Intellectual Property and Emerging Technologies: Beyond AI

Nigel S. Clarke. Rudolfovo Science and Technology Forum, 25/03/2025, Novo Mesto.

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

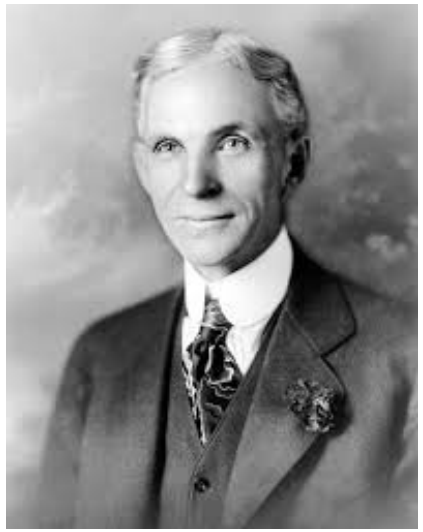
- **Emerging** technologies are those whose development, or practical applications are still largely unrealized. They are emerging from a background of nonexistence or obscurity. Emerging technologies are often perceived as capable of *changing the status quo*.
- **Disruptive** [A technology] that creates 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

Henry Ford



No 1
1885
16km/h

Model T
1908
70km/h

Image: wikipedia

Camille Janetzy 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 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.

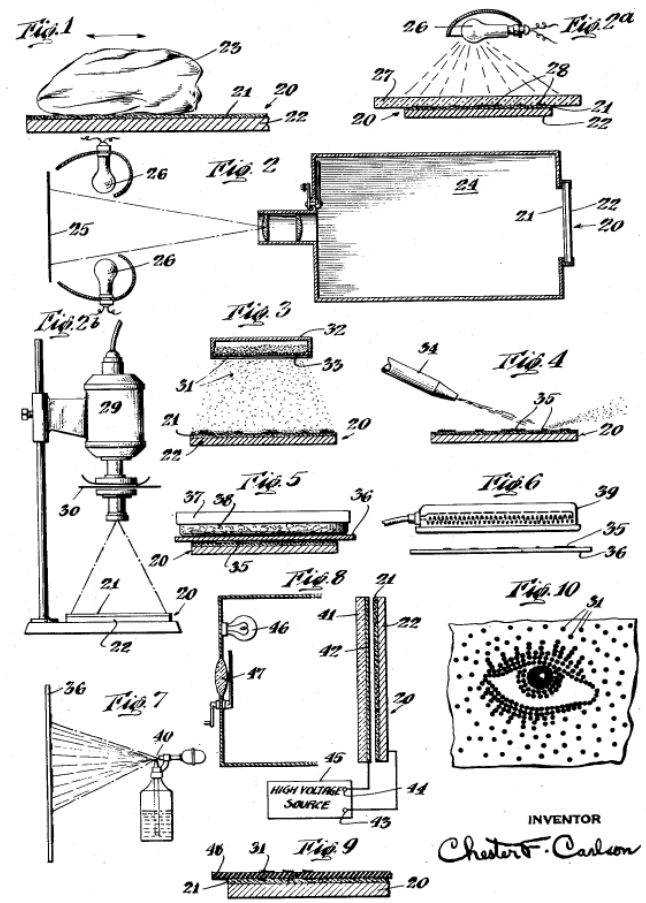
Sulfur coated plates may be prepared by placing a few crystals of pure sulfur onto the etched surface of the metal plate and heating the plate until the sulfur melts, then flowing the sulfur uniformly over the surface of the plate and allowing any excess to run off, and cooling the plate to solidify 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

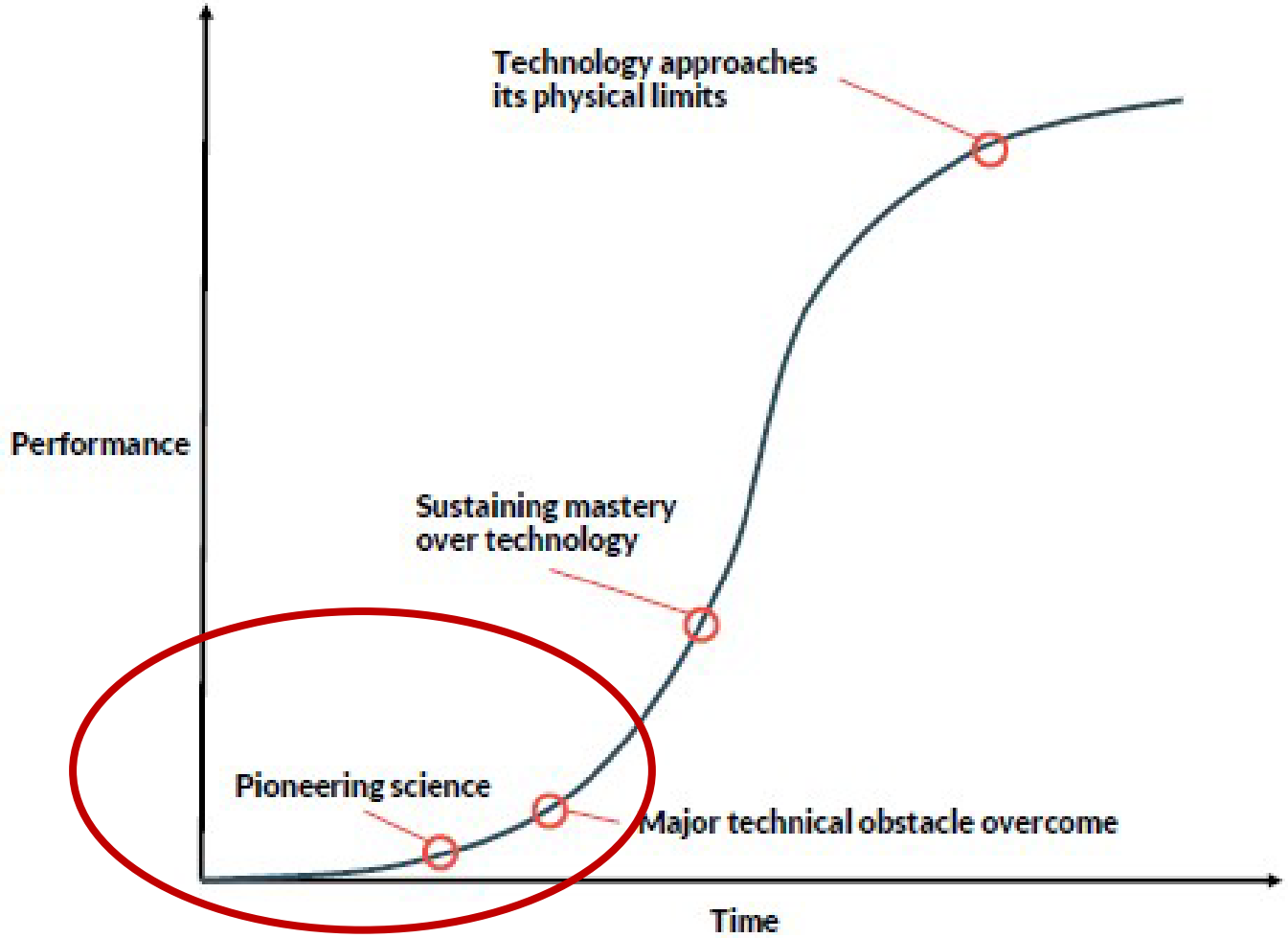
Filed April 4, 1939



Some Characteristics of Emerging Technologies

S - curve

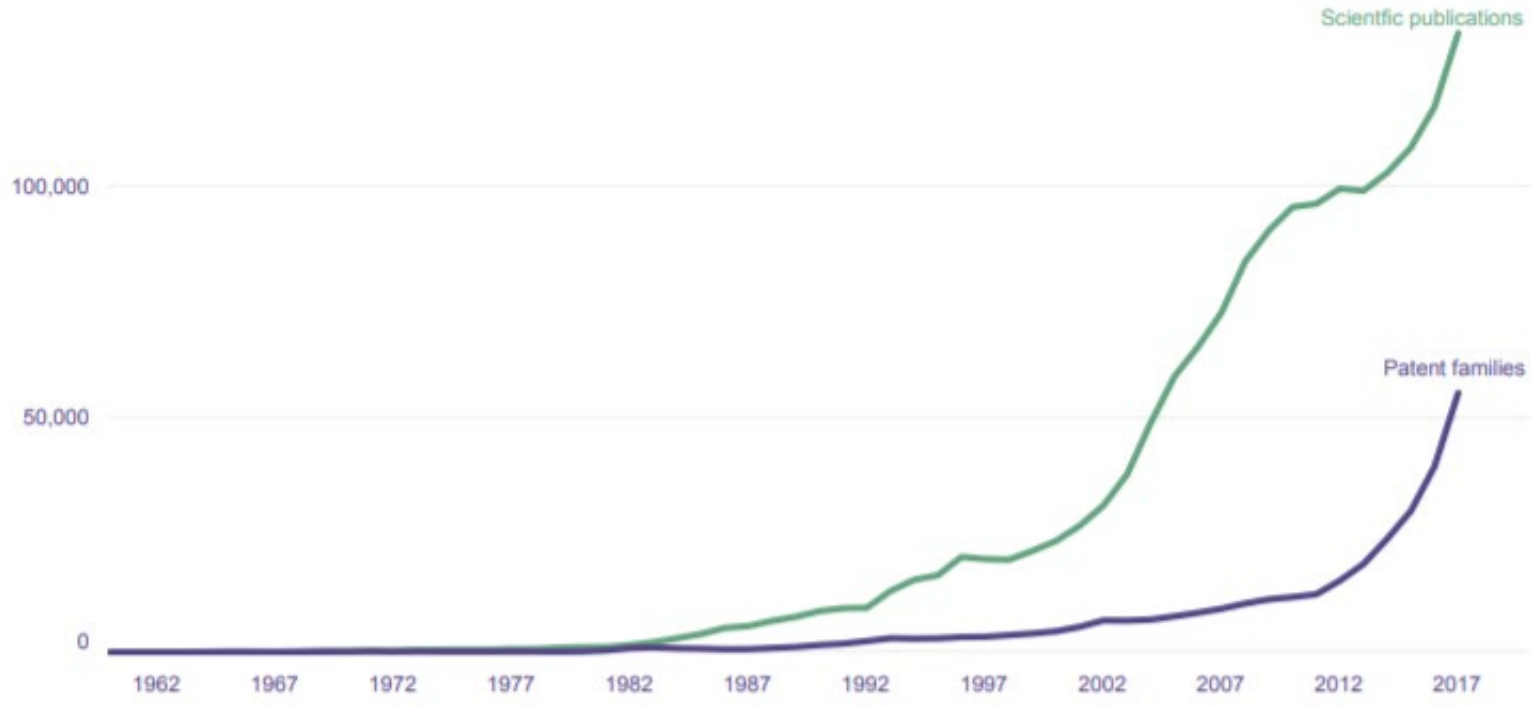
Wikimedia commons



AI Scientific publications lead patents

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

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[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 cells[3].

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 literature[5–7]. 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 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.

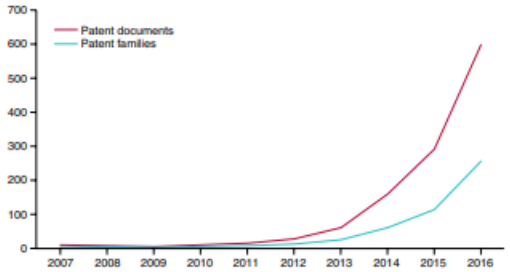


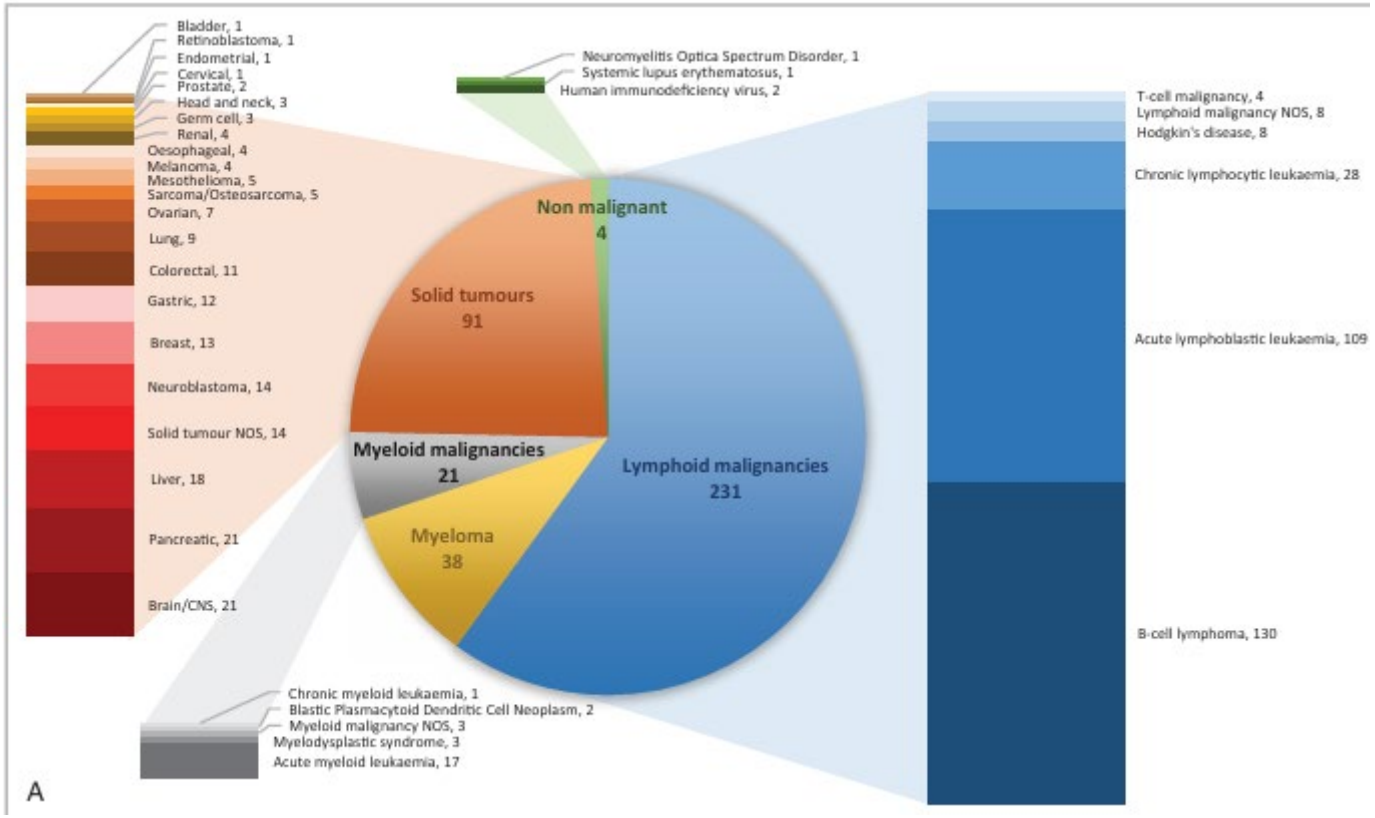
Fig. 1 | The number of CAR T-cell patents started increasing markedly in 2013.

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 patents[12] 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 immunotherapy[14]. A recent but very restricted study retrieved only ten CAR T-cell patent publications from the US Patent and Trademark Office[15].

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.

Autologous

Blood malignancies



Allogenic

Solid tumours

Other malignancies

Non-oncological

Non-human (animal)

NK cells

QUANTUM FLAGSHIP

1b € 10+ yr 5000+ researchers

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

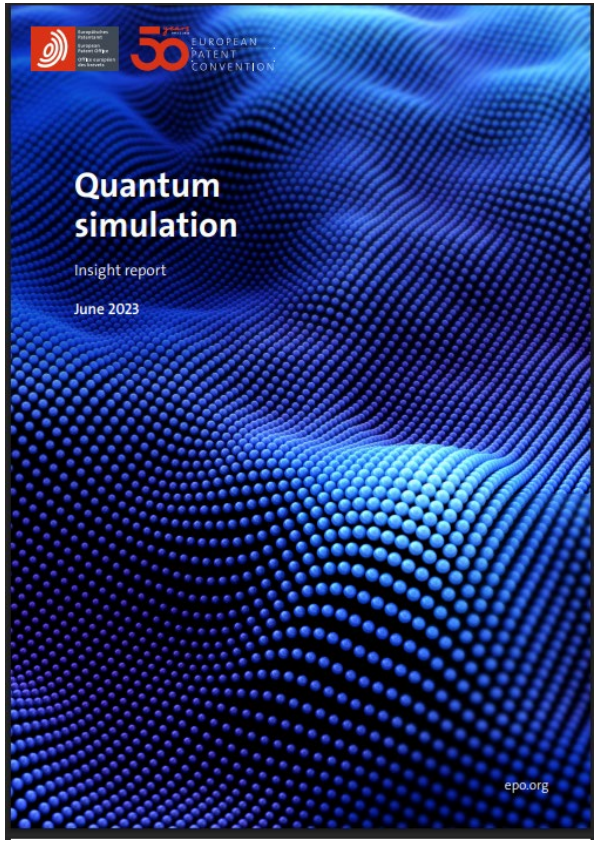
GRAPHENE
FLAGSHIP

Euro 1bn 10 years 170 research groups 22 countries

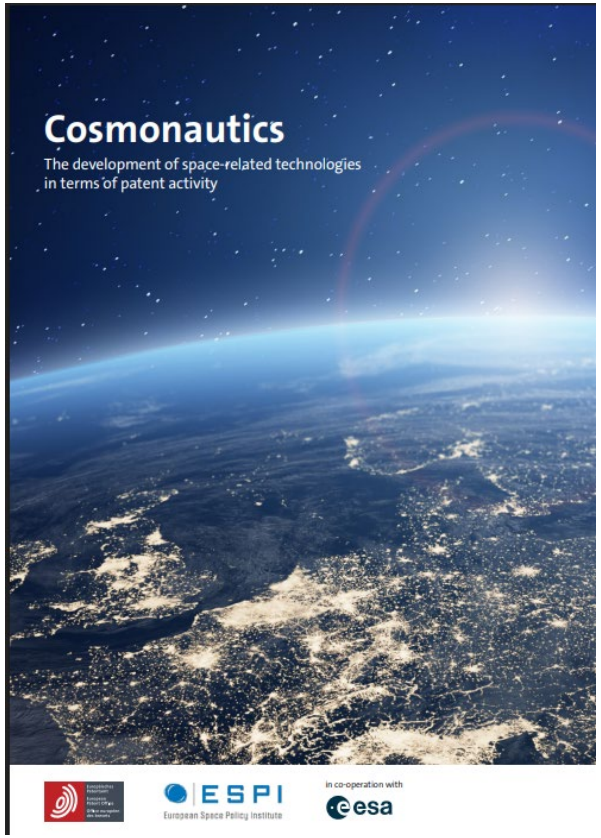
https://graphene-flagship.eu/collaboration/about-us/the-graphene-flagship/

Where to find emerging technologies?

1.Nigel´s favourites


EUROPEAN PATENT CONVENTION
Quantum simulation
Insight report
June 2023
epo.org

Europäisches Patentamt
European Patent Office
Office européen des brevets
Landscape study on patent filing
Quantum metrology and sensing


Cosmonautics
The development of space-related technologies in terms of patent activity
ESPI
European Space Policy Institute
in co-operation with
esa

Europäisches Patentamt
European Patent Office
Office européen des brevets
Patents and additive manufacturing
Trends in 3D printing technologies

2. Where other people think

Hype Cycle for Artificial Intelligence, 2023

Plateau will be reached:

○ less than 2 years ● 2 to 5 years ● 5 to 10 years ▲ more than 10 years ⊗ obsolete before plateau

As of July 2023

gartner.com

Source: Gartner

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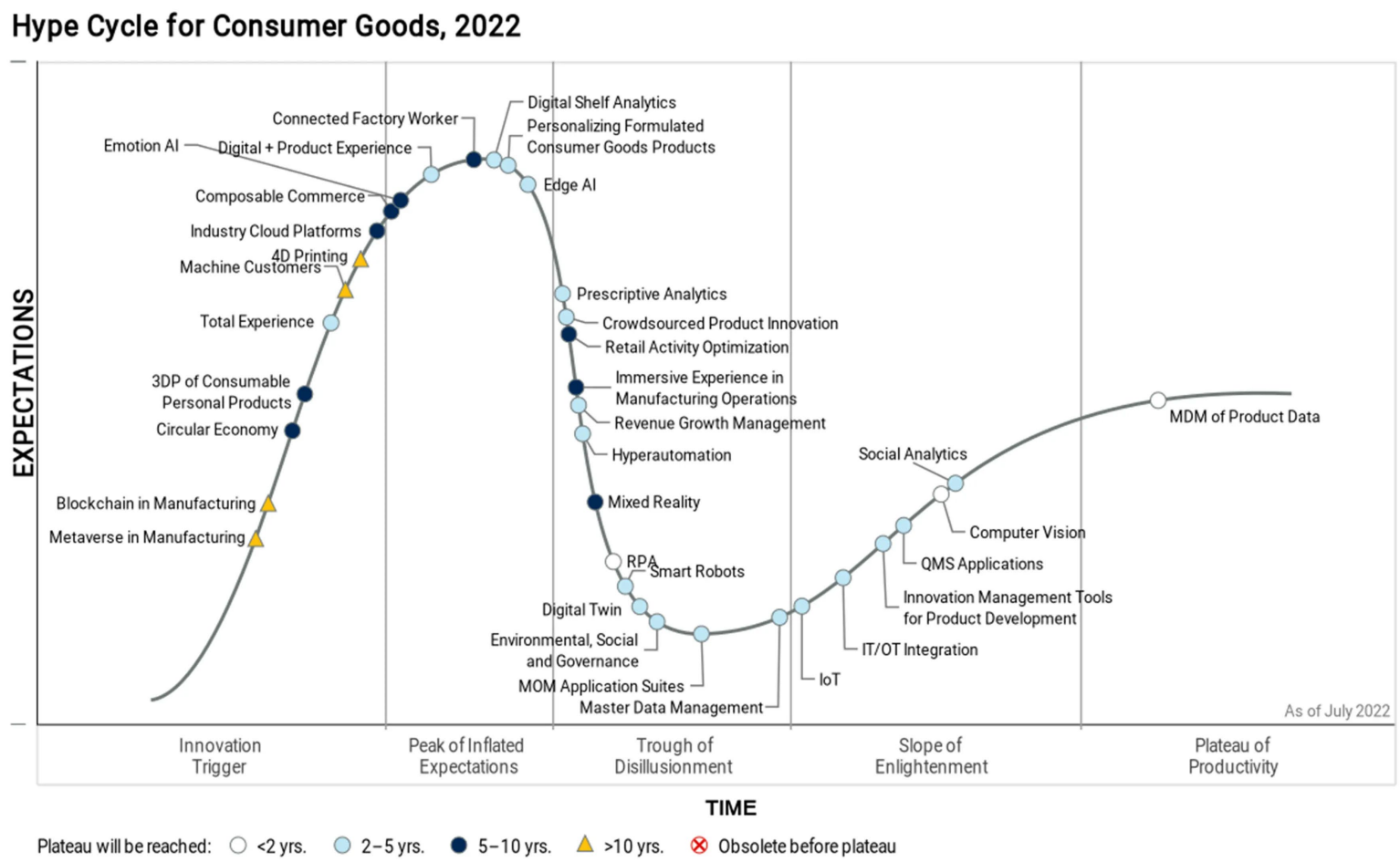
Gartner

Figure 1: Hype Cycle for Consumer Goods, 2022



Source: Gartner (July 2022)

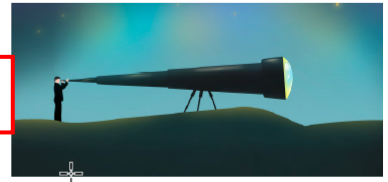
https://ec.europa.eu/info/sites/info/files/research_and_innovation/knowledge_publications_tools_and_data/documents/ec_rtd_radical-innovation_poster_052019.pdf

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

		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 5 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 EM	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	Artifical intelligence AI 40 AI	Computational creativity Cc 41 AI	Augmented reality AR 42 AI	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

LIKEHOOD OF SIGNIFICANT USE / EXPANSION BY 2038 → STRONG

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

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MIT Technology Review

10 Breakthrough Technologies 2024

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.

https://www.technologyreview.com/2024/01/08/1085094/10-breakthrough-technologies-2024/

- 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

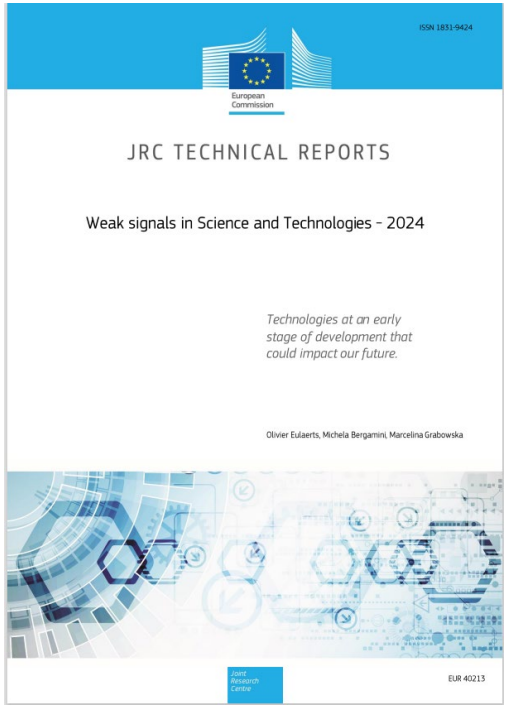
Detection of emerging technologies

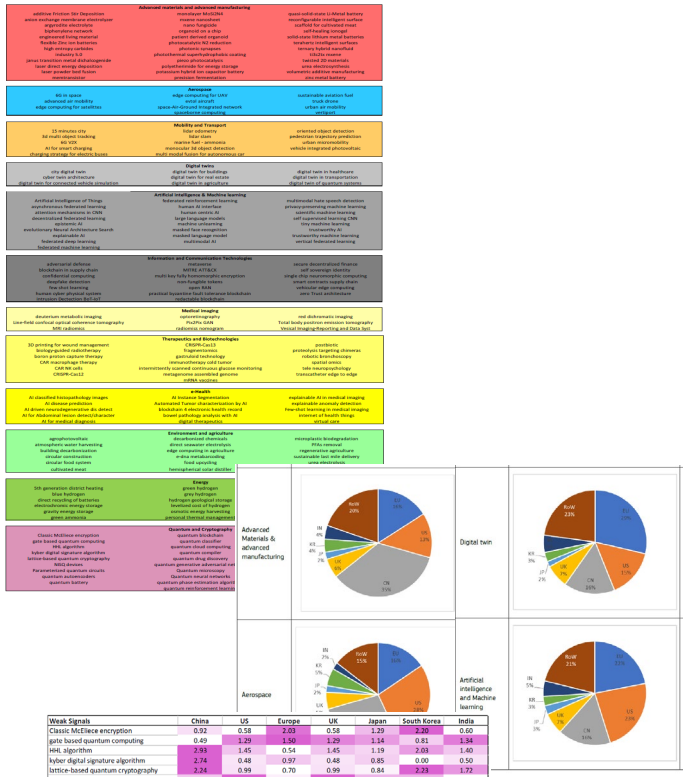
Technology foresight: detecting emerging technologies in scientific data

Analysis

Dashboards

Weak Signals 2024 Report
221 signals in 12 technology clusters

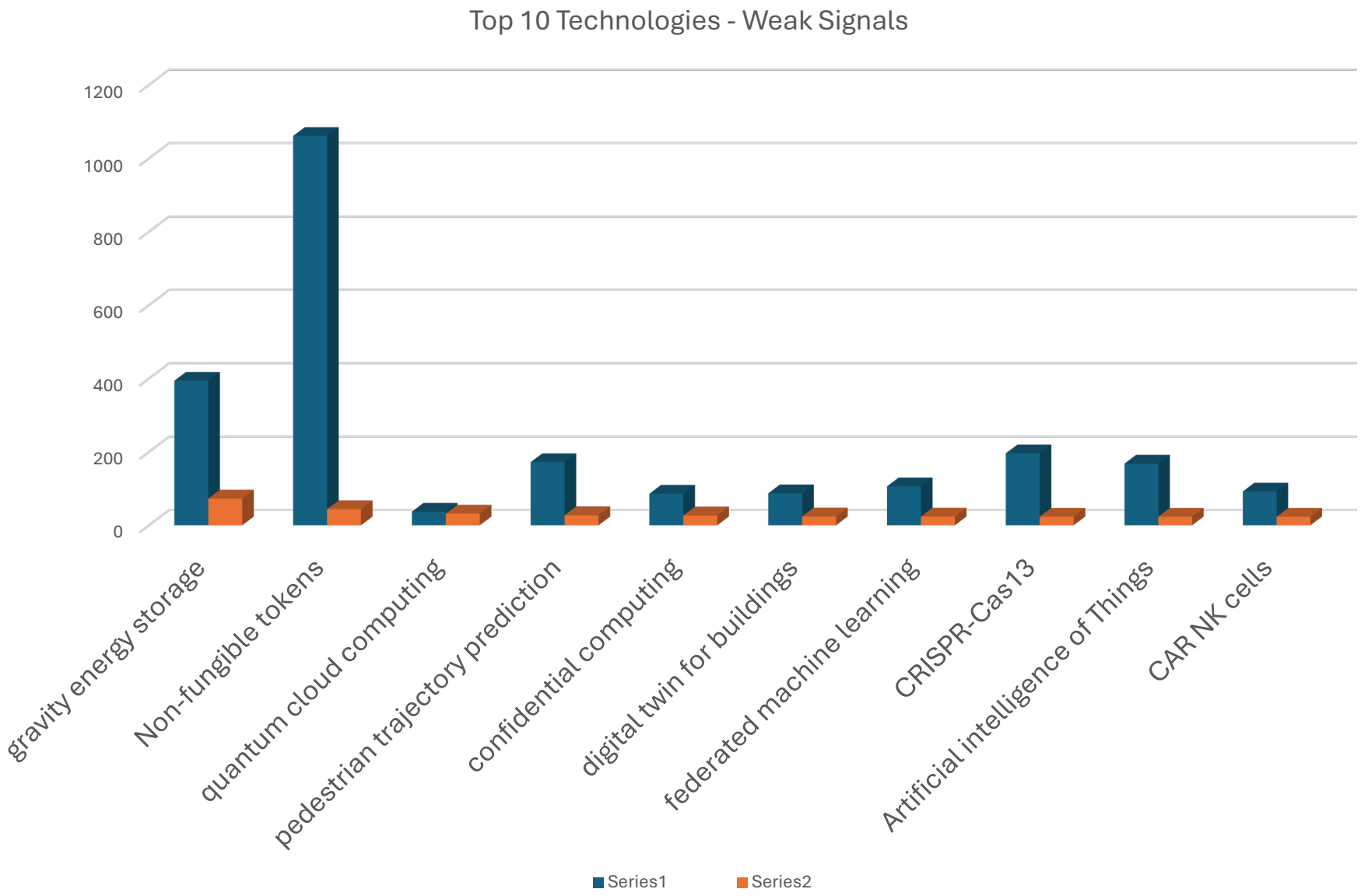


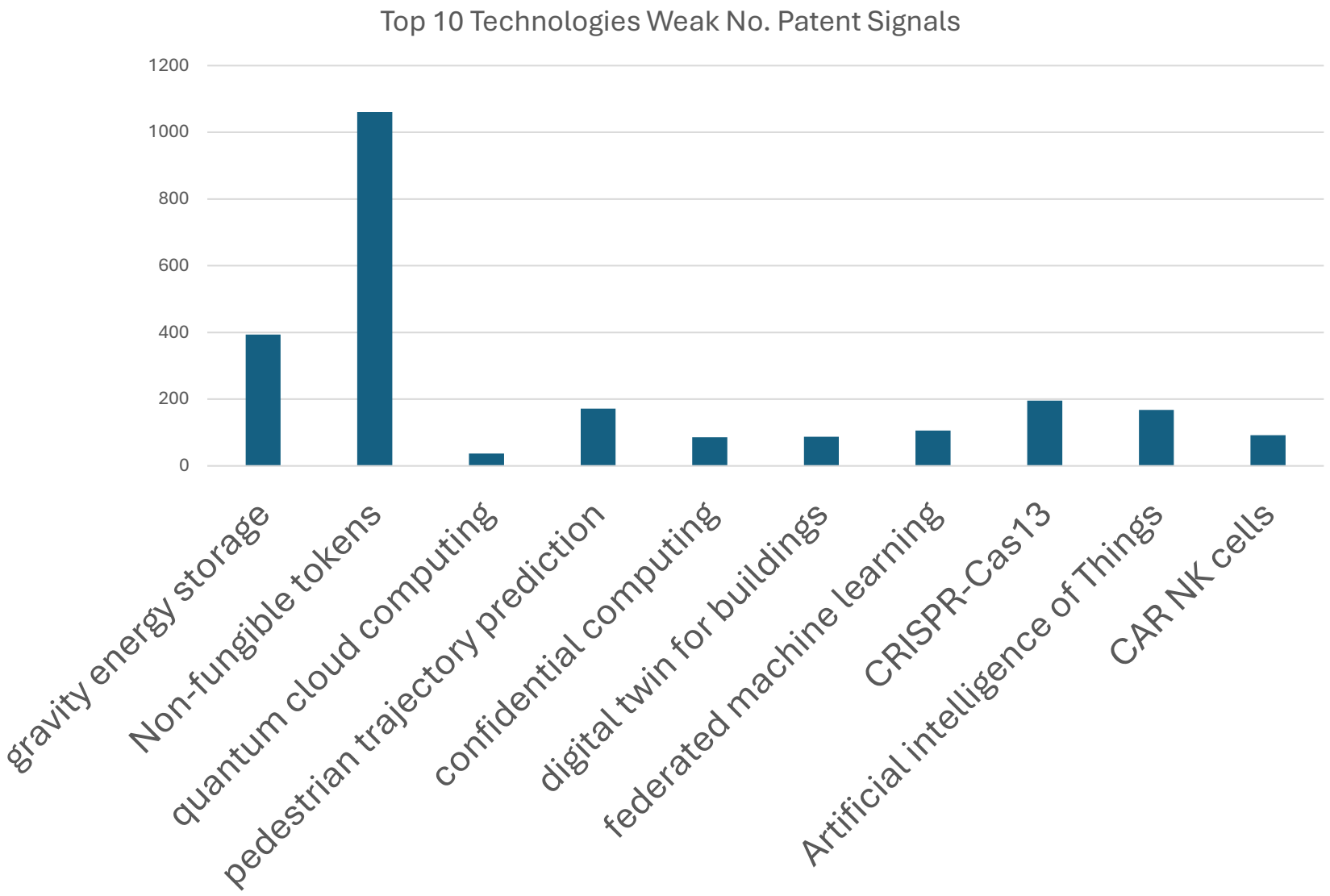


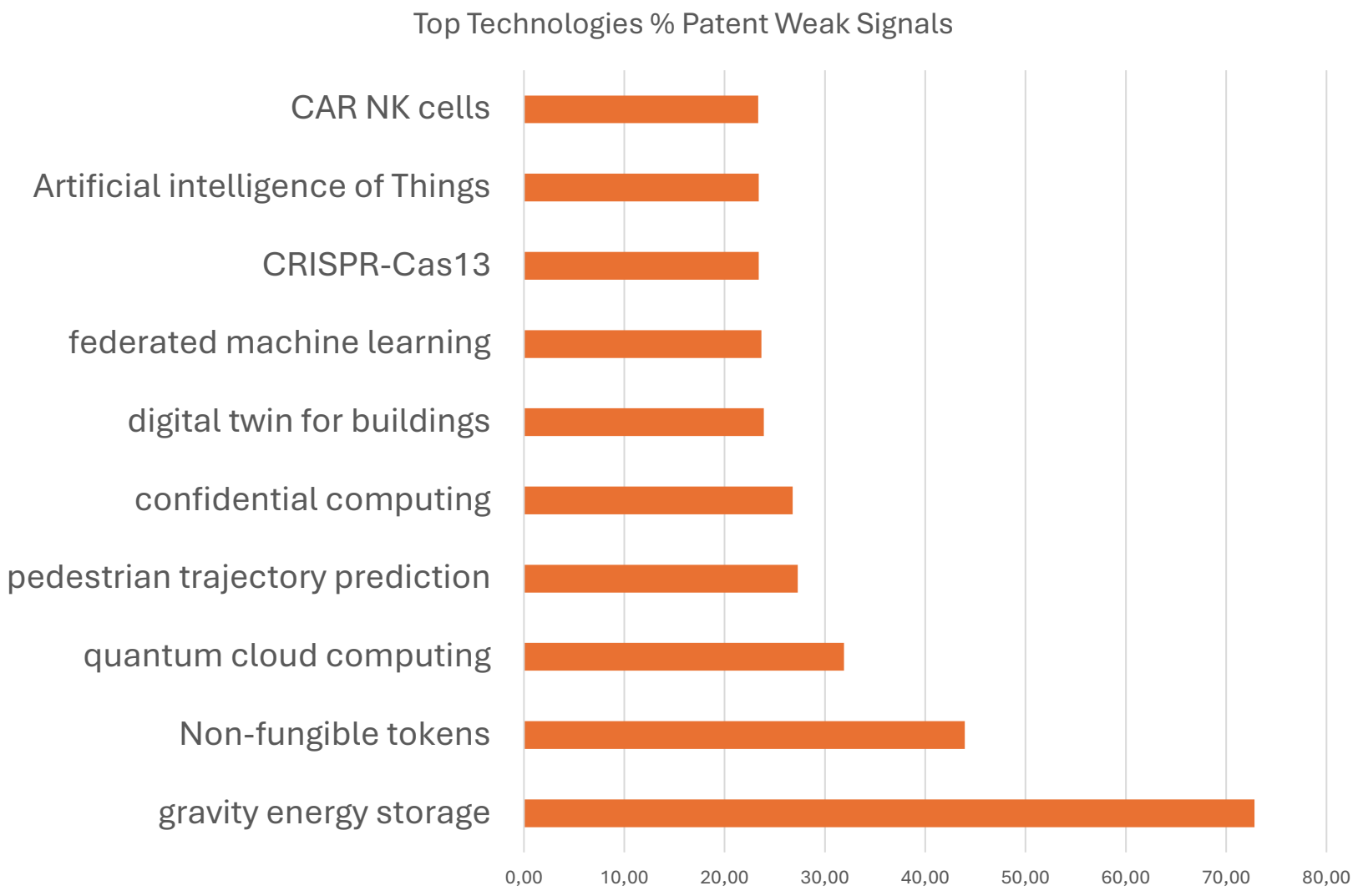
Weak Signals	China	US	Europe	UK	Japan	South Korea	India
Classic McEliece encryption	0.92	0.58	2.03	0.58	2.30	0.60	0.60
gate based quantum computing	0.49	1.29	1.50	1.29	1.14	0.81	1.34
HHL algorithm	2.93	1.45	0.54	1.45	1.19	2.03	1.40
kyber digital signature algorithm	2.74	0.48	0.97	0.48	0.85	0.00	0.50
lattice-based quantum cryptography	2.24	0.99	0.70	0.99	0.84	2.23	1.72
NISQ devices	1.25	1.92	1.00	1.92	1.38	1.36	0.89
Parameterized quantum circuits	1.82	1.80	0.78	1.80	1.53	1.45	1.40
quantum autoencoders	1.61	1.40	1.38	1.40	1.24	0.88	0.49
quantum battery	1.66	0.67	1.77	0.67	0.51	2.18	2.28
quantum blockchain	1.91	0.38	0.74	0.38	0.34	2.16	6.52
quantum classifier	1.35	0.81	1.15	0.81	0.77	0.62	3.29
quantum cloud computing	2.36	0.86	0.86	0.86	0.35	0.74	2.03
quantum compiler	0.79	2.28	1.05	2.28	1.01	0.92	0.68
quantum drug discovery	0.43	1.30	1.01	1.30	0.00	0.94	4.67
quantum generative adversarial network	1.93	1.92	1.00	1.92	0.57	0.00	0.33
Quantum microscopy	0.95	1.21	1.42	1.21	0.49	2.08	0.00
Quantum neural networks	1.78	0.98	0.64	0.98	1.21	0.79	2.61
quantum phase estimation algorithms	1.04	1.95	0.77	1.95	3.21	2.11	1.16
quantum reinforcement learning	1.90	0.68	1.55	0.68	0.18	2.28	1.67
quantum reservoir computing	0.31	0.86	2.47	0.86	3.33	1.02	0.00
quantum resistant algorithm	1.23	1.03	1.00	1.03	0.40	0.43	1.82
quantum sdk	0.57	1.06	1.04	1.06	0.00	0.63	5.15
quantum support vector	0.93	0.70	0.75	0.70	0.36	1.02	6.88
quantum transduction	0.50	3.20	0.89	3.20	0.19	0.41	0.68
Quantum Variational Algorithms	1.14	1.87	1.03	1.87	1.44	0.98	0.95
shallow quantum circuits	1.64	2.10	1.05	2.10	2.72	0.00	0.46
superconducting quantum processors	1.37	2.56	1.22	2.56	1.41	0.32	0.26
variational quantum circuits	0.92	1.49	0.96	1.49	1.14	1.22	1.91
Average for all weak signals	1.38	1.35	1.11	1.35	1.04	1.14	1.85

Report here

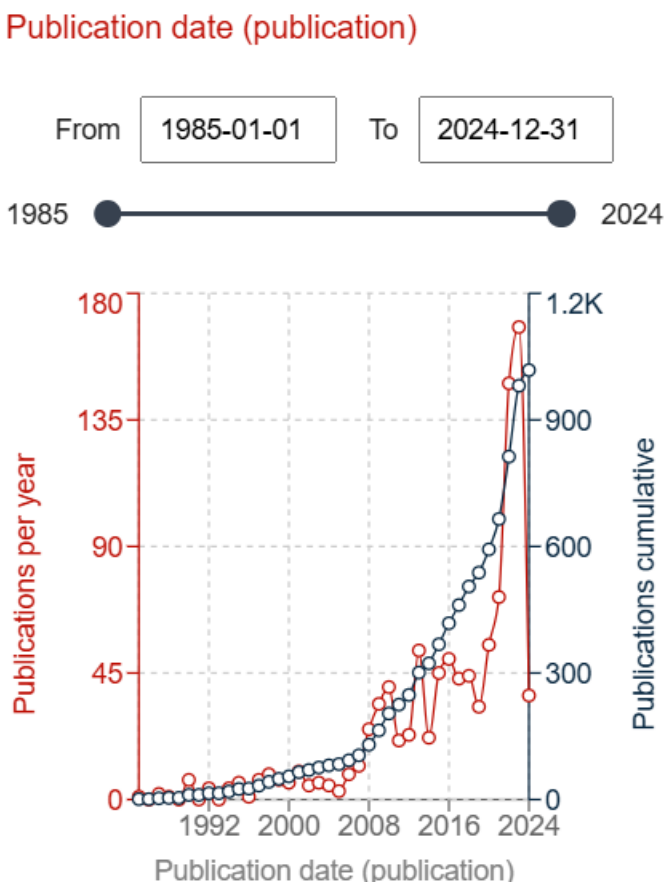
Dataset	#patents	%patents
gravity energy storage	394	72.83
Non-fungible tokens	1061	43.95
quantum cloud computing	37	31.90
pedestrian trajectory prediction	172	27.30
confidential computing	86	26.79
digital twin for buildings	87	23.90
federated machine learning	106	23.66
CRISPR-Cas13	196	23.42
Artificial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

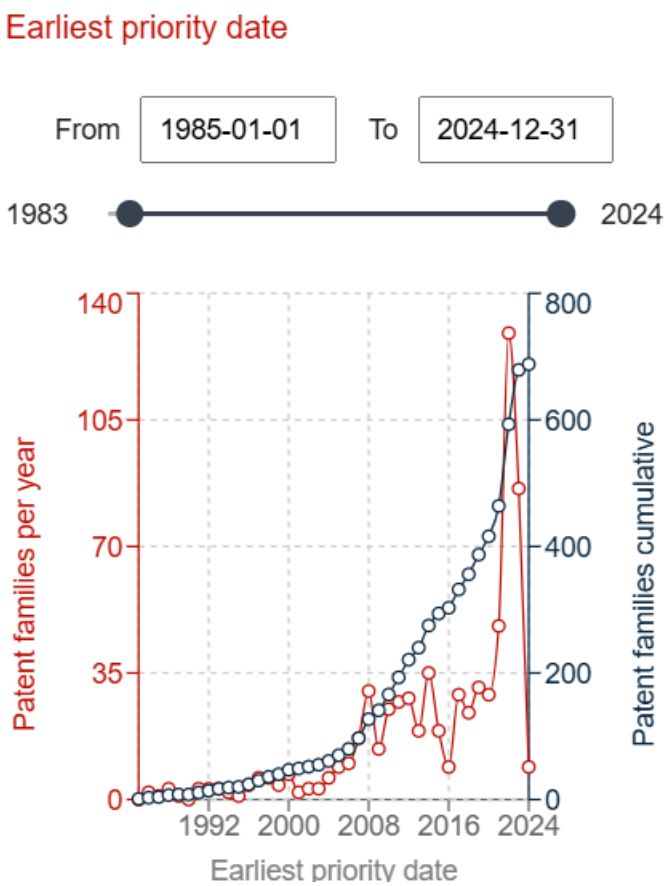

Top 10 Technologies - Weak Signals
1200
1000
800
600
400
200
0
gravity energy storage
Non-fungible tokens
quantum cloud computing
pedestrian trajectory prediction
confidential computing
digital twin for buildings
federated machine learning
CRISPR-Cas13
Artificial intelligence of Things
CAR NK cells
Series1
Series2


Top 10 Technologies Weak No. Patent Signals
1200
1000
800
600
400
200
0
gravity energy storage
Non-fungible tokens
quantum cloud computing
pedestrian trajectory prediction
confidential computing
digital twin for buildings
federated machine learning
CRISPR-Cas13
Artificial intelligence of Things
CAR NK cells

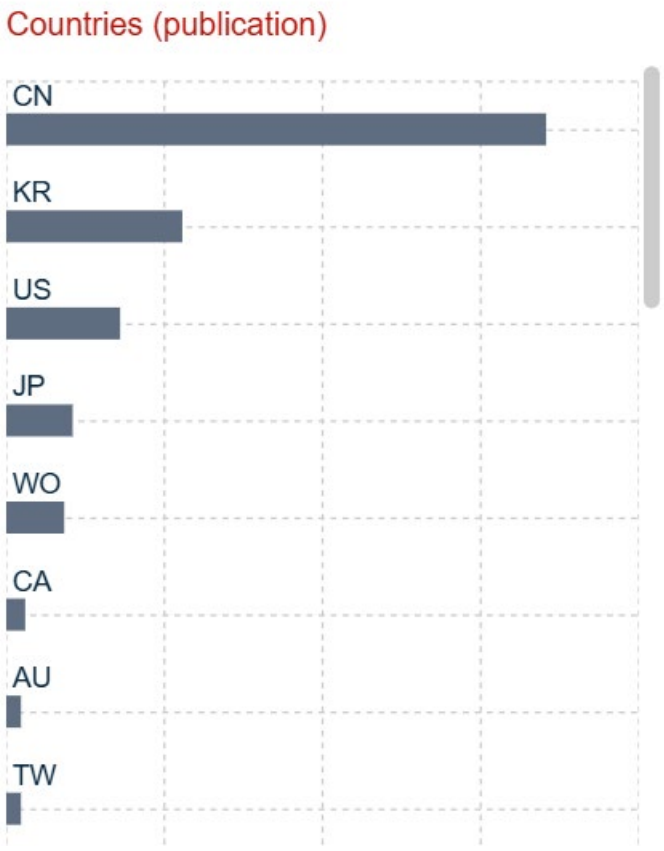

Top Technologies % Patent Weak Signals
CAR NK cells
Artificial intelligence of Things
CRISPR-Cas13
federated machine learning
digital twin for buildings
confidential computing
pedestrian trajectory prediction
quantum cloud computing
Non-fungible tokens
gravity energy storage
0,00
10,00
20,00
30,00
40,00
50,00
60,00
70,00
80,00

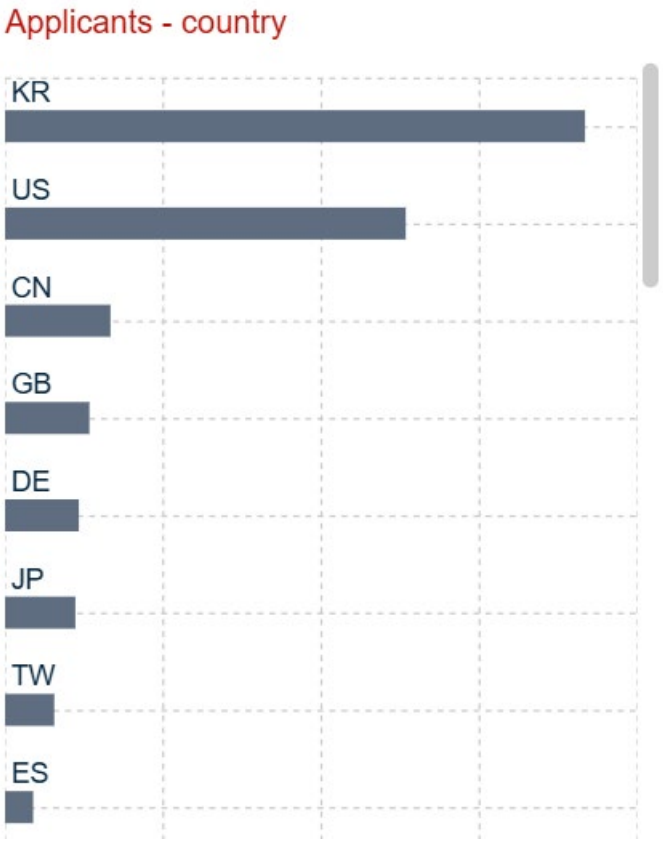
Gravity Energy Storage





Gravity Energy Storage





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

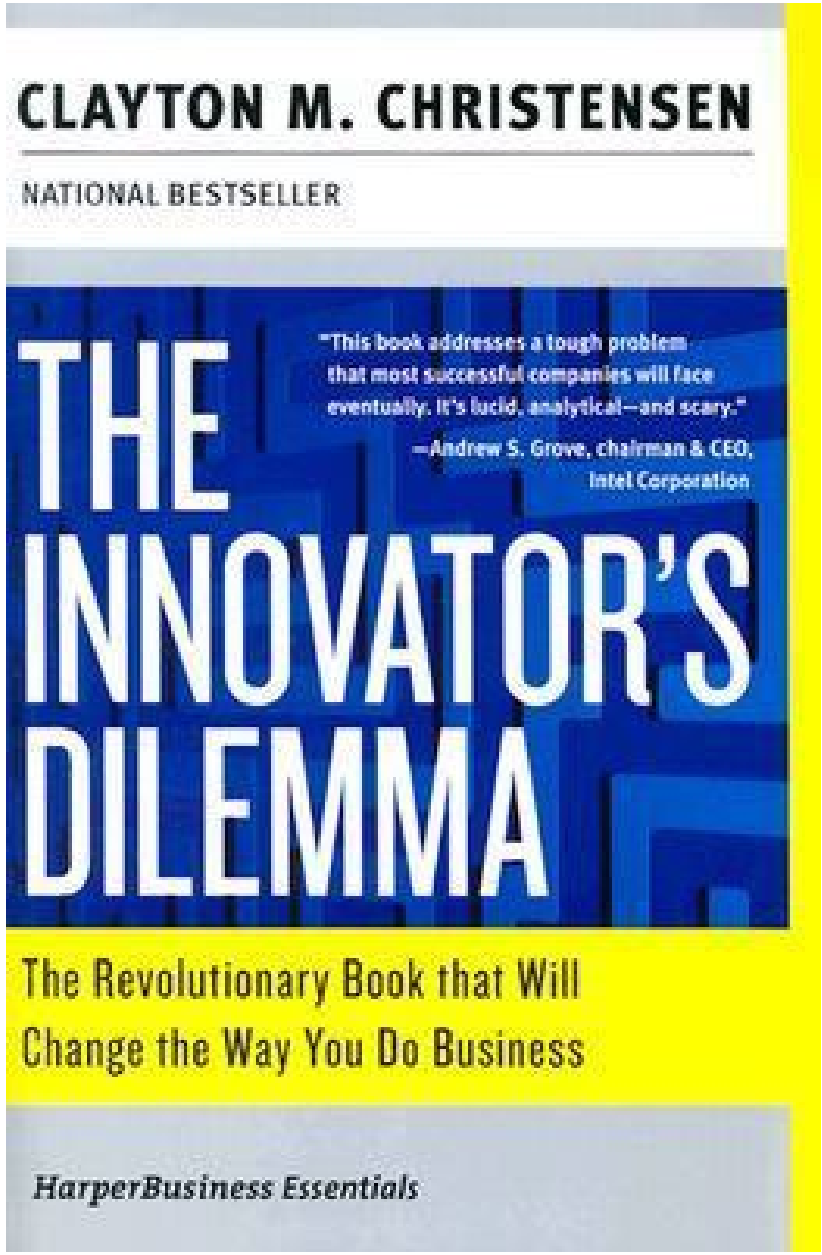
NPL/patents < 1 established

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

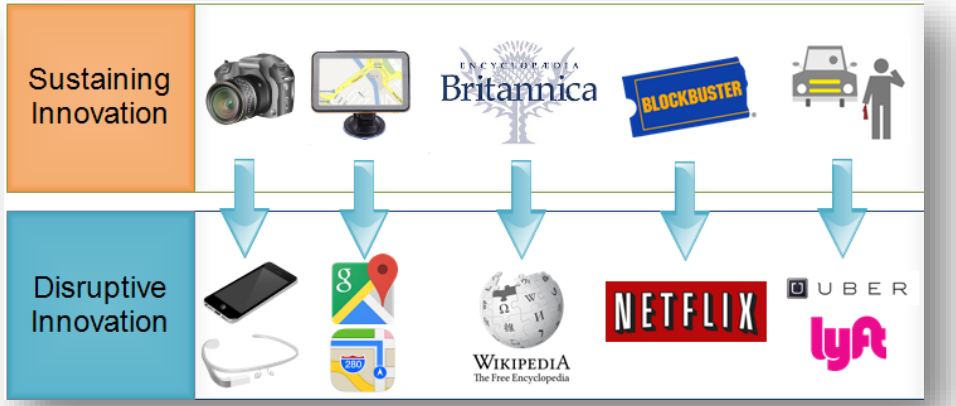

CLAYTON M. CHRISTENSEN
NATIONAL BESTSELLER
THE INNOVATOR'S DILEMMA
"This book addresses a tough problem that most successful companies will face eventually. It's lucid, analytical—and scary."
—Andrew S. Grove, chairman & CEO, Intel Corporation
The Revolutionary Book that Will Change the Way You Do Business
HarperBusiness Essentials

TYPICAL DISRUPTIVE INNOVATION EXAMPLES – THE USUAL SUSPECTS

Of which some are:

- Disruptive technology-based products
- Disruptive business models
- Disruptive technology

Industry	Incumbent	Entrant	Type of innovation *(Sustaining vs. Disruptive)*
Online Education in a University	HARVARD BUSINESS SCHOOL	Harvard Business School Online	Sustaining Innovation
Personal vs. Xerox High-Quality Copiers			New-Market **Disruptive** Innovation
On-demand Video Streaming	BLOCKBUSTER	NETFLIX	Combination of Low-End and New Market **Disruptive** Innovation
Smartphone vs. Pcs			New Market **Disruptive** innovation
PCs vs. Mainframe Computers			Combination of Low-End and New Market **Disruptive** Innovation
Airbnb vs. Hotels	Marriott MARRIOTT	airbnb	Combination of Low-End and New Market **Disruptive** Innovation
Digital vs. Film Cameras	Kodak	Canon	Combination of Low-End and New Market **Disruptive** Innovation
Cellphone Camera vs. Photography Industry	photography market as a whole		Combination of Low-End and New Market **Disruptive** Innovation



LIMITED EVIDENCE ON CLEARLY „PROVEN“ DISRUPTIVE INNOVTIONS

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

King, Andrew A, and Baljir Baatartogtokh. ‘How Useful Is the Theory of Disruptive Innovation?’ *Sloan Management Review* 57, no. 1 (2015).

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

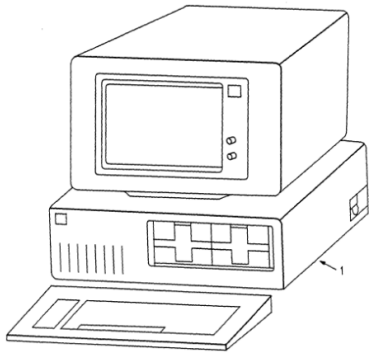


FIG. 1

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, t_0
i.e. sustaining innovations

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

SQL patent LINK

PATENT ZERO EXAMPLE – SOME INITIAL OBSERVATIONS

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

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