PATENT PROTECTION TOOLS IN THE FIELD OF ARTIFICIAL INTELLIGENCE AND IoT

- TRENDS IN EUROPE AND OPEN CRITICALITIES -

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Our agenda

- Definitions
- Statistics about patents / applications relating to AI
- AI inventions
- Inventive AI
- "*Take aways*"

Definitions

DEEP LEARNING

LARGE-SCALE MACHINE LEARNING

REINFORCEMENT LEARNING

COMPUTER VISION

ROBOTICS

NATURAL LANGUAGE PROCESSING

INTERNET OF THINGS

COLLABORATIVE SYSTEMS

NEUROMORPHIC COMPUTING

The first definition

"The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it."
[John McCarthy, 1955]

The current definitions

Artificial intelligence (AI) is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings, such as discover, generalize or learn from past experience.
[*https://www.britannica.com/technology/artificial-intelligence*]

Machine learning (ML) relates to algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference. It is seen as a subset of artificial intelligence.
[*https://en.wikipedia.org/]*

Still other definitions …

Deep learning (also known as *deep structured learning* or *hierarchical learning*) is part of a broader family of machine learning methods based on artificial neural networks.
[*https://en.wikipedia.org/*]

"Big data" is a field that analyzes, systematically extracts information from, or otherwise deals with data sets that are too large or complex to be dealt with by traditional data-processing application software.
[*https://en.wikipedia.org/*]

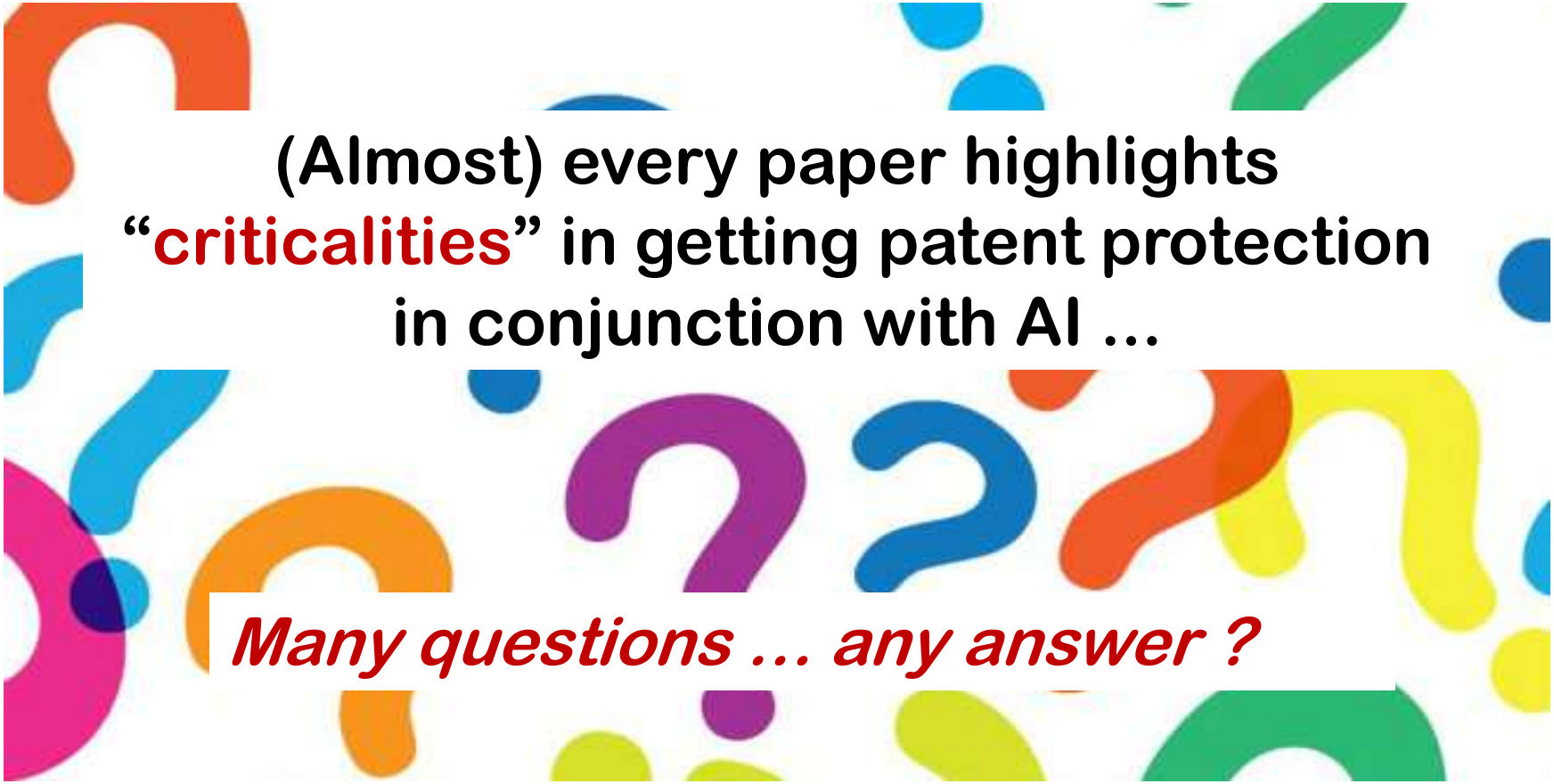
A “typical” AI path …

(1) Training data
Used by ML algorithm to configure output function

(2) New data
Exposed to output function to get prediction

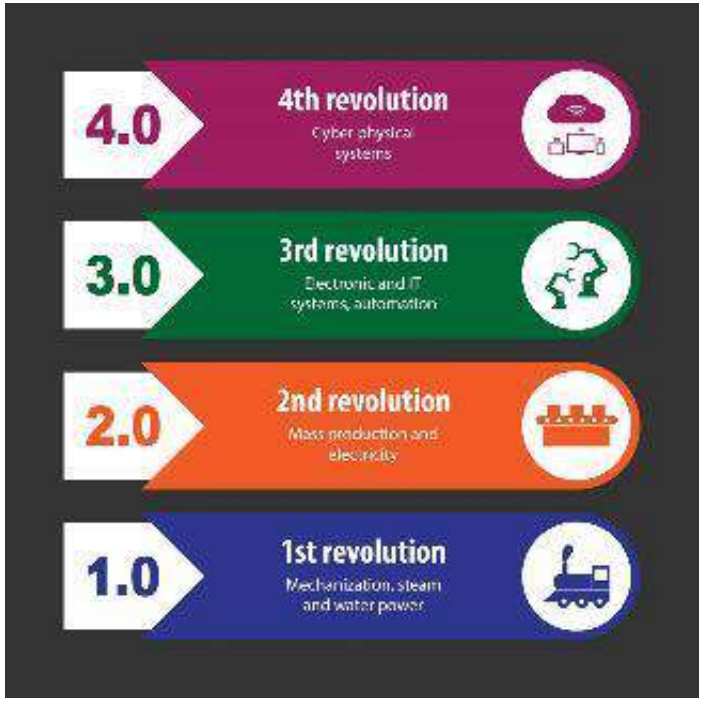
"Black box"
with output function based on ML algorithm

Prediction
(different types exist)



Why all such questions come up now, when the first discussions about AI started in the '50 ?

Because now the technological advancements in <u>data handling capacity</u> and <u>processing</u> have paved the way for machine-learning to use deep leaning and big data techniques in today's business.



In fact, AI is one of the main drivers of the present 4th industrial revolution.

Examples of AI applications

BUSINESS / General

- Wall Street transactions (60%)
- Robotic Process automation
- Robotic manufacture automation

BUSINESS / IP & Legal firms

Document automation

Translations, drafting, proof-reading, auto-generated drawings.

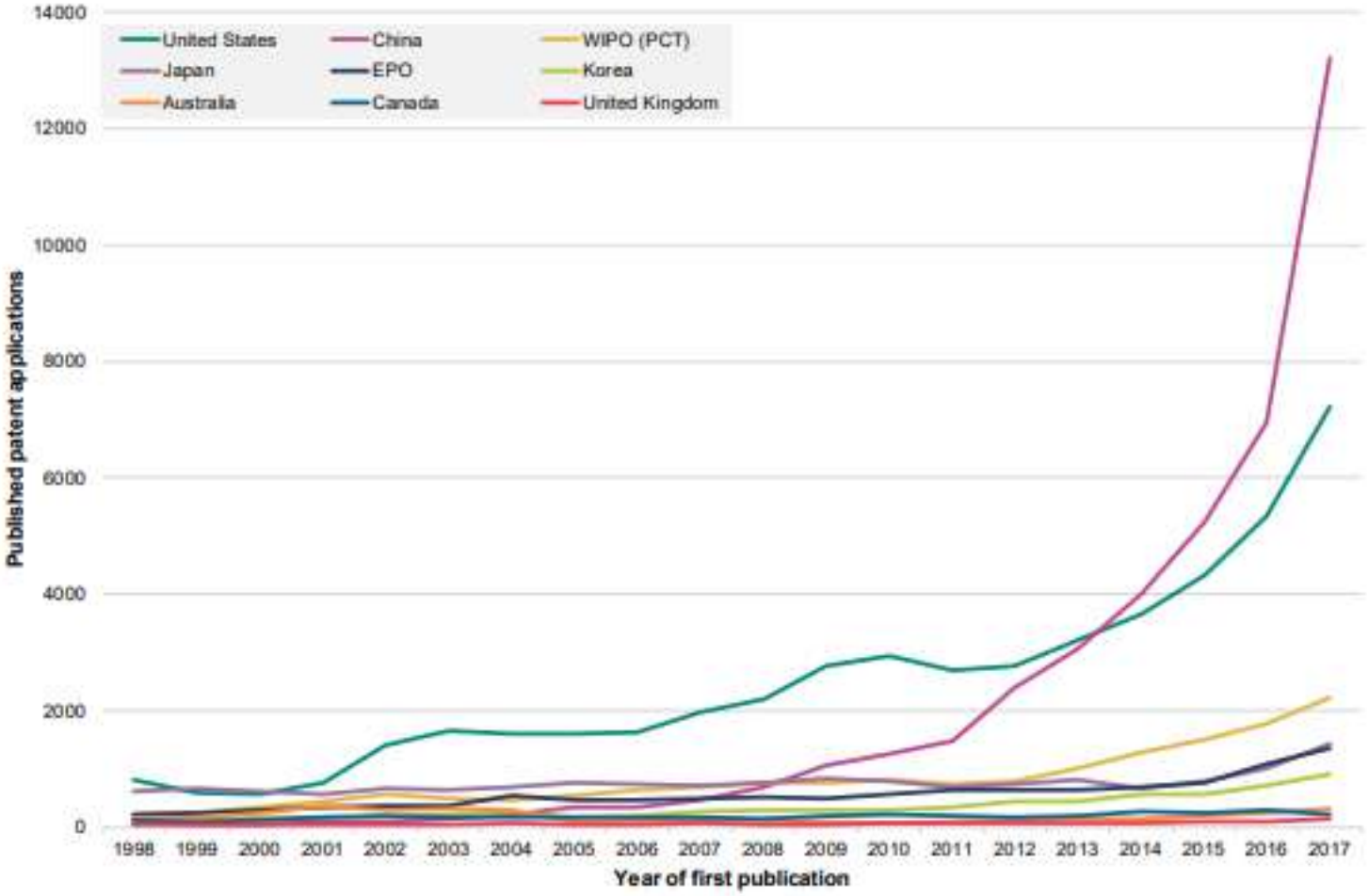
Process automation

Docketing, office action handling, filing procedures, patentability/trademark searches, IDS, client reporting.

Insights into substantive work

Prediction of office objections, proceedings outcome, FTO, as influencing judgment and creativity / allowing informed decision.

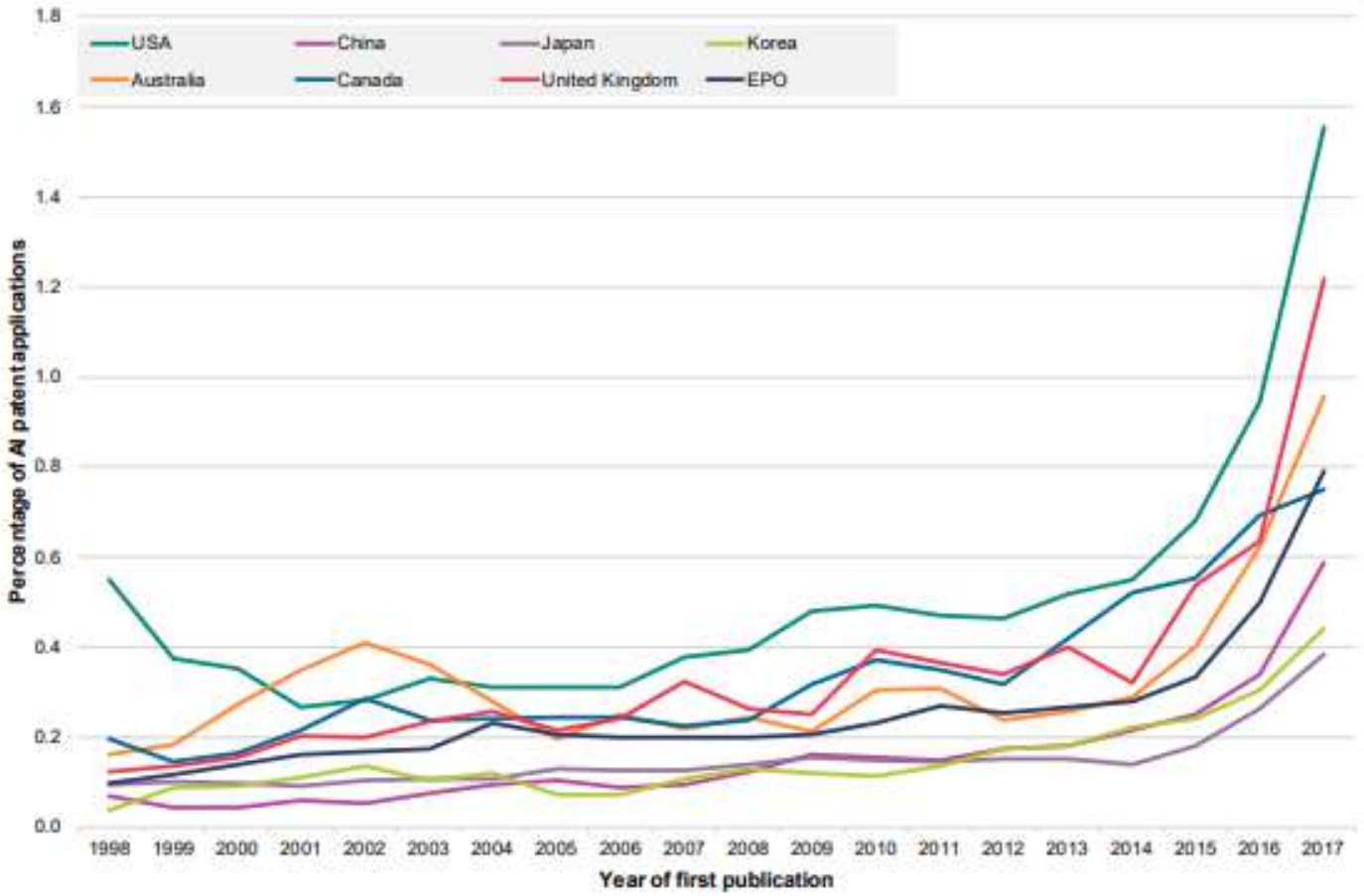
A few numbers (i)



AI patent applications, per year of first publication, per publication country
(Vancouver Group and IP5 countries, plus WIPO (PCT) applications)

https://www.iam-media.com/market-developments/everything-you-wanted-know-about-ai-patents-were-afraid-ask-part-2

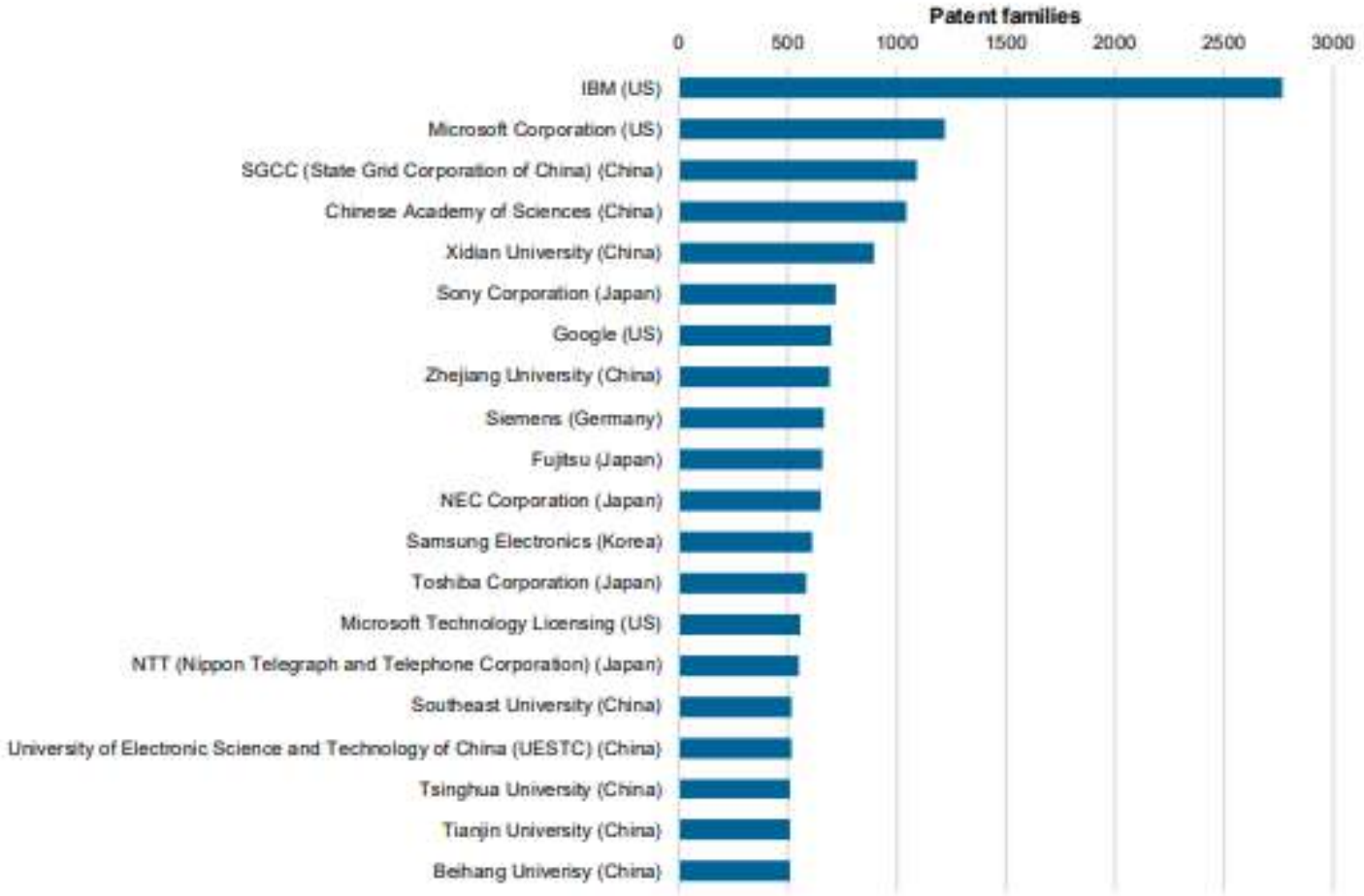
A few numbers (ii)



AI patent applications as a proportion of overall patenting activity, per publication country, per year of first publication (Vancouver Group and IP5 offices)

https://www.iam-media.com/market-developments/everything-you-wanted-know-about-ai-patents-were-afraid-ask-part-2

A few numbers (iii)



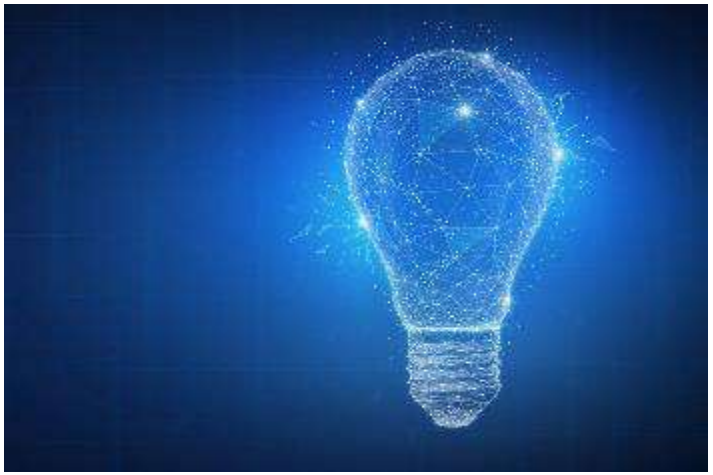
Top applicants by total number of AI patent families, 1998-2017

https://www.iam-media.com/market-developments/everything-you-wanted-know-about-ai-patents-were-afraid-ask-part-2

AI INVENTIONS
(including IoT)

meaning those inventions that pertain to AI

Typically, AI innovation consists of software, algorithms, training methods, training data, neural network structures.



The criticalities in patenting AI inventions (i)

Eligibility

- AI inventions relate to software, algorithms, computational models, data and databases, often for non-technical applications, e.g. classification, clustering, cognitive data processing.

- Algorithms, models, data, software are generally excluded, *per se*, from patent protection.

Answers

- (Applicant) Show that the innovation has a "*technical character*", i.e. it provides a technical effect going beyond the normal interaction between software and machine, because, e.g., has a concrete application, entails technical considerations, processes technical data for a technical purpose, not being concerned with purely abstract ideas only.

- (Office) More flexibility in allowing patents upon algorithms ?

- (Office) Avoiding field discrimination.

Examples of (in)eligible subject-matter (before the European Patent Office)

- Use of a neural network in a heart monitoring apparatus to identify irregular heartbeats is patentable (T598/07).
- Classification of images, videos, audio or speech signals based on low-level features are technical purposes, as well as training of classifiers (T1286/09).
    - However, classification of unstructured text documents has been held not to be, *per se*, a technical purpose, but rather a linguistic one (T1358/09).

The criticalities in patenting AI inventions (ii)

Sufficiency of disclosure

- "Black-box" patents are generally not allowed.
- The training set of data should be disclosed.
- Privacy restricted data pools might have been used.
- Scope of protection must be balanced with the scope of disclosure.

Answer

- Making available the dataset or the network structure in ways alternative to the written disclosure ? (*Similarities with biotech inventions*)

The criticalities in patenting AI inventions (iii)

Inventive step

- Two-hurdle approach at the EPO *vs* eligibility and inventive step, wherein "non technical" features are not considered in the assessment of inventive step.

- Reliable construction of the state of the art.

Answers

- Same as above for the two-hurdle (linked to eligibility).

- The state of the art will need be construed over time (assessed by AI ?).

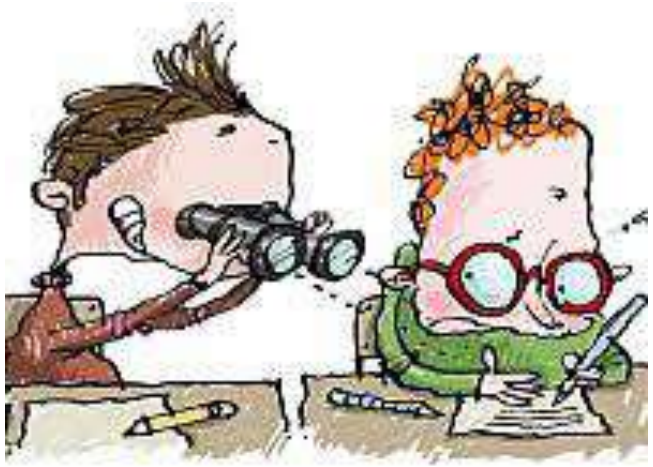
The criticalities in patenting AI inventions (iv)

Enforcement (a problem in common with CII inventions)

- Infringement of a method or algorithm claim is difficult to assess.

Answer

- Partial reversal of the burden of proof ?
- SEPs, patent pools.



Why do you want to patent AI ?

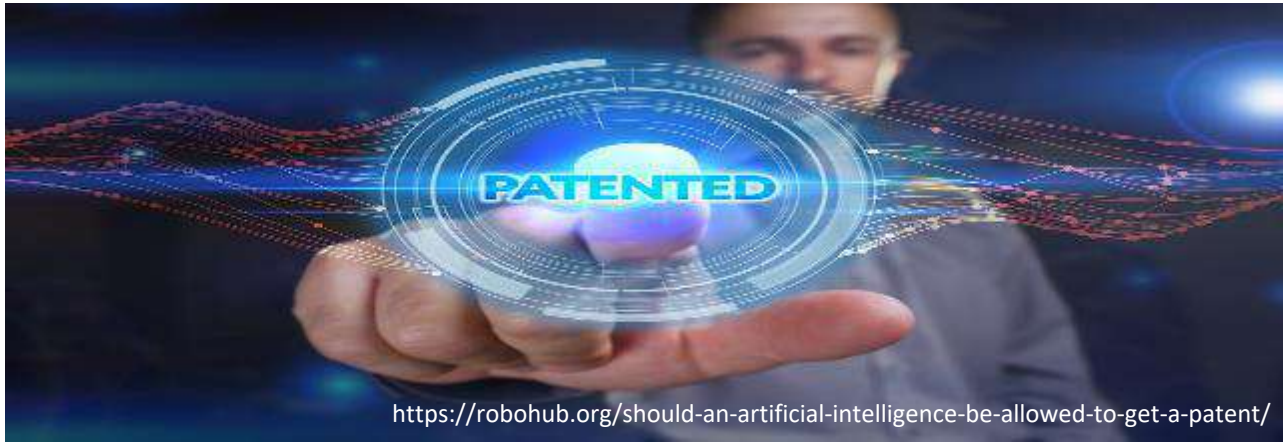
Use copyright, design, trademark or know-how (trade secrets) protection instead.

For the inventor/creator company

- **Foster further innovation in the field.**

For the public

- **Better to disclose than not to disclose.**

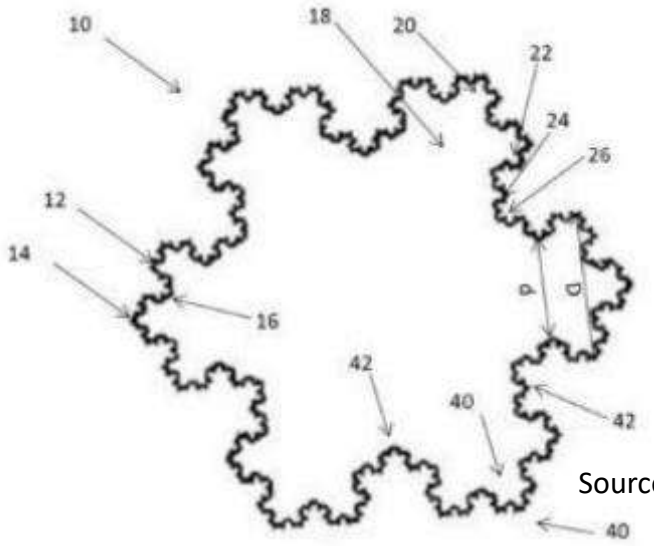


https://robohub.org/should-an-artificial-intelligence-be-allowed-to-get-a-patent/

INVENTIVE AI

meaning those inventions that are developed through/by AI

Typically, inventive AI provides new devices, molecule, composition of matters *et al*



Source: Ryan Abbott

The criticalities in patenting inventive AI (i)

Inventorship & ownership

- Recognizing computers as legal persons (patrimonial and moral rights) represents quite a re-assessment of society's relationship *vs* technology

  (e.g., the USPTO has a presumption that the Inventor is human, not the EPO).
- Fair prize to the Inventor(s).

Answer

- Human inventors (team) who designs the algorithm and/or the system architecture, chooses or provides the data training set or the input data, indicates a specific technical application.

www.hansonrobotics.com/robot/sophia/

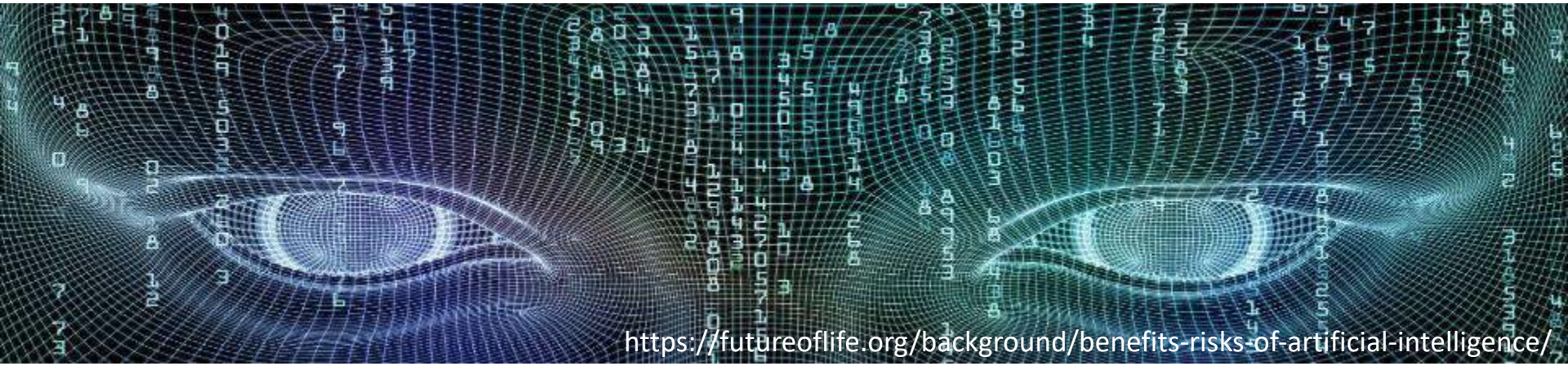
The criticalities in patenting inventive AI (ii)

Examination

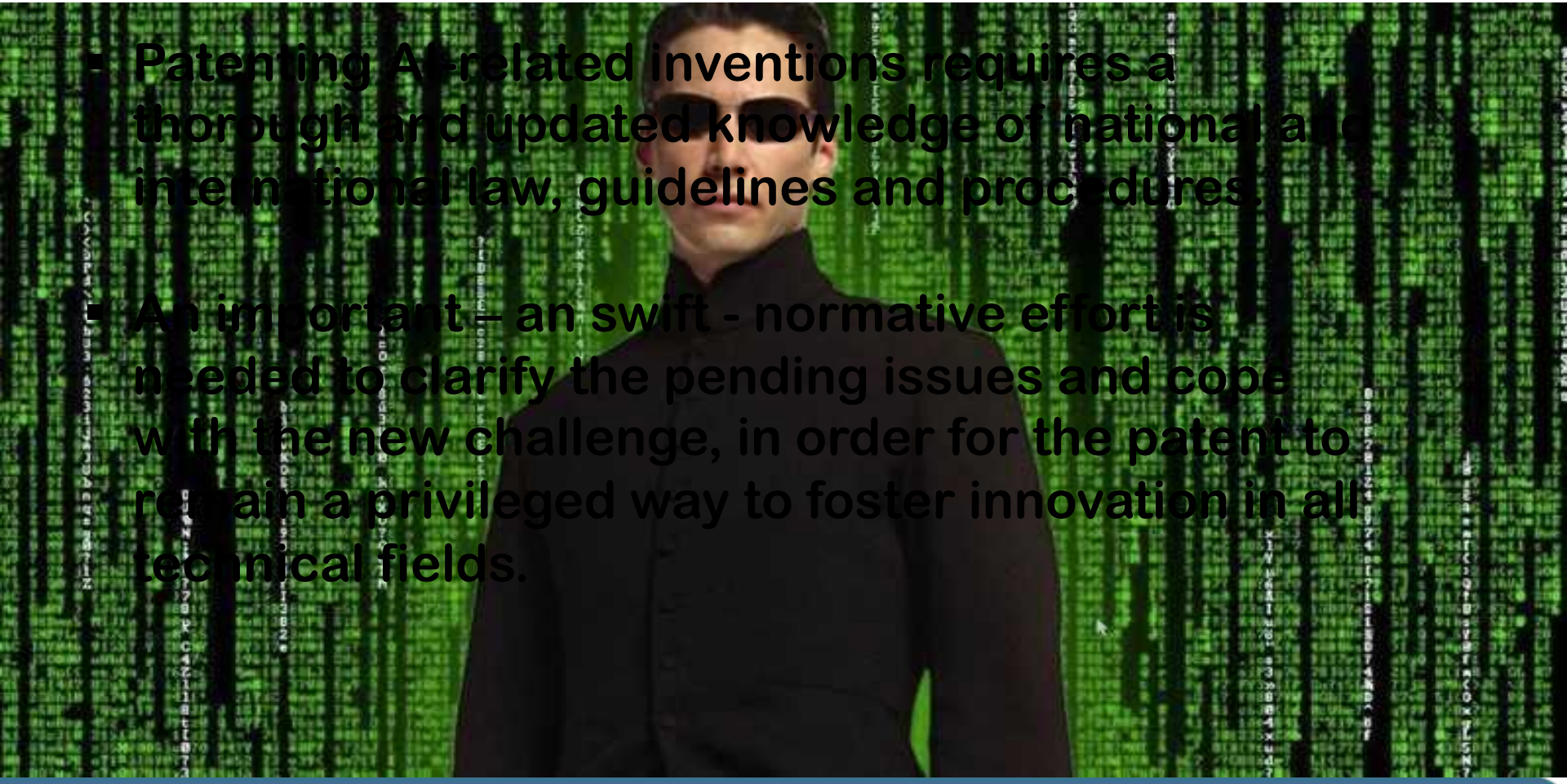
- Identification of the person skilled in the art / assessing inventive step.

Answer

Human(s) using a machine.



https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/



- Patenting AI-related inventions requires a thorough and updated knowledge of national and international law, guidelines and procedures.
- An important – an swift - normative effort is needed to clarify the pending issues and cope with the new challenge, in order for the patent to remain a privileged way to foster innovation in all technical fields.

THANK YOU !

Any (human) question ?

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