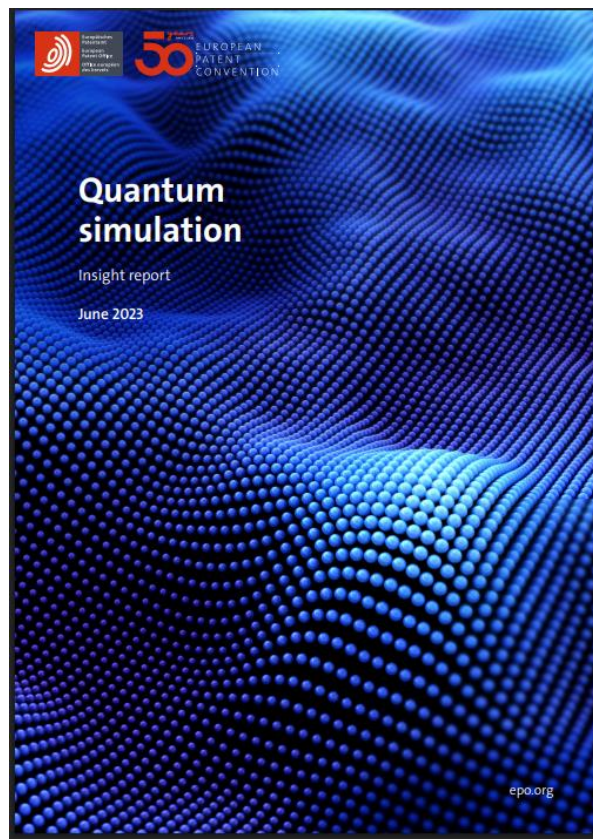
Where to find emerging technologies?





1.Nigel 's favourites







2. Where other people think





Hype Cycle for Artificial Intelligence, 2023



gartner.com

Source: Gartner
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Gartner



Figure 1: Hype Cycle for Consumer Goods, 2022

Hype Cycle for Consumer Goods, 2022

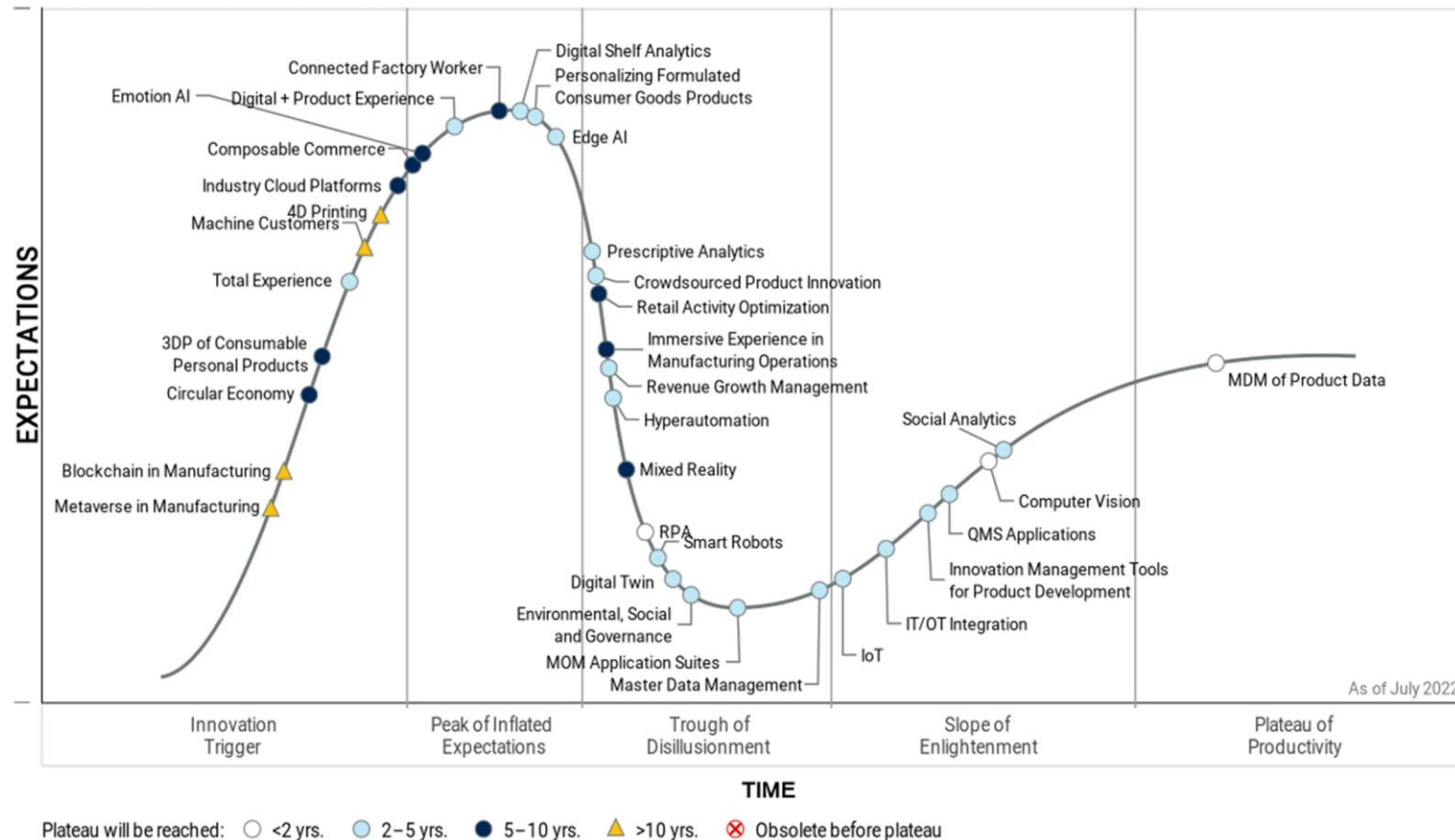
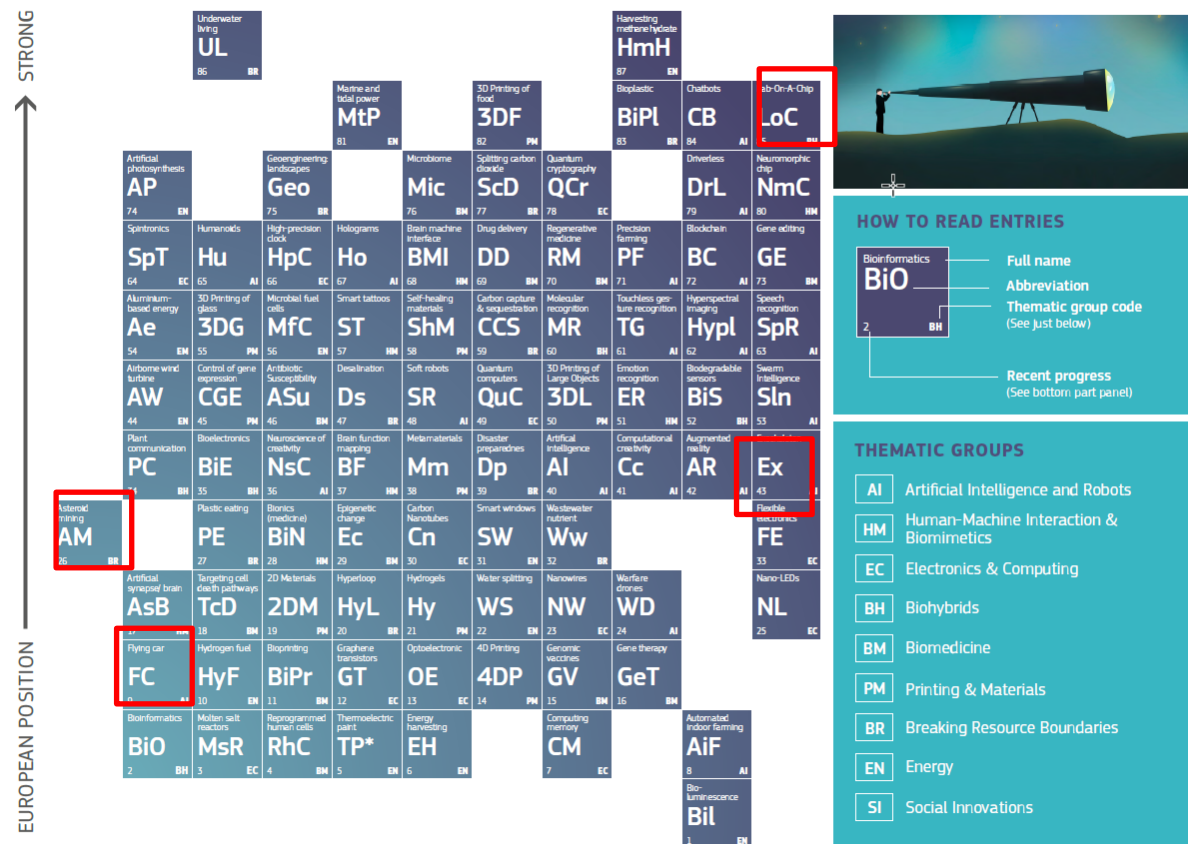






TABLE OF RADICAL INNOVATIONS BREAKTHROUGHS

A dashboard of 100 emerging developments offering strong impact on global value creation and potential solutions to societal needs



LIKEHOOD OF SIGNIFICANT USE / EXPANSION BY 2038 → STRONG

Local food crisis	Basic income	Owning & sharing health data	New journalist networks	Alternative currency	Life caching	Car-free city	RW culture diversifying	Accommodating economy	Reinventing education	Collaborative RM species	Body 2.0 & the qualified self	Gemification
Lf	BI	Osh	Nj	AC	LC	CF	RwC	AE	Re	CS	B2	Gm
88	89	90	91	92	93	94	95	96	97	98	99	100



MIT Technology Review

10 Breakthrough Technologies 2024

[in](#) [f](#) [link](#) [email](#)

Every year, we look for promising technologies poised to have a real impact on the world. Here are the advances that we think matter most right now.

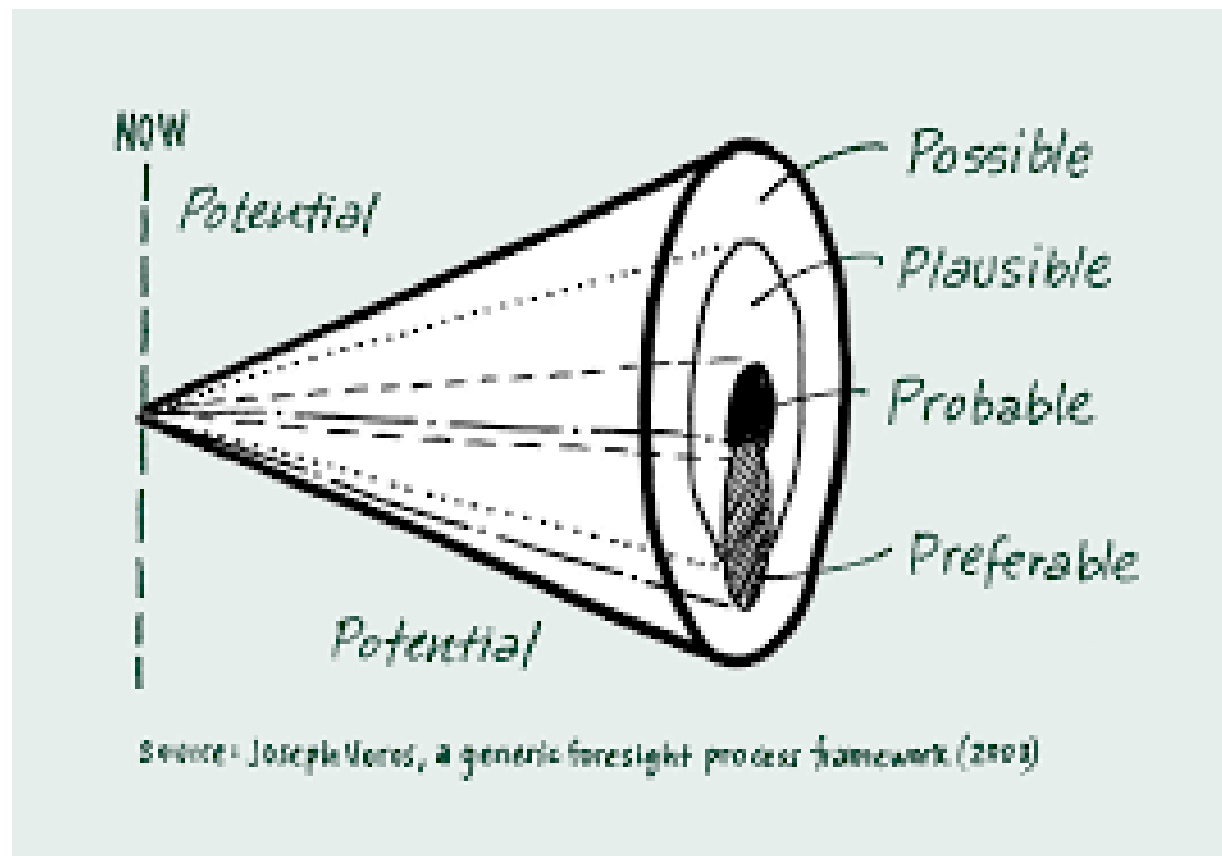


- 1 AI for everything
- 2 Super efficient solar cells
- 3 Apple Vision Pro
- 4 Weight loss drugs
- 5 Enhanced geothermal systems
- 6 Chiplets
- 7 Gene editing treatment
- 8 Exascale computers
- 9 Heat pumps
- 10 Twitter killers
- 11 Thermal Batteries



3. Forward looking

- Foresight





European Commission: Joint Research Centre,
Eulaerts, O., Grabowska, M. and Bergamini, M.,

*Weak signals in science and technologies 2024 –
Technologies at an early stage of development that
could impact our future,*

Publications Office of the European Union, 2025,

<https://data.europa.eu/doi/10.2760/6571994>

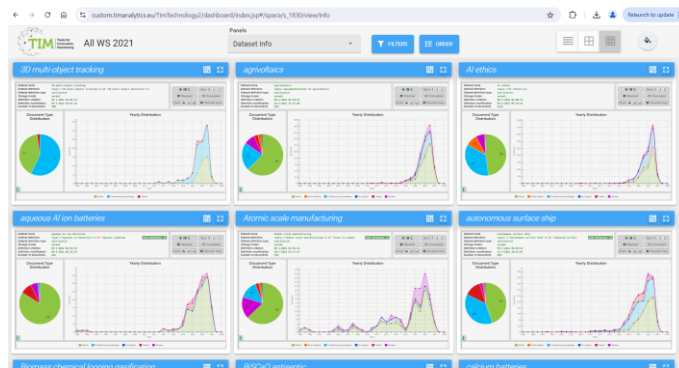


Technology foresight: detecting emerging technologies in scientific data

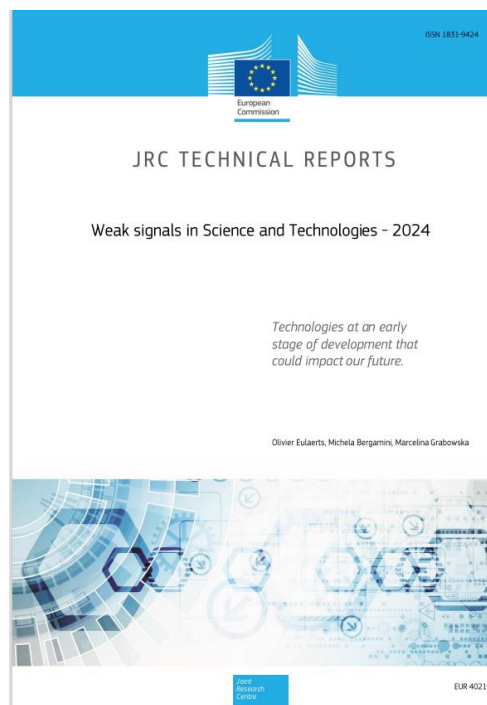
Analysis



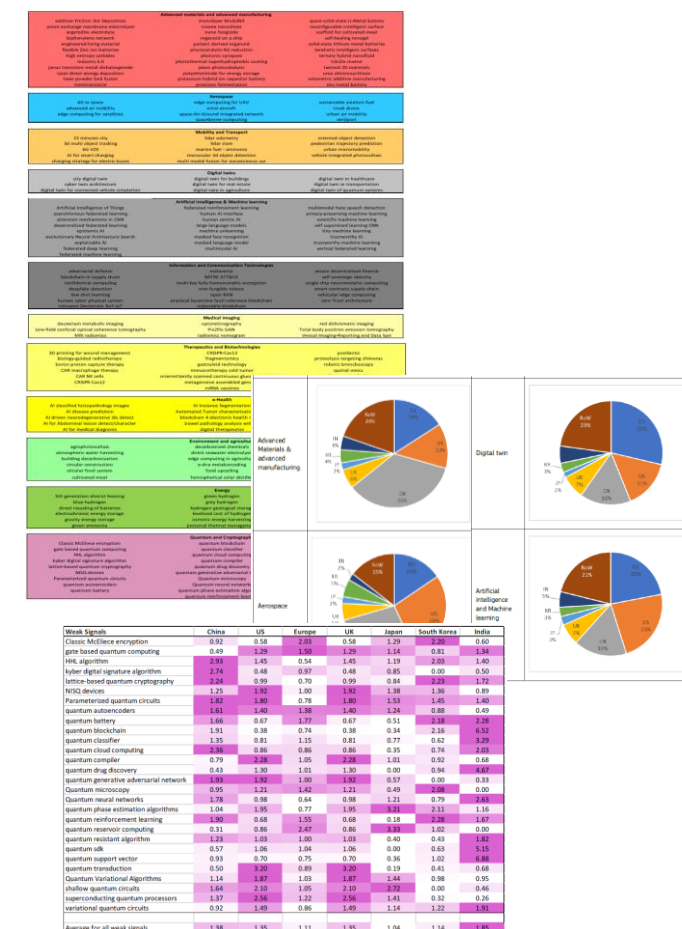
Dashboards



Weak Signals 2024 Report 221 signals in 12 technology clusters



Report [here](#)

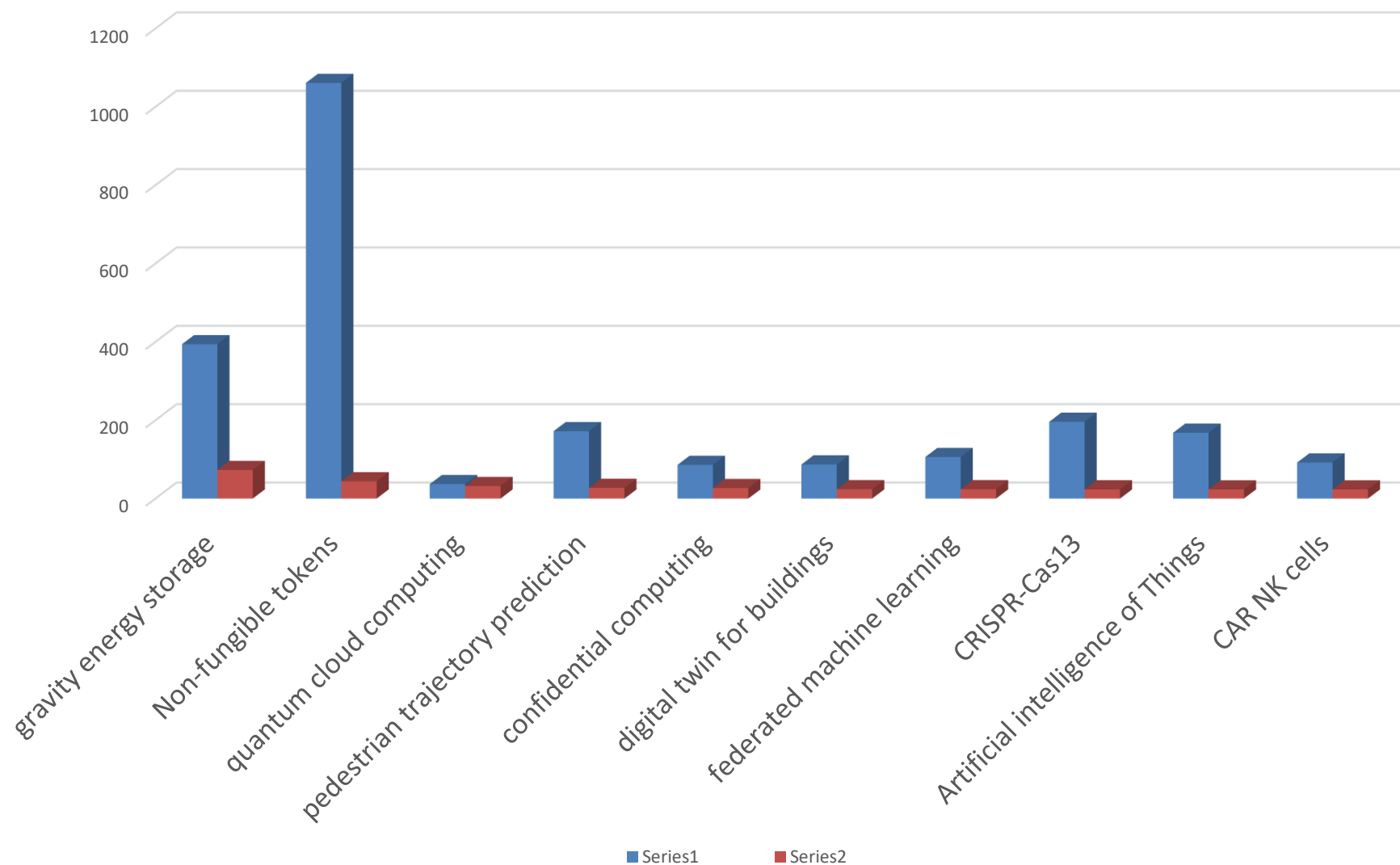




Dataset	#patents	%patents
gravity energy storage	394	72.83
Non-fungible tokens	1061	43.95
quantum cloud computing	37	31.90
pedestrian trajectory prediction	172	27.30
confidential computing	86	26.79
digital twin for buildings	87	23.90
federated machine learning	106	23.66
CRISPR-Cas13	196	23.42
Artificial intelligence of Things	168	23.40
CAR NK cells	92	23.35

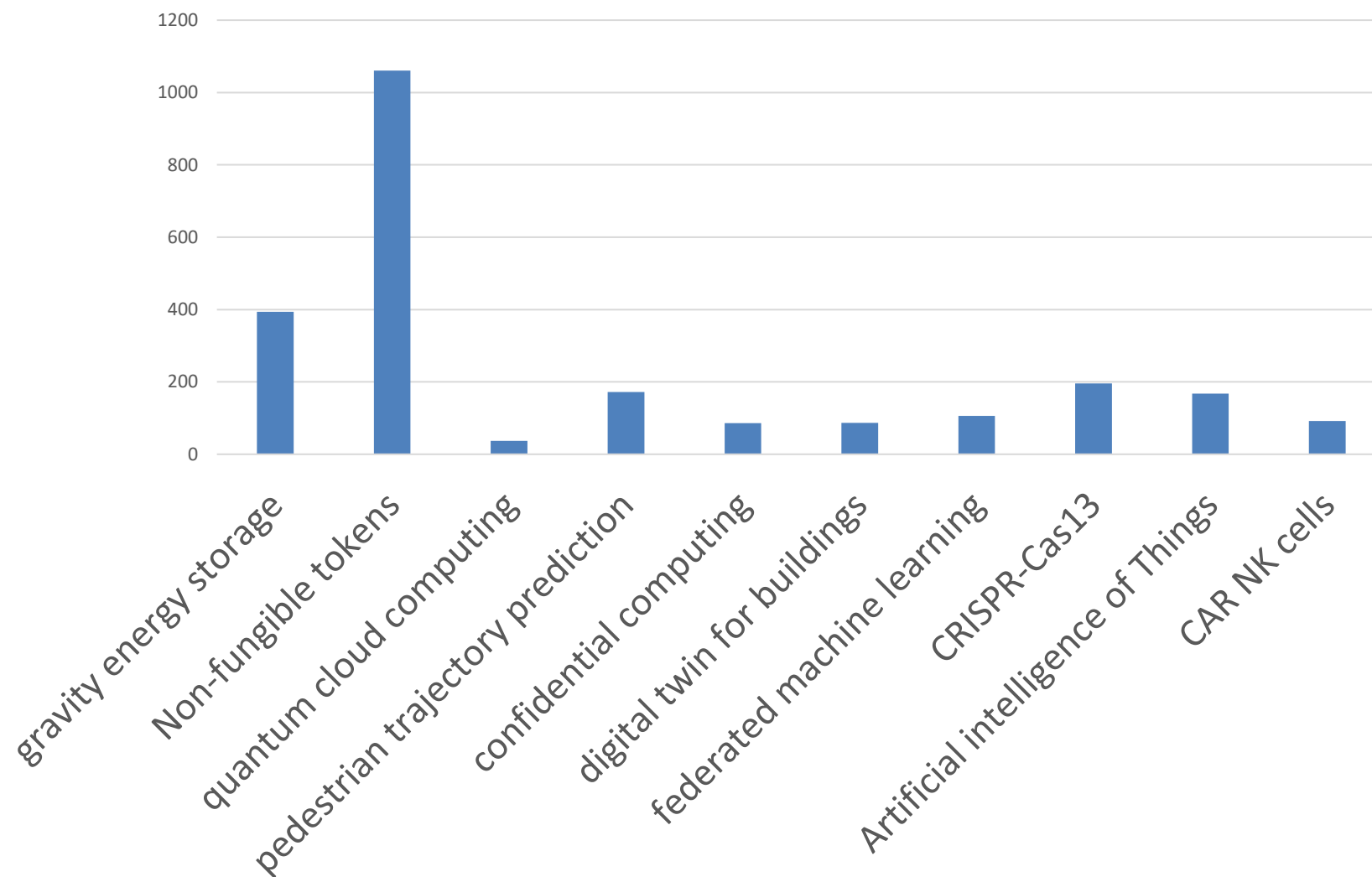


Top 10 Technologies - Weak Signals



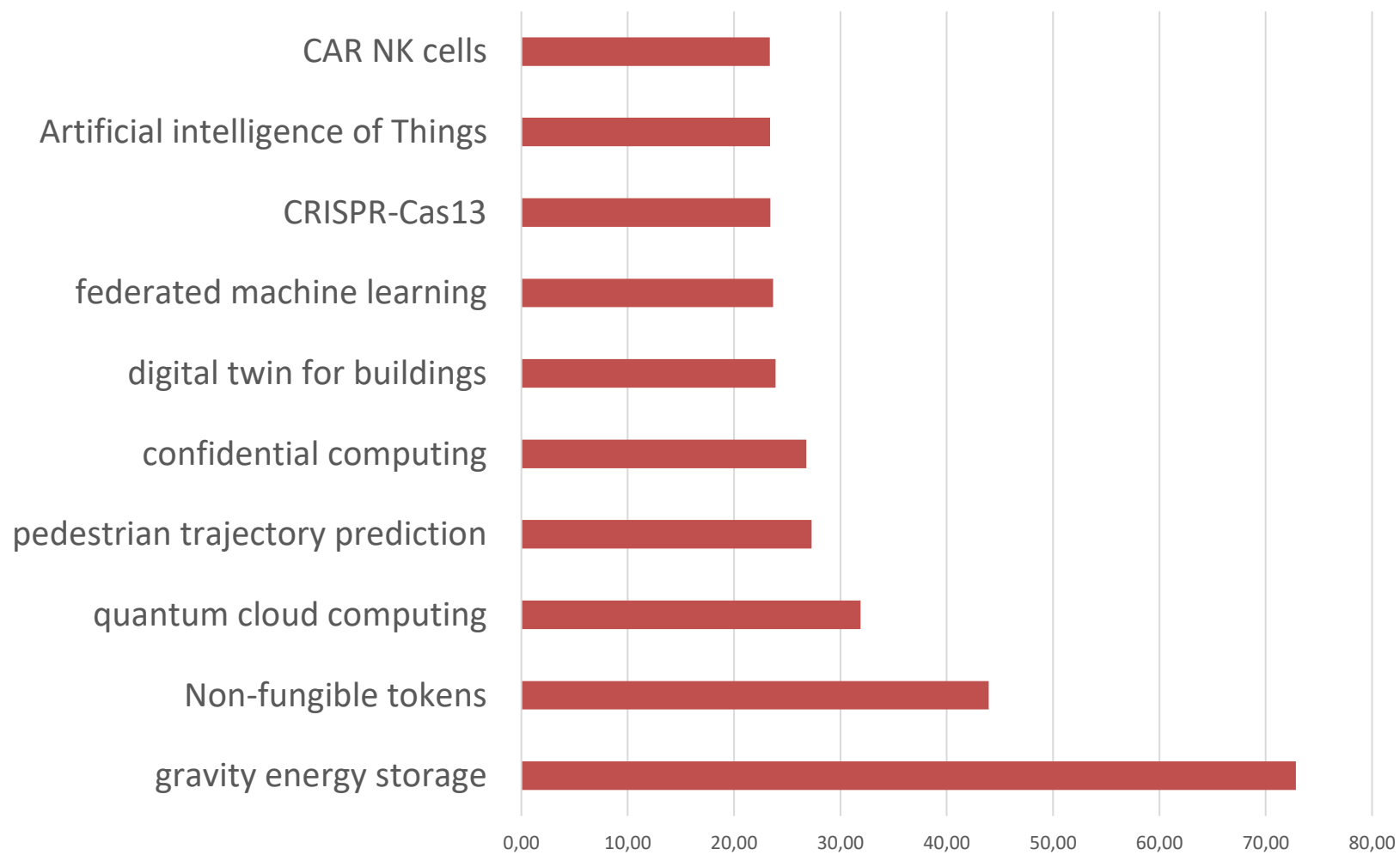


Top 10 Technologies Weak No. Patent Signals



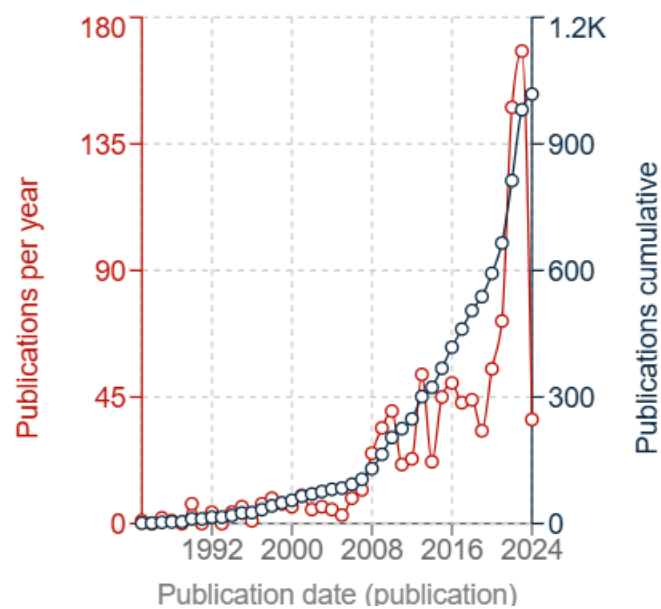


Top Technologies % Patent Weak Signals

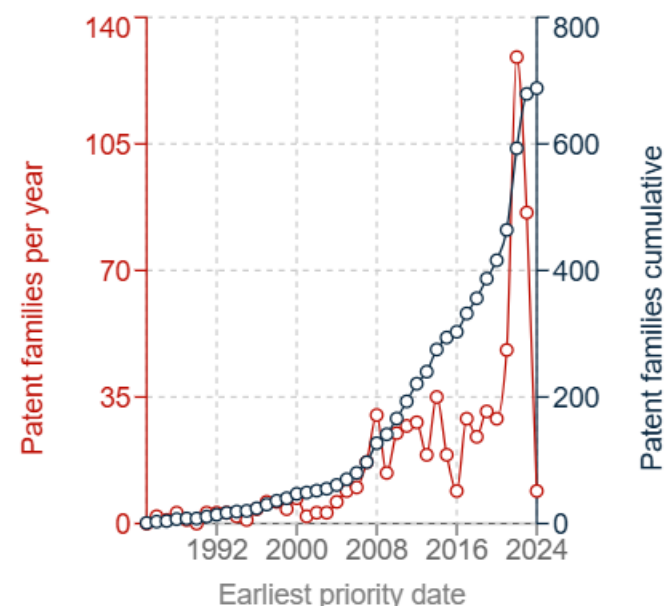




Publication date (publication)



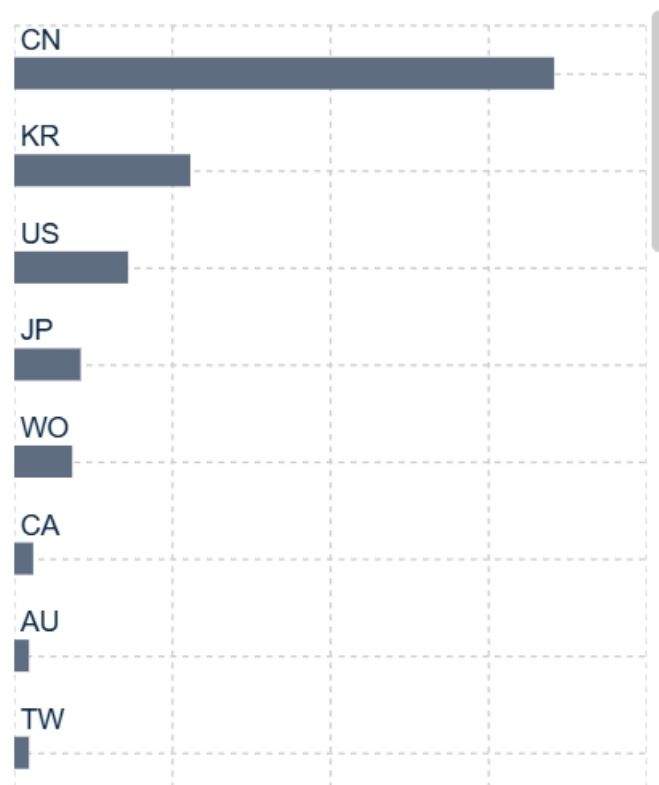
Earliest priority date



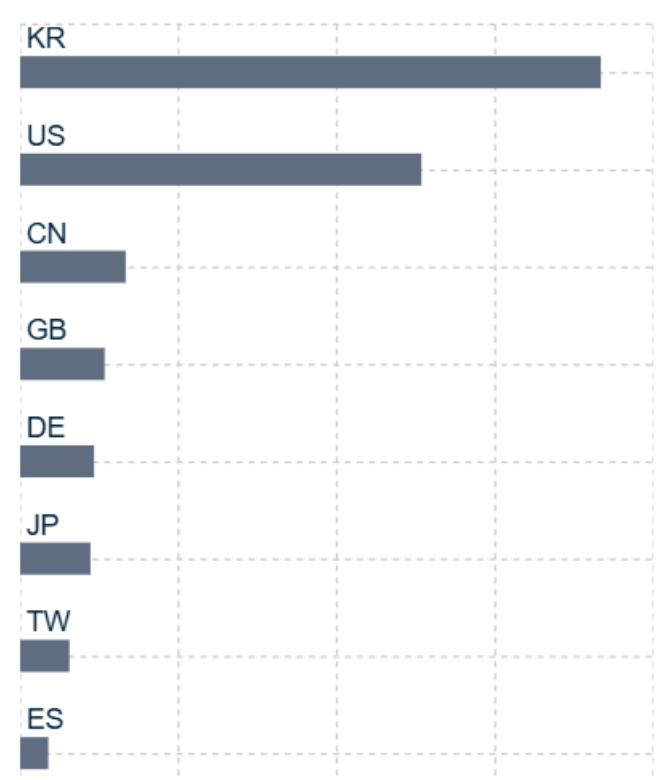


Gravity Energy Storage

Countries (publication)



Applicants - country





4. Backward looking

Hindsight





The Nobel Prize in Chemistry 2020

“development of a method
for genome editing”



© 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 – Cas9

NPL/patents > 1 early

WO2007025097 (A3) EPO Search Report 1 NPL only

NPL/patents ~ 1 emerging

NPL/patents < 1 established

WO2020198675 (A1) 1 NPL 8 Patents

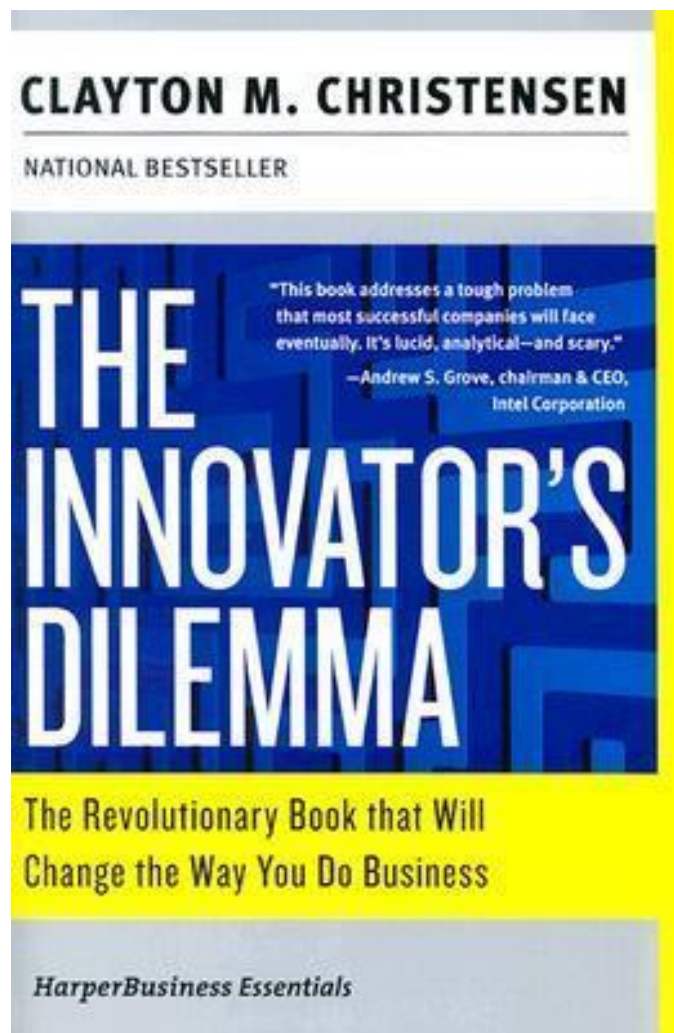


Conceptualizing Disruptive Innovation Paths, Patent Zero and Patent-Data Based Operationalization

Frank Tietze IfM

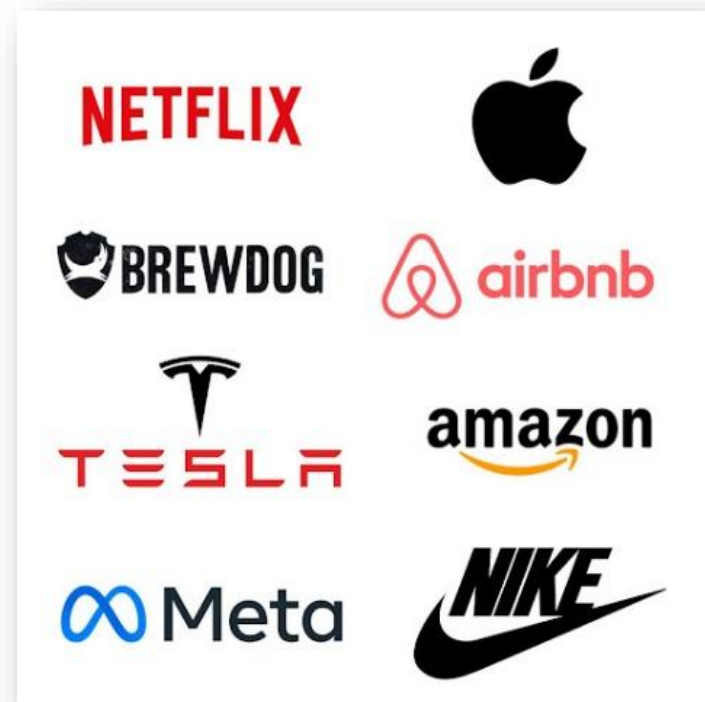
With: Melanie Martini ¹, Marcus John ¹, Leonidas Aristodemou ², Alexander Schönmann ³, Sven Schimpf ⁴

¹ Fraunhofer INT, ² OECD, ³ Technische Hochschule Ingolstadt, ⁴ Fraunhofer IAO





TYPICAL DISRUPTIVE INNOVATION EXAMPLES – THE USUAL SUSPECTS





Base year	As described by Christensen	Industry	Disruptive_innov	Example	Patent zero
2000s	Salesforce.com	Customer relationship management software development	Salesforce.com	Salesforce.com	Possible first patent: US2005065925 AA; 2003
Recent past	Blended Plastics	Plastics production	Polyolefin plastics	Himont composite materials	Possible first patent: US5286564A; 1990
1990s	Amazon.com	Book retailing	Online book sales	Amazon.com	Unclear. Combination of multiple patents?
1960s	Boxed beef	Beef butchering	Boxed beef	Iowa Beef Packers' boxed beef	Hard to find – can't be found?
1990s	Intuit's QuickBooks accounting software	Accounting software production and sales	Personal finance software	Intuit's QuickBooks accounting software	Possible first patent: US6411938 BA; 1999
1990s	Embraer & Canadair regional jets	Commercial passenger aircraft production	Smaller (regional) jets	Embraer & Canadair regional jets	Unclear. Combination of multiple patents?
2000s	ECNs	stock exchange services (e.g. the NY Stock Exchange)	electronic clearing networks	Direct Edge	Hard to find, possible first patent: US2003004853AA; 2001; "Graphical Front End System For Real Time Security Trading"
2000s	SQL database software	database software development	SQL database software	Microsoft's SQL	Possible first patent: US5495604A; 1993



PATENT ZERO EXAMPLE: SQL DATABASE SOFTWARE BY MICROSOFT

Office

European Patent Office 

Application Number

94927247

Application Date

24.08.1994

Publication Number

0715739

Publication Date

12.06.1996

Publication Kind

B1

IPC

G06F 12/00

G06F 17/30

CPC

G06F 16/2423

G06F 16/24526

G06F 16/243

G06F 16/2428

Y10S 707/99943

Y10S 707/968

[View more classifications](#)

Applicants

MICROSOFT CORP

Inventors

HARDING JAMES ALLAN

MCCORMACK JONATHAN IAN

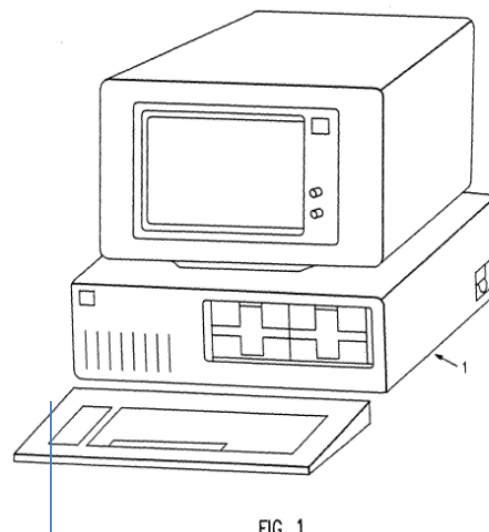
Designated States

Title

[DE] VERFAHREN UND GERÄT ZUR MODELLIERUNG UND ABFRAGE VON DATENBANKENSTRUKTUREN MIT NATÜRLICHEN SPRACHARTIGEN KONSTRUKTIONEN

[EN] [METHOD AND APPARATUS FOR THE MODELING AND QUERY OF DATABASE STRUCTURES USING NATURAL LANGUAGE-LIKE CONSTRUCTS](#)

[FR] PROCÉDE ET APPAREIL POUR LA MODELISATION ET L'INTERROGATION DE STRUCTURES DE BASE DE DONNEES A L'AIDE DE CONSTRUCTIONS SEMBLABLES AU LANGAGE NATUREL



Abstract

[EN] Computerized tools for modeling database designs and specifying queries of the data contained therein. Once it is determined that an information system needs to be created, the Fact Compiler of the present invention is invoked to create it. After creating the information system, the user creates a fact-tree as a prelude to generating queries to the system. After creating the fact-tree, the user verifies that it is correct using the Tree Interpreter of the present invention. Once the fact tree has been verified, the Query Mapper of the present invention is u

[SQL patent LINK](#)



SQL database software Microsoft, 1993, US5495604A: METHOD AND APPARATUS FOR THE MODELING AND QUERY OF DATABASE STRUCTURES USING NATURAL LANGUAGE-LIKE CONSTRUCTS

Table 2 Patent indicators of patent zero.

Indicator	Details	Patent zero
Knowledge base	Number of backward citations	5
Originality	Ratio of backwards citations in focal IPC classes	0.75
Radicalness	Ratio of backwards citations with different IPC classes	0.83
Technological Disruptiveness	Proportion of forwards citations which have the same backwards citations	-0.69
Scientific base	Number of Non-Patent-Literature references	9
Impact	Number of forward citations	145
Applicability index	Ratio of forwards citations not in focal IPC classes	0.9941
Recombinant novelty	Ratio of pairwise combinations of IPC classes which have not been patented before	0.0017
Potential marketability	Number of jurisdictions of patent	70
Number of patents of assignees	Number of (overall) patents of applicant	262

“Low”. The five comprise crucial components for the SQL-capable machine

Both high as expected

Existing measure for disruptive technologies might not suffice

Comparably high



LIMITED EVIDENCE ON CLEARLY „PROVEN“ DISRUPTIVE INNOVATIONS

Base year	As described by Christensen	Industry	Disruptive_innov	Example	Patent zero
2000s	Salesforce.com	Customer relationship management software development	Salesforce.com	Salesforce.com	Possible first patent: US2005065925 AA; 2003
Recent past	Blended Plastics	Plastics production	Polyolefin plastics	Himont composite materials	Possible first patent: US5286564A; 1990
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2000s	ECNs	stock exchange services (e.g. the NY Stock Exchange)	electronic clearing networks	Direct Edge	Hard to find, possible first patent: US2003004853AA; 2001; "Graphical Front End System For Real Time Security Trading"
2000s	SQL database software	database software development	SQL database software	Microsoft's SQL	Possible first patent: US5495604A; 1993



Office European Patent Office	Title [DE] VERFAHREN UND GERÄT ZUR MODELLIERUNG UND ABFRAGE VON DATENBANKENSTRUKTUREN MIT NATÜRLICHEN SPRACHARTIGEN KONSTRUKTIONEN [EN] METHOD AND APPARATUS FOR THE MODELING AND QUERY OF DATABASE STRUCTURES USING NATURAL LANGUAGE-LIKE CONSTRUCTS [FR] PROCÉDE ET APPAREIL POUR LA MODÉLISATION ET L'INTERROGATION DE STRUCTURES DE BASE DE DONNÉES A L'AIDE DE CONSTRUCTIONS SEMBLABLES AU LANGAGE NATUREL
Application Number 94927247	
Application Date 24.08.1994	
Publication Number 0715739	
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Publication Kind B1	
IPC G06F 12/00 G06F 17/30	
CPC G06F 16/2423 G06F 16/24526 G06F 16/243 G06F 16/2428 Y10S 707/99943 Y10S 707/968 View more classifications	
Applicants MICROSOFT CORP	
Inventors HARDING JAMES ALLAN MCCORMACK JONATHAN IAN	
Designated States	

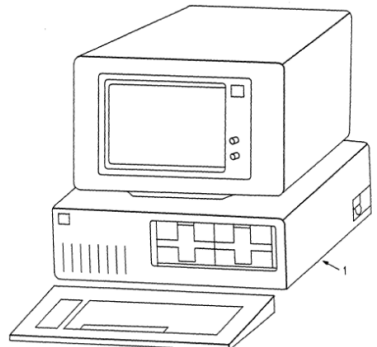


FIG. 1

Abstract
[EN] Computerized tools for modeling database designs and specifying queries of the data contained therein. Once it is determined that an information system needs to be created, the Fact Compiler of the present invention is invoked to create it. After creating the information system, the user creates a fact-tree as a prelude to generating queries to the system. After creating the fact-tree, the user verifies that it is correct using the Tree Interpreter of the present invention. Once the fact tree has been verified, the Query Mapper of the present invention is used to generate information system queries.



Pre-Patent Zero period,
i.e. sustaining innovations

Post-Patent Zero period, i.e.
new patenting trajectory for disruptive innovation



PATENT ZERO EXAMPLE – SOME INITIAL OBSERVATIONS

Table 2 Patent indicators of patent zero.

Indicator	Details	Patent zero
Knowledge base	Number of backward citations	5
Originality	Ratio of backwards citations in focal IPC classes	0.75
Radicalness	Ratio of backwards citations with different IPC classes	0.83
Technological Disruptiveness	Proportion of forwards citations which have the same backwards citations	-0.69
Scientific base	Number of Non-Patent-Literature references	9
Impact	Number of forward citations	145
Applicability index	Ratio of forwards citations not in focal IPC classes	0.9941
Recombinant novelty	Ratio of pairwise combinations of IPC classes which have not been patented before	0.0017
Potential marketability	Number of jurisdictions of patent	70
Number of patents of assignees	Number of (overall) patents of applicant	262

“Low”. The five comprise crucial components for the SQL-capable machine

Comparably high

Comparably high



Stanfield Clarke Associates

Stanfieldclarke@gmail.com

Institute for Manufacturing,
Cambridge

nsc46@cam.ac.uk