

Artificial Intelligence (AI) and Patents in the European Union

EU-Japan Center, Tokyo,
September 28, 2017

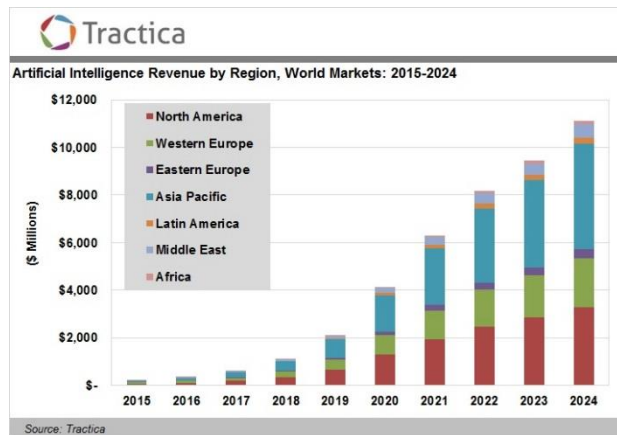


Dr. Christian Einsel
European Patent Attorney,
Patentanwalt
Prüfer & Partner, Munich, Germany

- I. Introduction
- II. Patentability
- III. Inventorship
- IV. Infringement / Prior Art
- V. Call on Proposal for Directive

Relevance of AI Patents

- Worldwide artificial intelligence (AI) market:
- Forecasted to achieve between 6.8 and 13,4 Billion € by 2022,
- with growth at a CAGR between 62.9% from 2016 to 2022.

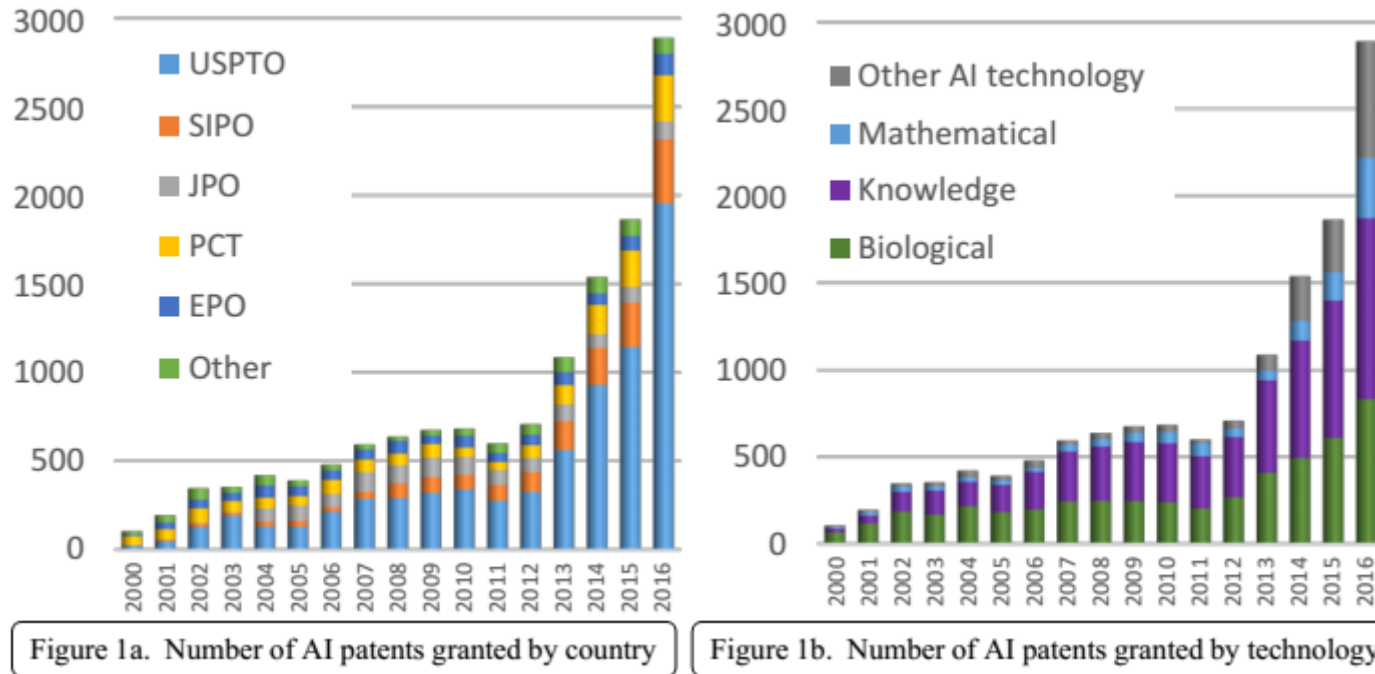


- AI: Number of annual patent filings in EU tripled from 2004 to 2014



Further exponential increase expected

Development of AI Patent Grants in Recent Years (2000-2016):



Source: Fujii & Managi, RIETI Discussion Paper Series, May 2017: „Trends in AI Technology Inventions: A Global Patent Analysis“

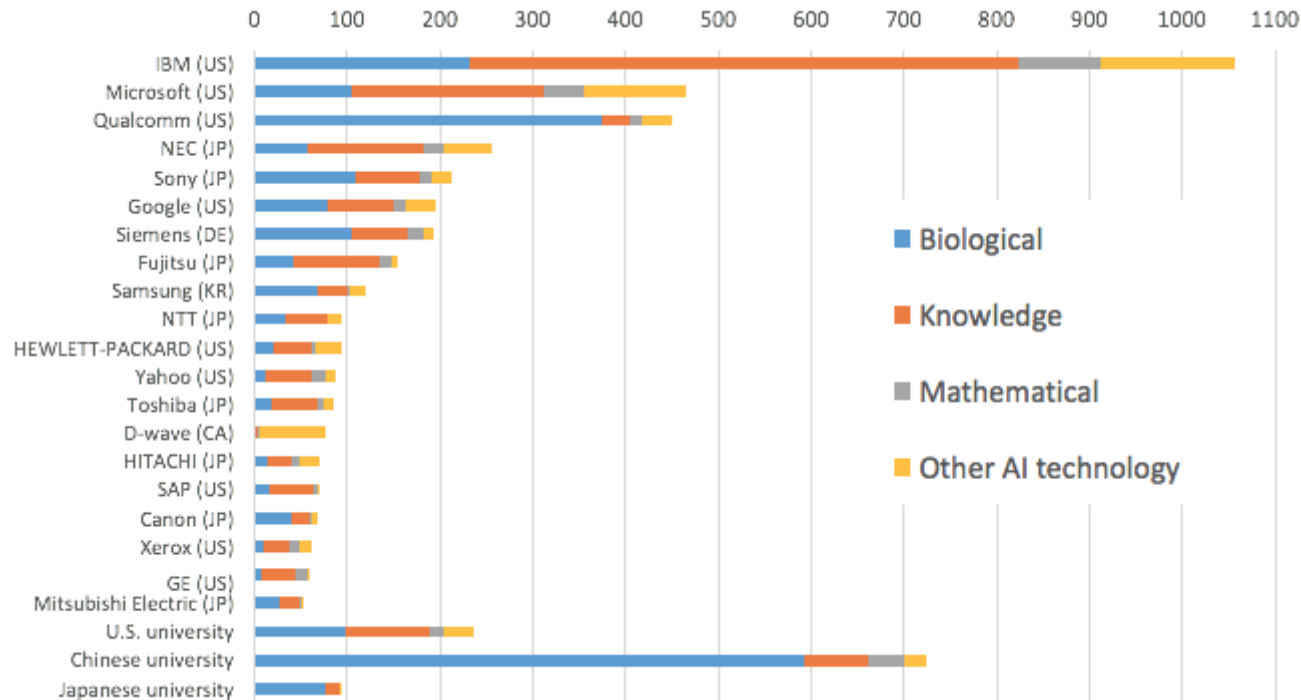
International patent clarification related to AI technologies

IPC	Technology group	Description
G06N 3/00	Biological model	Computer systems based on biological models
G06N 3/02	Biological model	Using neural network models
G06N 3/04	Biological model	Architectures
G06N 3/06	Biological model	Physical realization
G06N 3/063	Biological model	Using electronic means
G06N 3/067	Biological model	Using optical means
G06N 3/08	Biological model	Learning methods
G06N 3/10	Biological model	Simulation on general-purpose computers
G06N 3/12	Biological model	Using genetic models
G06N 5/00	Knowledge-based model	Computer systems utilizing knowledge-based models
G06N 5/02	Knowledge-based model	Knowledge representation
G06N 5/04	Knowledge-based model	Inference methods or devices
G06N 7/00	Specific mathematical model	Computer systems based on specific mathematical models
G06N 7/02	Specific mathematical model	Using fuzzy logic
G06N 7/04	Specific mathematical model	Physical realization
G06N 7/06	Specific mathematical model	Simulation on general-purpose computers
G06N 7/08	Specific mathematical model	Using chaos models or non-linear system models
G06N 99/00	Other AI technology	Subject matter not provided for in other groups of this subclass

Source: USPTO Class 706 Data processing: Artificial intelligence.

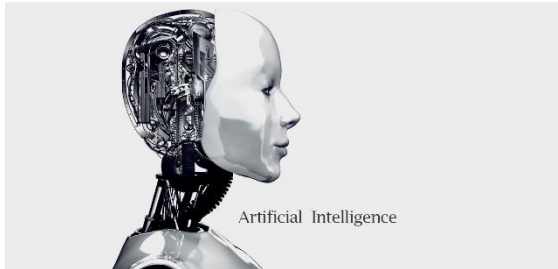
Report on FY2014 Trend survey of patent application technology: Artificial intelligence (2016) https://www.jpo.go.jp/shiryoku/pdf/gidou-houkoku/26_21.pdf.

AI Patents: Activities and Filing Strategies Worldwide:



Source: Fujii & Managi,

in: <http://www.eurasiareview.com/19062017-trends-and-priority-shifts-in-artificial-intelligence-technology-invention-a-global-patent-analysis/>



What are „AI Inventions“?

- A. (Human) Inventors develop a technical improvement in the field of Artificial Intelligence (as used in the statistics of previous slides)
- B. A system of Artificial Intelligence (computer/network having machine learning capability, a neural network, etc.) develops an improvement in *any* technical field
- C. AI system develops technical improvements of itself (AI)

Patentability of AI Inventions

... under the **European Patent Convention (EPC)** of 2000:

Art. 52(1) EPC:

European patents shall be granted for any inventions, in all fields of **technology**, provided that they are new, involve an inventive step and are susceptible of industrial application.

patent eligibility: **technical character**

patentability: novelty, inventive step, industrial application

further requirements: clarity (Art. 84 EPC),

sufficiency of disclosure (Art. 83 EPC)

formal requirements (Rules 42, 43 EPC)

Exclusion from Patent Eligibility:

Art. 52 (2) EPC:

The following in particular shall **not** be regarded as inventions within the meaning of paragraph 1:

- (a) discoveries, scientific theories and **mathematical methods**
- (b) ...
- (c) schemes, rules and methods for performing **mental acts**, playing games or doing business, and **programs for computers**;
- (d) ...

Art. 52 (3) EPC:

Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities **as such**.

AI-inventions as *computer implemented inventions* (CII): excluded?

Case law since early 80's: „Technical Character“ of claimed subject-matter has to be determined: however, in the past:

- case law assumed to be divergent
- no clear methods of assessment for Examiners
- unsatisfactory situation for applicants

➔ **(A) Measures taken at the EU:**



- *20 Feb. 2002*: Proposal by the Commission (EU) for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions COM(2002)92
- *Goal*: harmonize law in view of key decisions specifically of the EPO

Measures taken at the EU: *cont'd*



Parlamentum Europaeum

- 24 Sep. 2003: directive passed **European Parliament** *heavily* amended
- *amendments*: definition of „technicity“, blanket rules
- 7 Mar. 2005: **Council of Ministers**: resubmitted „compromise version“
- *amendments*: reversed and step back to „technical character“
- 6 July 2005: **European Parliament** *rejected* proposal with 648 against 14 votes and 18 registered abstentions



Status Quo confirmed at EU level

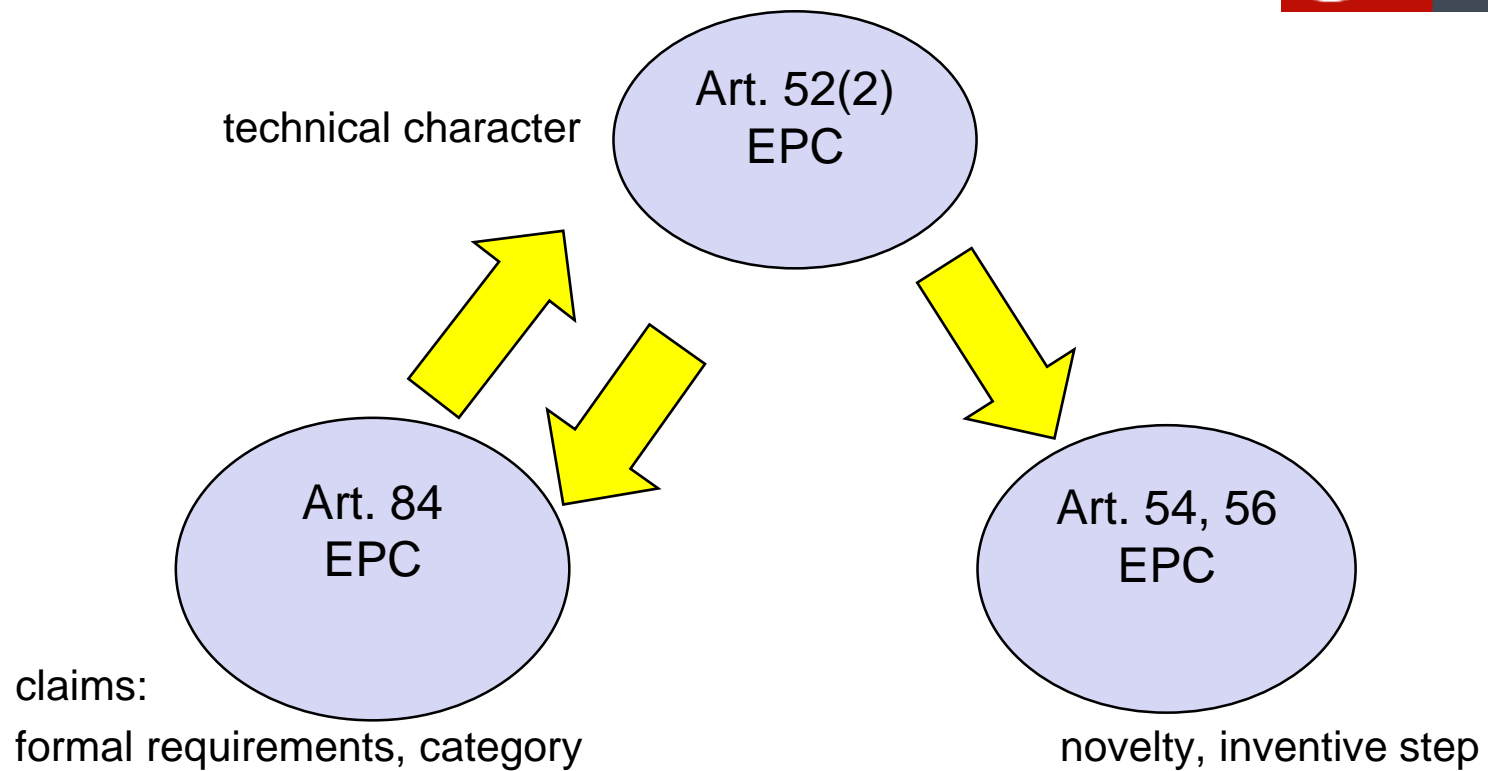
➔ **(B) Measures taken at the EPO:**



2016: Revision of the „**Guidelines for Examination at the EPO**“
with respect to computer implemented inventions

- Unified approach for an assessment of patent eligibility, patentability (inventive step) and clarity
- Amendments reflect previous and most recent case law of the Boards of Appeal and the Enlarged Board of Appeal at the EPO, in particular:
- decisions T1173/97, T424/03 and G3/08
- Fundamental concept of exclusion in view of „technical character“ not changed, but hurdles are formally shifted to subsequent stages of Examination to allow an unique and unified assessment

Examination of CII at the EPO:



Technical character (Art. 52(2)(c) and (3) EPC):

- assessed without regard to the prior art
- Computer program claimed (T424/03)?
- Case (a): computer program claimed by itself:

Patentable if, when loaded into a computer, a **further technical effect** arises going ***beyond the "normal" physical interactions*** between the program (software) and the computer (hardware) on which it is run (T1173/97)

- control of an industrial process
- Further technical effect: internal functioning of the computer itself or its interfaces:
 - E.g., efficiency of a process
 - E.g., management of resources
 - E.g., rate of data transfer
 - implementation of a (technical) mathematical method
- Further technical effect may be commonly known
- Case (b): presence of a device defined in the claim: embedded system

Formal requirements (Art. 84 EPC):

➡ Help to bring program claims into a form that may easily assessed w.r.t Art. 52 EPC !

One of two cases applicable:

- a. all method steps can be fully implemented by *generic* data processing means (e.g., PC, smartphone)
- b. method steps require *specific* data processing means and/or require *additional technical devices* as essential features

Case (a):

*Claim X: A **computer program** [product] comprising instructions which, when the program is executed by a **computer**, cause the computer to carry out [the steps of] the **method of claim 1**.*

Case (b):

*Claim X: A **computer program** [product] comprising instructions to cause the **device of claim Y** to execute the steps of the **method of claim 1***

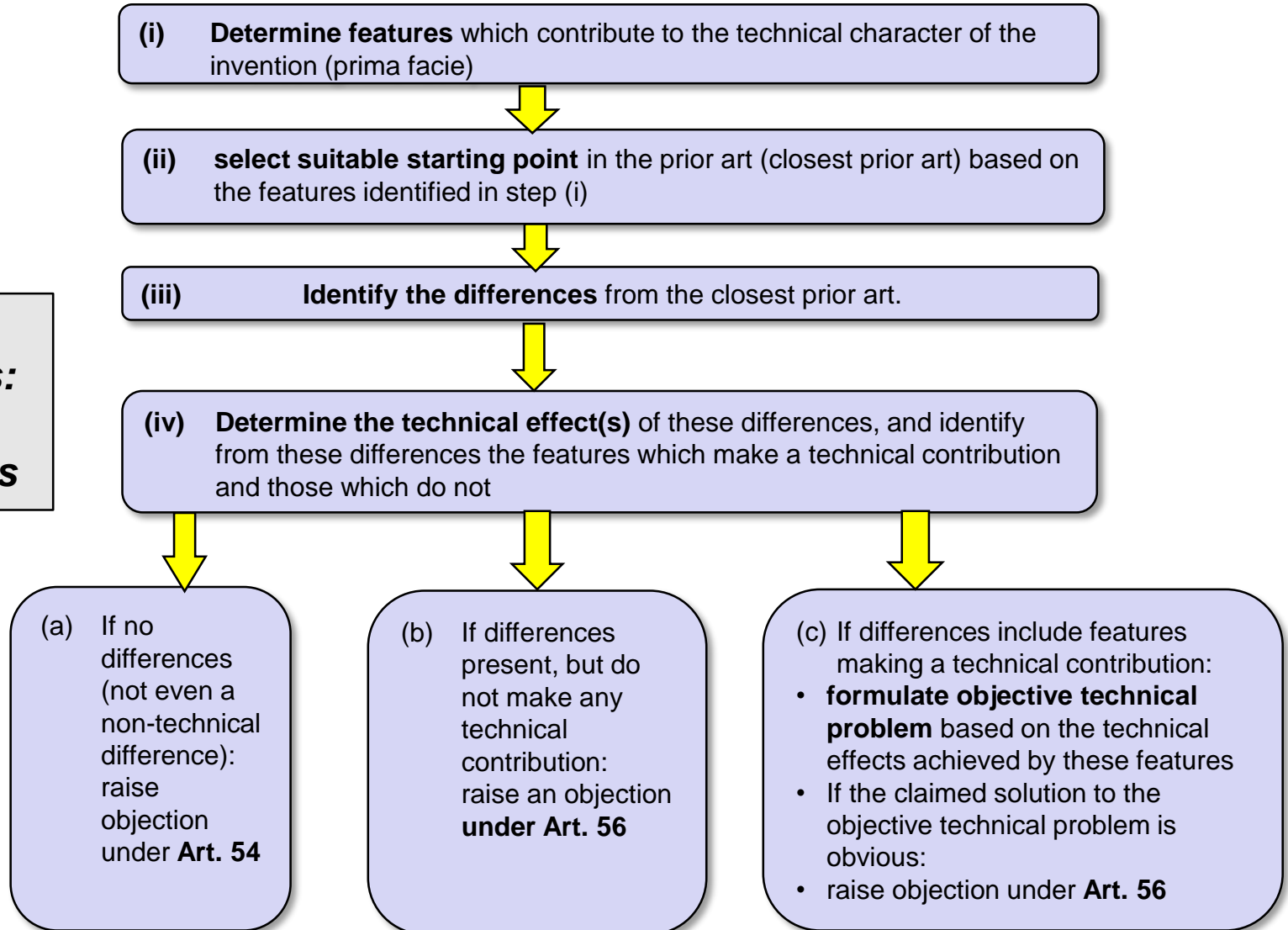
- Note: method claim 1 is technical when it uses means of the computer
- Note: computer-readable medium claim that stores the program is also technical

Inventive step (Art. 56 EPC):

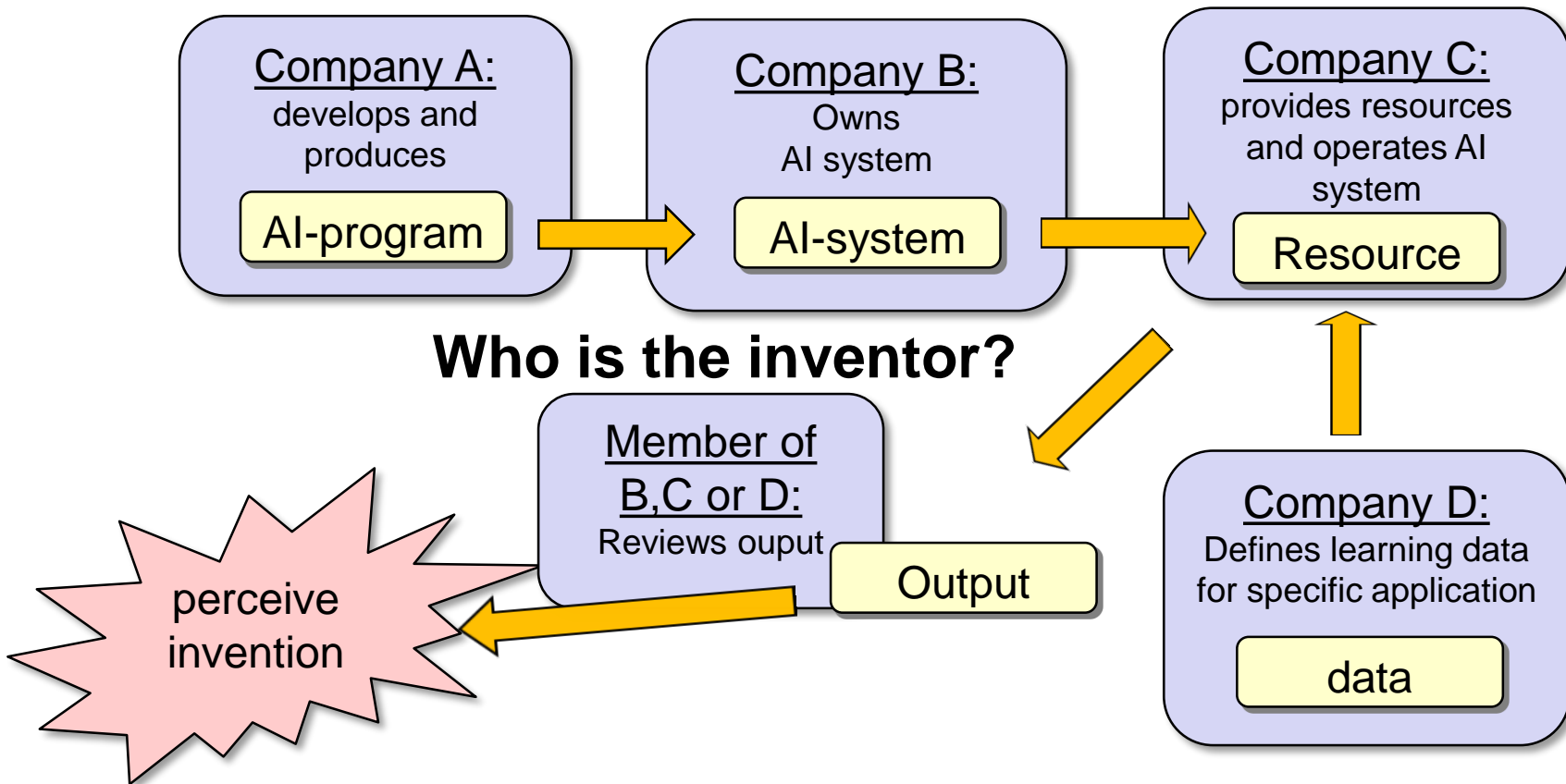
- Common problem-solution approach
- Considerations w.r.t. Art. 52 EPC imply that **a technical solution to a technical problem** is required (T641/00)
- All features are considered, which contribute to technical character – even **non-**technical features, which serve for technical purposes
- However, a non-technical feature cannot not support the presence of an I.S.
- “where the claim refers to an aim to be achieved in a **non-**technical field this aim may legitimately appear in the formulation of the problem... **as a constraint to be met**”

Steps:

**Revised Guidelines:
present
4 Examples**



AI systems as subject of an invention?



Provisions according to the EPC (1):

Article 60 EPC:

Right to a European patent

- (1) The right to a European patent shall belong to the **inventor** or his successor in title. If the inventor is an employee, the right to a European patent shall be determined in accordance with the law of the State in which the employee is mainly employed; ...
- (2) ...
- (3) In proceedings before the European Patent Office, the applicant shall be **deemed to be entitled** to exercise the right to a European patent.

Provisions according to the EPC (2):

Article 61 EPC:

European patent applications filed by non-entitled persons

(1) If by a final decision it is adjudged that a **person** other than the applicant is entitled to the grant of the European patent, that person may, in accordance with the Implementing Regulations:

- (a) prosecute...
- (b) file...
- (c) request...

Provisions according to the EPC (3):

Article 62 EPC:

Right of the inventor to be mentioned

The **inventor** shall have the right, vis-à-vis the applicant for or proprietor of a European patent, **to be mentioned as such** before the European Patent Office.

Article 81 EPC:

Designation of the inventor

The European patent application shall designate the **inventor**. If the applicant is not the inventor or is not the sole inventor, the designation shall contain a **statement** indicating the origin of the right to the European patent.

Provisions according to the EPC (4):

Rule 19 EPC:

Designation of the inventor


- (1) ... The designation shall state the **family name, given names** and **full address** of the inventor, contain the statement referred to in Article 81 and bear the signature of the applicant or his representative.
- (2) The European Patent Office **shall not verify the accuracy** of the designation of the inventor.
- (3) ...

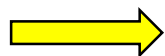
According to Rule 60 EPC, an inventor **must** be designated, 16 months after filing at the latest. Else: rejection of application!

- Definition of Invention:


*„The invention as an intellectual and thus individual creation originates from the inventor, who always must be a **natural person**“*

(cf. Singer/Stauder, 7th ed., 2016 (Legal Commentary to the EPC):
Art. 60 EPC, margin note 4)


- 
- The EPC at present does not allow for AI systems to be inventors
 - **In practice**, in many instances a **natural person** *might* at least be one **co-inventor** as either having contributed by
 - **defining the problems** to be solved, and/or
 - reviewing the output and **perceiving** the presence of an invention




Pass formal requirements to obtain an EP-patent *at all*

- However legal situation yet unsatisfactory:
- Succession of rights between companies A-D not resolved, when inventor's contribution vanishes in the future
-  Companies A, B, C, D should define ownership of rights in mutual contracts before operation of the AI system

Step back to discussion above:

- Even more: if there is no inventor, there might be no invention.
-  Art. 52(1) EPC would then not be fulfilled, and thus no patent eligibility ?
- One idea, publicly discussed: *serendipity* as an element qualifying to an invention?

Further issues:

- **Patent Infringement by AI systems:**
 - Infringement presently handled under national law (Art. 64(3) EPC)
 - Legal framework sufficient? (might also be addressed by evolving case law)
- **Prior art:**
 - Art project „*All Prior Art*“ (AI system that continuously produces any possible meaningful combinations features from published patents)
 -  idea that AI generated inventions without human intervention are generally excluded from prior art? (Hard to distinguish)

V. Call on Proposal for Directive

Time Scales of Progress in AI-Development:

Stephen Hawking:

- *„the short term impact of AI depends on who controls it;*
- *the long term impact depends on whether it can be controlled at all“*



Ray Kurzweil (2005):

- Turing test will be passed by 2029
- Around 2045, *“the pace of change will be so astonishingly quick that we won't be able to keep up, unless we enhance our own intelligence by merging with the intelligent machines we are creating”*



IV. Call on Proposal for Directive

Measures taken at the European Union:



Parlamentum Europaeum

Resolution 2015/2103(INL) by European Parliament with recommendations to the Commission on Civil Law Rules on Robotics:

- Adopted by 451 votes to 138 with 20 abstentions, on **Feb. 16, 2017**
- EU aware of **new industrial revolution** with respect to AI
- The development of robotics and artificial intelligence raises legal and ethical issues that require a **prompt** intervention at EU level
- Wishes to guarantee that **humans have control over intelligent machines at all times**
- **registration of smart robots**: establish criteria for the classification of robots that would need to be registered
- set up a **European Agency** for robotics and artificial intelligence

IV. Call on Proposal for Directive

Resolution 2015/2103(INL) cont'd:

- **Intellectual property rights:** Members call on the Commission to support a **horizontal and technologically neutral approach to intellectual property** applicable to the various sectors in which robotics could be employed.
- balanced approach to intellectual property rights when applied to hardware and software standards and codes that protect innovation and at the same time foster innovation.
- “the elaboration of criteria for "own intellectual creation" for *copyrightable works* produced by computers or robots is demanded”
- Patents mentioned only in the introductory portion



is patent law concerned herein at all?

IV. Call on Proposal for Directive

Resolution 2015/2103(INL) cont'd:

- **Issues of liability:** call on a **proposal for a legislative instrument** on legal questions related to the development and use of robotics and artificial intelligence foreseeable in the next **10 to 15 years**, combined with non-legislative instruments such as guidelines and codes of conduct.
- explore the implications of all possible legal solutions:
- a **compulsory insurance scheme**
- creating a **specific legal status** for robots in the long run

Thank you for your attention!



Dr. Christian Einsel
Prüfer & Partner mbB
Intellectual Property Law Firm

Sohnckestr. 12, D-81749 Munich, Germany
office@pruefer.eu
www.pruefer.eu

Phone: +49 89 69 39 21-0 / Fax: +49 89 64 22 238