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LIVA RUDZITE-CELMINA

Creations Involving Artificial Intelligence Under the European Patent Convention: Legal Implications and Potential Solutions

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Creations Involving Artificial Intelligence Under the European Patent Convention: Legal Implications and Potential Solutions

UNIVERSITY OF TARTU
Press
1632

School of Law, University of Tartu, Estonia

The dissertation has been accepted for the commencement of the degree of Doctor of Philosophy (Ph.D.) in law on 9 December 2024, by the resolution of the Council of the School of Law.

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Commencement will take place on 7 February 2025 at 10.00 a.m. in the School of Law, Tallinn, Kaarli pst 3, room 101, and via video bridge.

The publication of this dissertation is supported by the School of Law of the University of Tartu.

ISSN 1406-6394 (print)
ISBN 978-9916-27-779-9 (print)
ISSN 2806-2353 (pdf)
ISBN 978-9916-27-780-5 (pdf)

University of Tartu Press
www.tyk.ee

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LIST OF PUBLICATIONS

The thesis is based on the following publications:

I Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. New Legal Reality: Challenges and Perspectives. II. The 8th International Scientific Conference of the Faculty of Law of University of Latvia 21–22 October 2021. Riga: University of Latvia Press, 2022. Collection of Research Papers, 2021. – https://doi.org/10.22364/iscflul.8.2.27, pp. 400–408.

II Rudzite, L. Algorithmic explainability and the sufficient disclosure requirement under the European Patent Convention. Juridica International, No. 31, 2022. – https://doi.org/10.12697/JI.2022.31.09, pp. 125–135.

III Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process. International Comparative Jurisprudence, Vol. 8 No. 1, 2022. – http://dx.doi.org/10.13165/j.icj.2022.06.009, pp. 112–128.

IV Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence. International Comparative Jurisprudence, Vol. 9 No. 1, 2023. – http://dx.doi.org/10.13165/j.icj.2023.06.010, pp. 139–154.

V Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence. Masaryk University Journal of Law and Technology, Vol. 17 No. 2, 2023. – https://doi.org/10.5817/MUJLT2023-2-4, pp. 249–279.

Contribution to publications:

Four out of five publications are the sole authorship of L. Rudzite-Celmina. One publication was written in collaboration with prof. A. Kelli, whose contribution was limited to assisting in revising the draft paper. Most of the conceptual and analytical research was carried out by Rudzite-Celmina.

COMPENDIUM TO A DISSERTATION

The European Parliament has stated that patent protection is essential for the development of creations involving artificial intelligence (innovative outcomes applying artificial intelligence or AI-assisted creations). However, such creations encounter numerous obstacles in meeting the criteria for patentability under, for example, the Convention on the Grant of European Patents or the European Patent Convention (hereinafter – EPC). Considering the rapid development of creations involving artificial intelligence and the significant contribution that the respective innovative outcomes can provide to human prosperity, it is imperative to overcome the above-mentioned obstacles to legal protection.

The thesis "Creations Involving Artificial Intelligence Under the European Patent Convention: Legal Implications and Potential Solutions" examines whether the EPC can be interpreted to address the patentability difficulties encountered by creations involving artificial intelligence (hereinafter – AI). The thesis aims to identify and propose potential solutions to these challenges, thereby facilitating the compliance of creations involving AI with the patentability requirements under the EPC. As a hypothesis, the thesis asserts that the patent social contract (the rationale behind patent protection) regarding patent protection possibilities under the EPC for creations involving AI must be reconceptualized and incorporated with a *sui generis* mechanism. Since none of the alternative approaches could provide efficient protection in all cases or be incorporated without fundamental amendments to the EPC, the hypothesis of the doctoral thesis has been confirmed.

1. INTRODUCTION

1.1. An Overview of the Current Situation of the Field of Research and the Position of the Research Problem in it

Whether AI and its subfield Machine Learning (hereinafter – ML)[1] is a threat or an opportunity is a subject of an ongoing debate.[2] The issue has become even more pressing due to the development of large language models (hereinafter – LLM) or a form of generative AI such as ChatGPT.[3] Namely, LLM and other generative AI models are treated by scholars as a step towards AI singularity.[4]

The appearance of more advanced AI models also raises legal and more general policy issues. From the standpoint, aspects of intellectual property (hereinafter – IP), data protection,[5] and competition law are also of concern. The European Parliament has stated that patent protection is an essential incentive for generating creations involving AI.[6]

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[1] Broussard, M. Artificial Unintelligence: How Computers Misunderstand the World. Cambridge: MIT Press 2018, p.91.

[2] Haq, R. Enterprise Artificial Intelligence Transformation. New Jersey: John Willey & Sons, Inc. 2020, p. 6–7; Cave, S. *et al*. (Eds.). AI Narratives: A History of Imaginative Thinking About Intelligence. Oxford: Oxford University Press 2020, p. 1–19.

[3] Foster, D. Generative Deep Learning. Teaching Machines to Paint, Write Compose and Play. Sebastopol: O'Reilly Media, Inc. 2019, p. 5–6; The World Intellectual Property Organization. Generative AI: Navigating Intellectual Property. IP and Frontier Technologies Factsheet, 2024. – https://www.wipo.int/about-ip/en/frontier_technologies/news/2024/news_0002.html (30.10.2024), p. 2.

[4] The World Intellectual Property Organization. Generative AI: Navigating Intellectual Property. IP and Frontier Technologies Factsheet, 2024, p. 7. Gary, M. Keynote: The Rapid Rise of Generative AI: Opportunities and Challenges Ahead. – The World Intellectual Property Organization. Conversation on Intellectual Property and Frontier Technologies: Eight Session, WIPO/IP/CONV/GE/2/23/1 (20.09.2023). – https://www.wipo.int/meetings/en/details.jsp?meeting_id=78188 (20.09.2023); The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, 2024. – https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2003-en-getting-the-innovation-ecosystem-ready-for-ai.pdf (04.04.2024), p. 10.

[5] Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. New Legal Reality: Challenges and Perspectives. II. The 8th International Scientific Conference of the Faculty of Law of University of Latvia 21–22 October 2021. Collection of Research Papers. Riga: University of Latvia Press 2022. – https://doi.org/10.22364/iscflul.8.2.27 (11.08.2024), p. 401–403.

[6] The European Parliament. Motion for a European Parliament Resolution on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), 2020. The European Parliament. Report on intellectual property rights for the development of artificial intelligence technologies A9-0176/2020 (02.10.2020). – https://www.europarl.europa. eu/doceo/document/A-9-2020-0176_EN.html (08.08.2024), Paragraph 12.

The Term "Creations Involving AI"

No *consensus* exists on how to define the involvement of AI in generating outputs. The World Intellectual Property Organization (hereinafter – WIPO), among others, has indicated that the terms "AI-assisted" and "AI-generated" could be used **to define "inventor" under the patent framework.**[7] An alternative suggestion is to apply only the term "AI-assisted outputs", considering that the technology has not yet developed to enable "AI-generated" inventions. The term should describe outputs, applications, or productions generated by or with the assistance of AI systems, tools, or techniques susceptible to IP protection.[8] Nevertheless, the AI Act[9] uses the terms "AI-based", "AI-enabled", "AI-generated", and "AI-related". Furthermore, the European Patent Office (hereinafter– EPO) introduces the expression "inventions involving AI" to clarify their relationship with "computer-implemented inventions".[10]

Another suggestion is distinguishing between "direct output" and "application". Namely, anything the algorithm produces as a result is a direct output, such as a prediction, regardless of accuracy. "Application", on the other hand, refers to the practical use of the outcome, for example, in medical treatment, either as it is or as an aggregate, and requires varying levels of human input. The significance of the division lies more in the IP protection of AI-assisted output, which is dependent on human input, not necessarily on the material nature of the lifecycle of an invention.

For the purposes of the thesis, the term "creations involving AI" is used to describe the application of AI or the use of AI assistance to produce the desired outcome. The "involvement" of AI in current technological development is considered to be a tool applied by a human. However, the term could also be used to

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[7] The World Intellectual Property Organization. Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV (21.05.2020). – https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=499504 (02.10.2024), p. 5; The World Health Organization Conversation on Intellectual Property and Artificial Intelligence: Third Session. Summary of Second and Third Sessions. – WIPO/IP/AI/3/GE/20/INF/5 (04.11.2020). – https://www.wipo.int (02.10.2024), p. 4–5.

[8] The Joint Institute for Innovation Policy, IViR – University of Amsterdam. Trends and developments in artificial intelligence: Challenges to the Intellectual Property Rights Framework: Final report, 2020. Publication Office of the European Union. – https://op.europa.eu/en/publication-detail/-/publication/394345a1-2ecf-11eb-b27b-01aa75ed71a1/language-en European Parliament (11.08.2024), p. 28.

[9] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act). – OJ, L 2024/1689, Recitals 1, 29, 134, 142, Article 3, point (60), Article 8, Paragraph 1, Article 50, Paragraph 4.

[10] The European Patent Office. Artificial Intelligence: AI and Patentability. – https://www.epo.org/en/news-events/in-focus/ict/artificial-intelligence (05.10.2024).

refer to creations generated entirely by AI if the appropriate level of development is reached in the future.

Furthermore, "creations" comprise the outcome from the application or involvement of AI. The term has been chosen to distinguish it from the terminology used in other frameworks, in particular with well-established terms such as "work" in the copyright framework and "invention" in the patent landscape. Not all creations can be considered "works" or "inventions" if they do not meet the requirements of the copyright or patent frameworks.

Thus, "creations involving AI" following the rationale by the EPO is chosen as a uniform term, allowing for the proposal of a preliminary *sui generis* certification mechanism without confusion with the wording used in other legal frameworks. Nonetheless, for clarity, the above-mentioned terms used in other legal frameworks, for example, AI-based", "AI-enabled", "AI-generated" (both autonomously and with assistance), and "AI-related" might *mutatis mutandis* be treated as synonyms. To specify the concrete aspects of creation, the terms "AI-assisted" (involving a human), "AI-generated" (without a human), "AI-assisted outputs", and "AI-generated outputs" could be treated as equivalent to the term "creations involving AI", to the extent that they apply.

There is no unified definition for "AI".[11] Nonetheless, the EPO describes "AI" as the ability of computers and machines to perform mental tasks usually associated with humans, such as learning, reasoning and problem solving.[12] Following the distinction between "AI system" and AI as a scientific discipline,[13] the AI Act does not define AI but aligns the description of the "AI system" with the definition agreed by the Organisation for Economic Cooperation and Development.[14] Namely, an "AI system" is a machine-based system designed to operate with varying degrees of autonomy and exhibit adaptiveness after deployment. From the input it receives, it infers how to produce outputs such as predictions, content,

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[11] The Joint Institute for Innovation Policy. Trends and Developments in Artificial Intelligence. Challenges to the Intellectual Property Rights Framework. Final Report, p. 21.

[12] The European Patent Office. Artificial Intelligence.

[13] The European Commission High-Level Expert Group on Artificial Intelligence. A Definition of AI: Main Capabilities and Scientific Disciplines: Definition developed for the purpose of the deliverables of the High-Level Expert Group on AI (18.12.2018). – https://ec.europa.eu/futurium/en/system/files/ged/ai_hleg_definition_of_ai_18_december_1.pdf (05.10.2024), p. 3, 6.

[14] The European Parliament. Legislative Train 10.2024. 2 A Europe Fit for the Digital Age: Artificial Intelligence Act Q2 2021 (20.10.2024). – https://www.europarl.europa.eu/legislative-train/carriage/regulation-on-artificial-intelligence/report?sid=8501 (30.10.2024), p. 2; Council of the European Union. Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts – Analysis of the final compromise text with a view to agreement 2021/0106(COD) (26.01.2024). – https://data.consilium.europa.eu/doc/document/ST-5662-2024-INIT/en/pdf (30.10.2024), p. 3.

recommendations or decisions that may affect physical or virtual environments.[15] The Framework Convention on Artificial Intelligence adopted by the Council of Europe also uses an analogous definition.[16]

The AI Act uses the term "AI system" to distinguish AI from traditional programming approaches. It comprises software systems if they incorporate AI. The AI Act also covers ML systems, which are part of the field of AI.[17]

From the previously mentioned, it might be concluded that the EPO also directs the description of "AI" towards "AI systems" rather than AI as a scientific discipline. Nevertheless, the AI Act, by the term "AI systems", comprises a broader scope than, for instance, the EPO. The thesis focuses on analyzing the EPC, and builds on the interpretation used by the EPO regarding the meaning of "AI" and "creations involving AI". However, as creations involving AI are mainly related to ML, this scope is also considered in the dissertation.

The Present State of the Field Framing the Research Problem

In 2017, the European Parliament called for the European Commission to support a horizontal and technologically neutral approach to IP protection that could be attributed to various fields, including robotics.[18] The objectives were: 1) to ensure a proportionate approach to IP rights for the protection of software and hardware; 2) to develop mechanisms that allow interoperability, access to source code, data and system architecture. Besides, the European Commission in 2018 initiated the study highlighting the necessity to facilitate innovation and legal clarity proportionately and to assess the efficiency of the existing IP protection landscape for creations involving AI.[19] Furthermore, the European Commission proposed

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[15] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Article 3, point (1).

[16] The Council of Europe has enacted the Framework Convention on Artificial Intelligence (05.09.2024). The Council of Europe Treaty Series – No. 225. – https://rm.coe.int/1680afae3c (02.10.2024), Article 2.

[17] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Article 3, point (1), Recitals 12, 88, 102, 103, 128, 155.

[18] The European Parliament. Report with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)) (21.01.2017). The European Parliament. Report – A8-0005/2017. – https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.html (29.04.2024).

[19] The European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Artificial Intelligence for Europe COM(2018) 237 final (25.04.2018). – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2018:237:FIN (11.08.2024).

the adoption of the AI Act.[20] Also, it announced the aim of building an AI ecosystem and the European Union (hereinafter – EU) as the leader in the respective area.[21] Additionally, the Framework Convention on Artificial Intelligence[22] aims to facilitate technological progress internationally while ensuring the protection of fundamental rights.

Nevertheless, the AI Act and the Framework Convention on Artificial Intelligence do not address aspects of AI and patentability.[23] To the extent applicable, the AI Act touches upon certain aspects of copyright and related rights in relation to general-purpose AI models and foresees maintaining the trade secret protection.[24]

The need to re-evaluate the regulatory framework has also been stipulated at the national and regional levels. For example, the United Kingdom (hereinafter – the UK) for 2019–2020 prioritized harmonization of the interrelation of creations

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[20] The European Commission. Proposal for a Regulation Of The European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts. COM/2021/206 final. – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A0206%3AFIN (30.10.2024).

[21] The European Commission. Communication from The Commission to The European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Making the Most of the Eu's Innovative Potential an Intellectual Property Action Plan to Support the Eu's Recovery and Resilience. COM/2020/760 final. – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0760 (11.08.2024); The European Commission. Annexes to the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions Fostering a European approach to Artificial Intelligence, COM(2021) 205 final (21.04.2021). – https://digital-strategy.ec.europa.eu/en/library/coordinated-plan-artificial-intelligence-2021-review (11.08.2024), p. 32; The Joint Institute for Innovation Policy. Trends and developments in artificial intelligence: Challenges to the Intellectual Property Rights Framework: Final report, p. 20, 29.

[22] The Council of Europe has enacted the Framework Convention on Artificial Intelligence (05.09.2024). The Council of Europe Treaty Series – No. 225, Article 1, Paragraph 1.

[23] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Recitals 48, 104–109, Article 25, Paragraph 5, Article 53, Paragraph 1, Clause (b), (c). Annex VII, Paragraph 4.5; The Council of Europe has enacted the Framework Convention on Artificial Intelligence, Article 1, Paragraph 1.

[24] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Recitals 48, 88, 104–109, 167, Article 25, Paragraph 5, Article 52, Paragraph 6, Article 53, Paragraph 1, Clause (b), (c), Paragraph 7. Article 54, Paragraph 3, Article 78, Paragraph 1, point (a), Annex VII, Paragraph 4.5.

involving AI with IP framework.[25] Additionally, the Republic of Estonia has stressed the importance of the interrelation between creations involving AI and IP rights.[26] Furthermore, the United States Patent and Trademark Office (hereinafter – USPTO) has inquired about the patentability of creations involving AI. This inquiry aimed to assess the effectiveness of the legal framework and identify potential amendments that could accelerate the development of AI and its integration into research.[27]

Moreover, the WIPO has stressed the integration of creations involving AI in the IP framework.[28] It has also outlined the importance of fulfilling the "sufficient disclosure" criteria and others.[29] Meanwhile, the EPO, analogous to the WIPO, has considered the patentability aspects of creations involving AI and has issued guidance on the patentability of software and algorithms.[30]

Furthermore, unlike copyright and related rights, a patent exclusively protects the technical, not merely creative, aspects of an invention. Moreover, unlike trade secrets or contract protection, a patent does not require the creation to be kept secret from the public. Thus, it serves the purpose of enriching the common general knowledge.[31]

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[25] The Intellectual Property Office. Corporate Plan 2019 to 2020 (26.04.2019). – https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/797332/Corporate-Plan-2019-2020.pdf (11.08.2024), p. 23.

[26] The World Intellectual Property Organization. WIPO Director General Meets Estonian President, Ministers and Other Officials During the Visit (27.05.2019). – https://www.wipo.int/about-wipo/en/dgo/news/2019/news_0040.html (11.08.2024).

[27] The United States Patent and Trademark Office. Requesting for Comments on Patenting Artificial Intelligence Inventions (27.09.2019). – https://www.govinfo.gov/content/pkg/FR-2019-08-27/pdf/2019-18443.pdf (11.08.2024); The United States Patent and Trademark Office. Requesting for Comments on Patenting Artificial Intelligence Inventions (30.09.2019). – https://www.federalregister.gov/documents/2019/09/30/2019-21190/request-for-comments-on-patenting-artificial-intelligence-inventions (11.08.2024); The United States Patent and Trademark Office. Request for Comments Regarding the Impact of the Proliferation of Artificial Intelligence on Prior Art, the Knowledge of a Person Having Ordinary Skill in the Art, and Determinations of Patentability Made in View of the Foregoing (30.04.2024). – https://www.federalregister.gov/documents/2024/04/30/2024-08969/request-for-comments-regarding-the-impact-of-the-proliferation-of-artificial-intelligence-on-prior (11.08.2024).

[28] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 7, 34.

[29] The World Intellectual Property Organization. Background Document on Patents and Emerging Technologies, (27.06.2019). – https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=438393 (29.04.2020), p. 13–20.

[30] The European Patent Office. Guidelines for Examination G-II, 3.3.1. Artificial Intelligence and Machine Learning. – https://www.epo.org/law-practice/legal-texts/html/guidelines 2018/e/g_ii_3_3_1.htm (29.04.2020).

[31] Paterson, G. The European Patent System. The Law and Practice of the European Patent Convention. 2nd Ed. London: Sweet & Maxwell 2001, p. 310.

Patent protection was introduced to reward human ingenuity and incentivize the disclosure of unique social values or inventions.[32] The desired IP protection is closely linked to the specifics of a creation. Since ML is a branch of computer science, it is interconnected with underlying programming models and algorithms.[33] In this respect, the complexity and resources required to develop ML models in order to obtain outcomes create an incentive for developers not to lose the competitive advantage gained due to the rapid development of the industry. Specific monopoly protection is therefore necessary.[34]

At the same time, development, learning characteristics and the ability to process large amounts of data distinguish ML from traditional programming.[35] The respective characteristics also involve the tension between human ingenuity and the generation of creations by AI. In addition, the current patent system goes beyond human ingenuity because invention also requires non-inventive labour to conduct research to find an innovation and maintain the invention. However, incentives are also needed to carry out non-inventive work. Besides, it is said that there may no longer be a need for patent protection because the resources required to build an ML model far outweigh the economic results and unique outputs that could qualify for IP protection. Put simply, more resources are needed to maintain the current level of inventiveness. The short lead time in the market, especially for digital innovations, makes the incentive of the reward less attractive.[36] The paradigm raises the tension that the increasing capabilities of AI could reduce human ingenuity to the extent that patentability is dispersed or patent protection becomes obsolete.[37] However, there is as yet no systemic evidence to support the paradigm of abolishing patent protection. There is, therefore a necessity to preserve the patent system in a way that incentivizes innovation and continues the research and development in the field of AI.[38]

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[32] Abbott, F. M. *et al*. International Intellectual Property in an Integrated World Economy. 2nd Ed. New York: Wolters Kluwer Law & Business 2011, p. 131.

[33] The European Patent Office. Guidelines for Examination G-II, 3.3.1. Artificial Intelligence and Machine Learning.

[34] Samuelson, P. *et. al*. A Manifesto Concerning Legal Protection of Computer Programs. – Columbia Law Review, Vol 94 No. 8, 1994. – https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1783&context=faculty_scholarship (11.08.2024), p. 2333.

[35] Lee, J. A. *et al.* (Eds.). Artificial Intelligence & Intellectual Property. Oxford: Oxford University Press 2021, p. 1, 26.

[36] Fink, C. From patentability dilemmas to copyright conundrums: Economic prospective. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24 (05.11.2024). – https://webcast.wipo.int/video/WIPO_IP_CONV_GE_2_2024-11-05_AM_123858 (05.11.2024).

[37] *Ibid*., Leistner, M., Stadler, S. Rechtsprechung Künstliche Intelligenz: BGH, Beschluss vom 11.06.2024 – X ZB 5/22, Nun auch der BGH: Keine Benennung einer KI als Erfinder. – Recht Digital & RDi, Aufsätze Künstliche Intelligenz, 9/2024, s. 457.

[38] Fink, C. From patentability dilemmas to copyright conundrums: Economic prospective. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24 (05.11.2024).

Nonetheless, also the WIPO[39] has summarized challenges that creations involving AI encounter in complying with the patentability requirements, including under the EPC,[40] such as: 1) explainability; 2) patent-eligible subject matter; 3) inventorship; 4) inventive step. The difficulties outlined lead to the consideration of more general policy matters on the validity of the existing patent bargain or patent social contract.[41] The "patent social contract" describes the rationale behind patent protection. Namely, the bargain underlying patent protection under the EPC is the disclosure of the invention and contribution to science in return for obtaining exclusive rights granted for a certain period of time.[42]

Explainability

Regarding explainability, Article 83 of the EPC requires that an invention be "sufficiently disclosed" so that a person skilled in the art could carry it out from the written description without excessive experimentation and with a statistically frequent success rate.[43] The difficulties that creations involving AI face in meeting the "sufficient disclosure" requirement of Article 83 EPC relate to the ability to understand the ML model (especially in its most sophisticated forms)[44] and to explain it comprehensively in writing so that a person skilled in the art could carry it out. The EPC does not require the disclosure of the algorithm and entire datasets.[45] However, the level of disclosure may be challenging due to the peculiarities of AI, which differ from traditional programming or consist of the underlying algorithm and data.[46] The Boards of Appeal of the European Patent Office

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[39] The World Intellectual Property Organization. Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV.

[40] The European Patent Office. The Convention on the Grant of European Patents. 17th Ed. 2020. – OJ EPO 2020.

[41] The World Intellectual Property Organization. Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV (12.09.2023); Free, R. Panel 5: Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22 (22.09.2022). – https://www.wipo.int/meetings/en/details.jsp?meeting_id=72090 (21.09.2023).

[42] The European Patent Office. What to expect. – https://www.epo.org/en/new-to-patents/what-to-expect (02.10.2024).

[43] The European Patent Office. Guidelines for Examination G-II, 3.3.1. Artificial Intelligence and Machine Learning.

[44] The Independent High Level Expert Group on Artificial Intelligence set up by the European Commission. Ethics Guidelines for Trustworthy AI (08.04.2019). – https://ec.europa.eu/futurium/en/ai-alliance-consultation.1.html (11.08.2024).

[45] EPO BA T 0161/18, *Äquivalenter Aortendruck/ARC SEIBERSDORF*, Paragraph 2.2.

[46] Lee, J. A. *et al.* (Eds.). Artificial Intelligence & Intellectual Property, p. 1, 26.

(hereinafter – EPO BA), in recent case T 1669/21,[47] has reaffirmed that the level of disclosure in cases of creations involving AI must comprise, *inter alia*, a detailed overview of the architecture of the ML model, its learning and working process, concrete examples of the applied variables and the quantity and quality of the data involved as well as the source representing the claimed functionality of a creation involving AI. Additionally, the EPO has ruled that an inventor should be disclosed in the written description and attached to the patent application, even in cases of purported technical effect.[48] To overcome the respective aspects, the introduction of a deposit mechanism of an algorithm[49] or training data[50] has been suggested in the literature.

The thesis analyzes the respective requirements of the EPC and provides an overview of the level of disclosure. The dissertation also maps potential approaches, considering their efficiency in manoeuvring through the disclosure criteria. Based on the analysis of the EPC and the aspects outlined in the case law of the EPO nad EPO BA, the thesis proposes an alternative direction[51] that could help to meet the requirements of Article 83. Simultaneously, the proposed approach balances the compliance aspect with preserving competitive advantage.

Patent-Eligible Invention

As regards patentable inventions, Article 52 EPC, amongst others, excludes "computer programs" and "mathematical methods" from patent protection. Additionally, only inventions applied to "technical fields" are patentable. Considering that creations involving AI are based on "computer programs" or "mathematical methods" (algorithms)[52] and are also applicable in "non-technical" fields, such as

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[47] EPO BA T 1669/21, ECLI:EP:BA:2024:T166921.20240723, Paragraphs 1.2-1.8; EPO BA T 1191/19, *Neuronal plasticity/INSTITUTGUTTMANN*, ECLI:EP:BA:2022:T119119. 20220401, Paragraphs 4.1.–4.2.

[48] EPO BA G 0002/21, *Reliance on a purported technical effect for inventive step (plausibility)*, ECLI:EP:BA:2023:G000221.20230323, Paragraphs 72–75, 77, 88–95.

[49] Yanisky-Ravid, S., Jin, R. Summoning a New Artificial Intelligence Patent Model: In the Age of Pandemic. – Michigan State Law Review, Vol. 2021 No. 3, 2021. – https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3619069 (30.10.2024), p. 42–43.

[50] Tabrez, Y. E. Artificial Intelligence Inventions & Patent Disclosure. – Penn State Law Review, Vol. 125 No. 1, 2020. – https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3722720 (30.10.2024), p. 215–217.

[51] Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention. – Juridica International, No. 31, 2022. – https://doi.org/10.12697/JI.2022.31.09 (11.08.2024), pp. 125–135; Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. In New Legal Reality: Challenges and Perspectives, pp. 400–408.

[52] The European Patent Office. Guidelines for Examination G-II, 3.3.1. Artificial Intelligence and Machine Learning.

economics[53] and others, they encounter the risk of lacking "technicality". Besides, the EPO BA case law[54] demonstrates that a creation that might otherwise be "technical", but which is applied in a "non-technical" field, is considered to be excluded from patent protection. The idea is that these are discoveries rather than inventions in the field of art.[55]

In this respect, the thesis, amongst others, builds on the research conducted regarding the protection of functionality or behaviour of software[56] and considers whether and to what extent the EPC provides the respective protection for creations involving AI. It is outlined that selecting "technical" inventions according to their field of application alone does not reveal the inventiveness of a creation. *Vice versa*, the mere creation of a work in the artistic field does not guarantee copyright protection in cases where "technical" considerations are involved.[57]

Furthermore, recent UK case law demonstrates the controversial perception of patent-eligible subject matter, ML models, and the role of a human in building them.[58] The thesis builds upon the mentioned case law. It analyzes the respective perceptions in the light of "technical" aspects of creations involving AI, initial intentions behind respective exclusions, other patentability criteria, potential approaches under the EPC, and the directions taken in other jurisdictions.

Additionally, case T 0702/20[59] of the EPO BA in particular, outlines the view that ML models are considered "mathematical methods" or "computer programs", are not "technical", and are excluded from protection. Other cases of the EPO BA also illustrate the different approaches taken in assessing the "technical character" of the invention as a whole and of its parts[60].

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[53] EPO BA T 1954/08, *Marketing simulations/SAP*, EP:BA:2013:T195408.20130306, Paragraph 6.

[54] EPO BA T 0931/95, *Controlling pension benefits system*, ECLI:EP:BA:2000:T093195.20000908, Paragraph 8.

[55] Ang, S. The Moral Dimensions of Intellectual Property Rights. Northampton: Edward Elgar Publishing Ltd. 2013, p. 154.

[56] Samuelson, P. *et. al*. A Manifesto Concerning Legal Protection of Computer Programs.

[57] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence. – Masaryk University Journal of Law and Technology, Vol. 17 No. 2, 2023. – https://doi.org/10.5817/MUJLT2023-2-4 (11.01.2024), p. 256.

[58] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH) (21.11.2023). – https://8newsquare.co.uk/wp-content/uploads/Emotional-Perception-approved.pdf (11.08.2024), Paragraphs 54-63; *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036 (19.07.2024). – https://www.judiciary.uk/judgments/comptroller-general-of-patents-designs-and-trade-marks-v-emotional-perception-ai/ (11.08.2024), Paragraphs 64-66, 68.

[59] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, ECLI:EP:BA:2022:T070220.20221107.

[60] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267.

The thesis builds on the respective approaches by considering the evaluation criteria of "technical" and "non-technical" aspects of creations involving AI. Additionally, the thesis analyzes and builds upon the requirements of other industrial property regimes. Based on the analysis conducted, the thesis proposes an alternative approach[61] that could provide comprehensive protection for creations involving AI.

Inventorship

Concerning inventorship, recognition of the role of AI in the generation of creation has been identified as one of the fundamental issues of patentability.[62] Additionally, recognition of the role of AI in generating of creations is also seen as an economic incentive for developers.[63] Transparency also makes it possible to understand whether a creation represents human or AI capabilities, which could also affect the market price of the respective product. Nonetheless, the Artificial Inventor Project[64] demonstrates that most patent offices worldwide, including the EPO, have taken the approach that only a human can be an inventor and be granted patent protection, regardless of the level of human contribution.

The thesis builds on the perception of the EPC and the EPO BA on the issue of inventorship and AI. The dissertation analyzes the preparatory documents of the EPC to understand the original meaning behind the inventor and patent rationale criteria rewarding the involved labour. Furthermore, the perception[65] of the initiator of the Artificial Inventor Project, who is a pioneer in this field, is considered. Based on the respective analysis, the thesis considers whether the role of AI in generating creation needs to be recognized. Additionally, the thesis analyzes potential approaches also taken in other jurisdictions. Based on the understanding gained, the thesis proposes an alternative approach[66] to balance the interests involved and not disrupt the EPC framework.

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[61] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, pp. 249–279.

[62] The World Health Organization in Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence, p. 5–6.

[63] Kahn, B. M. Economic reasons to recognize AI inventions. Abbott, R. (Ed.). Research handbook on intellectual property and artificial intelligence. Cheltenham: Edward Elgar Publishing 2022, p. 385–398.

[64] The Artificial Inventor Project. Patent. – https://artificialinventor.com/patent/ (30.10.2024).

[65] Abbott, R. The reasonable robot. Artificial intelligence and law. New York: Cambridge University Press 2020.

[66] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process. – International Comparative Jurisprudence, Vol. 8 No. 1, 2022. – http://dx.doi.org/10.13165/j.icj.2022.06.009 (11.01.2024), pp. 112–128.

Inventive Step

Regarding the inventive step, Article 56 EPC provides that it is fulfilled if the creation is not obvious to the person skilled in the art in comparison with the prior knowledge. The increasing sophistication of creations involving AI[67] poses a challenge to the continued assessment of the inventive step under the existing criteria of the EPC. The literature suggests introducing, for example, an alternative evaluation approach of "obvious to try"[68] which could facilitate the examination of the inventive step. Additionally, introducing the term "technologies used by active workers, including inventive AI" is suggested to define the person skilled in the art. Furthermore, it is also proposed to replace the person skilled in the art with an AI or to define the extent of the technological progress to assess the inventive step of a creation.[69]

The thesis builds on the criteria of the EPC and evaluates proposals to overcome potential challenges that the increasing sophistication of creations involving AI may pose to evaluate the inventive step. The analysis and drawbacks of each approach are also relevant regarding *mutatis mutandis* similar suggestions[70] in the literature. As a result, the thesis proposes various alternative approaches[71] that could be taken to tackle the issue of evaluation of the inventive step.

General Policy Concerns

Regarding the general policy concerns, the EPC was developed and enacted with the guiding idea of a "machine-centric regulatory framework" behind it.[72] Nonetheless, the development of new technologies, AI, such as, in particular, ML and LLM, shifts the paradigm from hardware to software,[73] blurs the boundaries

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[67] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 6, 9.

[68] Shemtov, N., Gabinson, G. A. The inventive step requirement and the rise of the AI machines. Abbott, R. (Ed.). Research handbook on intellectual property and artificial intelligence, p. 432–435.

[69] Abbott, R. The reasonable robot. Artificial intelligence and law, p. 100, 102, 104–106.

[70] Leistner, M., Stadler, S. Rechtsprechung Künstliche Intelligenz: BGH, Beschluss vom 11.06.2024 – X ZB 5/22, Nun auch der BGH: Keine Benennung einer KI als Erfinder, s. 456–457.

[71] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence. – International Comparative Jurisprudence, Vol. 9 No. 1, 2023. – http://dx.doi.org/10.13165/j.icj.2023.06.010 (11.01.2024), pp. 139–154.

[72] *Mutatis mutandis* Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 156; Nack, R. Inventions and their amenability to patent protection. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law. Baden-Baden: Nomos Verlagsgesellschaft Mbh & Co 2014, p. 102–103.

[73] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 249–250.

between the "technical field" and the "artistic field",[74] merges "technical" and "artistic" creation[75] as well as no longer allows the concept of the "inventor" to remain dormant.[76] Furthermore, creations involving AI also force us to reconceptualize the aspects of the evaluation of the inventive step in terms of the determining the prior art and the person skilled in the art.[77]

The respective aspect becomes even more important in the light of the recent, controversial case law in the UK,[78] which also questions aspects of the patent-eligible subject matter, redefining the concepts of a "computer", "computer program" in correlation with ML models and the role of a human in the generation of the respective creations. In comparison, it has been stated that creations involving AI could be examined as falling outside the scope of "computer-implemented inventions" under the EPC if the reason is convincingly demonstrated. However, until now, the respective justification has not been provided.[79] Eventually, the peculiarities of AI make it difficult to comply with the criteria of "sufficient disclosure".[80]

Since many of the constitutive aspects of "inventiveness" under the EPC are shaken due to emerging technologies, it is necessary to consider the appropriate approaches to examine the inventive step. Namely, one aspect to be assessed in order to establish inventiveness is "application in the technical field" or "industrial application" under Article 57 of the EPC. Since Article 56 requires an invention to be in the "technical field", it excludes applications in "non-technical" areas.[81] It follows that only those creations that are applicable in the "technical field" can be considered for "industrial application". Consequently, the consideration of the relevance of the "industrial application" appears because:

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[74] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267.

[75] *Ibid.*

[76] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 117–119, 121–122.

[77] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 140–145.

[78] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 54-63; *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 64-66, 68.

[79] Muller, M. The European Patent Office Boards of Appeal case law on AI-related inventions. The European Patent Office. Conference on AI-related technologies: regulation, inventorship and patenting (JC01-2023). – https://www.epo.org/learning/training/details.html?eventid=16092 (11.08.2024).

[80] Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention, pp. 125–135; Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. In New Legal Reality: Challenges and Perspectives, pp. 400–408.

[81] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267.

1) if "technicality" is already established, there is no need to consider "industrial application" as well, because "technical" character *per se* includes "usefulness". *Vice versa*, if a creation is found to be "technical" and "non-useful", then it raises doubts about the correctness of the assessment of the "technicality" of the creation;

2) technology development demonstrates that "industrial applicability" may also relate to traditionally "non-technical" fields, for instance, business[82] and others. In this context, the question arises as to whether the core principle of the "technical" field still reflects current and future technical developments.

The difficulties outlined above for creations involving AI are related to multiple and core aspects of patentability under the EPC. In this regard, the thesis builds on the analysis of each patentability hurdle in isolation and considers them in an ensemble to observe general policy issues. Namely, the dissertation considers whether the existing patentability aspects under the EPC could be interpreted to overcome the respective hurdles and provide an adequate incentive for innovation involving AI. The analysis also considers potential solutions to overcome the respective hurdles. For instance, non-disclosure of a creation and keeping it under trade secret protection is possible. Nonetheless, there is a balance to be struck between the added value of secrecy and the disclosure of the invention. It should be noted that in patent law, the usefulness of an invention and the enrichment of the public domain promote welfare.[83]

The analysis outlines that an additional or complementary mechanism to the EPC would be welcomed to provide the missing protection by introducing a *sui generis* certification mechanism.[84] The approach is also supported by the fact that creations involving AI are already bringing the mentioned challenges for patent offices, including the EPO, in assessing patentability.[85] The emergence of LLM only exacerbates issues.[86] Namely, for instance, the recent practice demonstrates that the entrepreneurs producing LLM that previously opted for the open-source

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[82] EPO BA T 0931/95, *Controlling pension benefits system*, Paragraph 8.

[83] Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 151.

[84] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 121–122; Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267; Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a *Sui Generis* Protection Mechanism for Creations Involving Artificial Intelligence, p. 142–145; Rudzite, L. Algorithmic Explainability and the Sufficient-Disclosure Requirement under the European Patent Convention, p. 130–134.

[85] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 121–122.

[86] The World Intellectual Property Office. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, 2024, p. 10–11.

option or trade secrets have shifted their strategies to an unconventional approach, intensively choosing national patent protection with short examination periods.[87]

For example, there is a viewpoint in the UK that no new neighbouring rights for creations involving generative AI are necessary because obtaining rights in only one country is not worth disclosing an invention.[88] The corresponding opinion has approved the perception that aspects of IP protection for creations involving generative AI should be harmonized globally.[89] The mentioned opinion could be attributed not only to creations involving generative AI but also to creations involving AI in general.

Additionally, the analysis outlines that patent protection is limited to creations that are industrially applicable or useful to a human. However, the limitation of the patent framework to monopolies that promote the convenience of humans subsequently defines human boundaries of the permissible division between public property and ownership.[90] Analogous could be attributed to creations involving AI. Namely, according to the EPO BA,[91] only a human can be an inventor under the EPC and be named one. The opinion triggers the debate on whether the perception is relevant in the so-called AI era.[92] In other words, the question arises as to whether it is still beneficial for society and scientific development that only a human contribution is reflected in the patent. As described,[93] there are occasions where, on the contrary, outlining the contribution of AI in the inventive process would facilitate scientific progress and social justice for the monopolists.

In this regard, by not allowing the role of non-human actors to be reflected in the patent, these limitations have arrived at defining the boundaries of the system

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87 Vaibhav, H., Mitthatmeer, K. OpenAI's unconventional IP strategy for ChatGPT. – The World Intellectual Property Review, (12.08.2024). – https://www.worldipreview.com/future-of-ip/openais-unconventional-ip-strategy-for-chatgpt (12.08.2024).

88 Hervey, M. Panel 3: A Mosaic of IP Issues: Painting the Full Picture of Generative AI and IP. The World Intellectual Property Organization. Conversation on Intellectual Property and Frontier Technologies: Eight Session WIPO/IP/CONV/GE/2/23/1 (20.09.2023). – https://www.wipo.int/meetings/en/details.jsp?meeting_id=78188 (20.09.2023); Free, R. Panel 5: Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22.

89 Hervey, M. The World Intellectual Property Organization. Webinar on WIPO Guide to Generative AI and Intellectual Property WIPO/WEBINAR/FT/24/1 (16.04.2024). – https://www.wipo.int/meetings/en/details.jsp?meeting_id=82908 (16.04.2024); Free, R. Panel 5: Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22.

90 Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 157.

91 EPO BA, J 0008/20, *Designation of inventor/DABUS*, ECLI:EP:BA:2021:J000820.20211221, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, ECLI:EP:BA:2021:J000920.20211221, Paragraphs 4.3.9., 4.4.1., 4.6.4.

92 Abbott, R. The reasonable robot. Artificial intelligence and law, p. 12, 72.

93 Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 121–122.

under the EPC. Subsequently, the set limitation could also be deemed as defining boundaries for humans. Namely, the perception is that even though AI is involved, only a human is considered an inventor, and the role of AI in generating a creation cannot be recognized under the EPC.[94] In this regard, the human contribution is considered to comprise also creations involving AI; thus, under the EPC, there is no boundary between a human and a machine in generating a creation.

Considering that ML and LLM have surpassed technological development compared to the time when the EPC was written, the question arises at what point the scientific progress goes beyond the legislative premises of the expected monopoly incorporated in the EPC. In other words, whether the legislator anticipated that indicating only the role of humans in the inventive process might usurp the reward that patent protection provides. Consequently, the question arises as to whether these creations should be limited to the recognition of human actors or whether the respective patents should only be granted once the legislator has intervened and balanced the conflicting interests. As the EPO BA has stated, it can only rule differently on human involvement once the legislator decides otherwise.[95] Furthermore, it has to be noted that the EPO was established with specific presumed competence.[96] However, as previously mentioned, AI brings aspects that may be hard for the EPO alone to handle in the future due to the nature of these creations.[97]

In this respect, the thesis proposes implementing a *sui generis* certification mechanism to address the role of AI in generating a creation along with other issues mentioned. The thesis builds on existing proposals to protect creations involving AI through certification, similar to what exists, for example, in the

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[94] EPO BA, J 0008/20, *Designation of inventor/DABUS*, ECLI:EP:BA:2021:J000820.20211221, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, ECLI:EP:BA:2021:J000920.20211221, Paragraphs 4.3.9., 4.4.1., 4.6.4.

[95] EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraph 4.6.6.

[96] *Ibid*.

[97] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 121–122; Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267; Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a *Sui Generis* Protection Mechanism for Creations Involving Artificial Intelligence, p. 142–145; Rudzite, L. Algorithmic Explainability and the Sufficient-Disclosure Requirement under the European Patent Convention, p. 130–134.

electricity market[98] (acknowledgement of generation and ownership).[99] The thesis also builds on the suggestion that the patent landscape and the copyright framework for software should be combined in a separate protection regime at the national and EU level in parallel with the existing mechanisms.[100] Additionally, the thesis develops the view that a separate protection mechanism for creations involving AI is necessary due to the shortcomings of the existing IP regimes.[101] Furthermore, the thesis proposes the introduction of a *sui generis* mechanism, considering alternative positions on the need for a separate regime.[102] The thesis also addresses and builds on criticisms of the protection of digital innovations by utility models since the dissertation proposes the introduction of certification as a patent-like instrument in parallel with the existing mechanisms.[103]

Nevertheless, the literature sources do not outline the potential framework of a *sui generis* mechanism. Moreover, only a few aspects of the separate regime for digital innovations, including creations involving AI are analyzed by scholars. Therefore, the thesis builds on them and proposes a preliminary framework of a *sui generis* certification mechanism. The suggested certification model could serve as a starting point for further debate.

Moreover, considering the link between the EPC and EU Member States, as previously outlined, the thesis also considers the respective EU legal framework, particularly in the area of AI and IP. For example, the AI Act, amongst others, includes the deployment of regulatory sandboxes, certification and designation of

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[98] Norvig, P. Bridging AI's trust gaps, fireside chat 'Responsible AI'. Panel discussion. Reuters Events Virtual Forum Momentum "Overcome Global Challenges and Build a Better Future through Technology" (09.12.2020). – https://www.youtube.com/watch?v=DUdQDTQAnq0/ (30.10.2024).

[99] Karakosta, Q., Petropoulou, D. The EU electricity market: Renewables targets, tradeable green certificates and electricity trade. – Energy Economics, Vol. 111(2) No. 106034, 2022. – http://dx.doi.org/10.1016/j.eneco.2022.106034 (30.10.2024), p. 2.

[100] Picht, G. P., Thouvenin, F. AI & IP: Theory to policy and back again policy and research recommendations at the intersection of artificial intelligence and intellectual property. – SSRN, 2022. – http://dx.doi.org/10.2139/ssrn.4278819 (30.10.2024), p. 15–17.

[101] Pendleton, M. D. An abject failure of intelligence: Intellectual property and artificial intelligence. Abbott, R. (Ed.). Research handbook on intellectual property and artificial intelligence, p. 131–132; Harison, E. Intellectual property rights, innovation and software technologies. The economics of monopoly rights and knowledge disclosure. Cheltenham: Edward Elgar Publishing 2008, p. 74.

[102] For example, Leistner, M., Stadler, S. Rechtsprechung Künstliche Intelligenz: BGH, Beschluss vom 11.06.2024 – X ZB 5/22, Nun auch der BGH: Keine Benennung einer KI als Erfinder, s. 456–457.

[103] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a *Sui Generis* Protection Mechanism for Creations Involving Artificial Intelligence, p. 142–145; Rudzite, L. Algorithmic Explainability and the Sufficient-Disclosure Requirement under the European Patent Convention, p. 130–134.

competent authorities.[104] The thesis also proposes the involvement of regulatory sandboxes, certification, and designation, preferably of a centralized EU-wide or global authority, in evaluating the respective matters. Thus, to their respective extent, the thesis proposal of certification and the respective aspects of the AI Act involve analogous elements. In this respect, the *sui generis* certification mechanism is proposed to be preferably EU-centralized, harmonized and unified with the respective instruments introduced under the AI Act to reduce regulatory, examination and administrative burdens.[105] The respective suggestion and approach is also in line with the EU policy of building an AI ecosystem and becoming a forerunner in the respective area.[106] To alleviate the administrative burden, facilitate the establishment of the EU AI ecosystem for AI and ensure competitiveness with other countries that are pioneers in the respective field, the *sui generis* certification could incorporate existing initiatives, sandboxes, incubators and researchers in the EU.[107]

1.2. Research Problem, the Research Objective and Research Questions

The Research Problem and Ojective

AI has considerable potential to enhance human prosperity in various areas, such as pharmaceuticals, the discovery of new drugs, the optimization of the retail storage process, and others.[108] Thus, it is of the utmost importance to accelerate

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[104] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Article 57.

[105] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a *Sui Generis* Protection Mechanism for Creations Involving Artificial Intelligence, p. 146–147.

[106] The European Commission. Annexes to the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions Fostering a European approach to Artificial Intelligence, COM(2021) 205 final.

[107] The European Commission. The future of the European competitiveness. Part A: A competitiveness strategy for Europe (2024). – https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en (02.10.2024), p. 26, 29–32; The European Commission. The future of the European competitiveness. Part B: In-depth analysis and recommendations (2024). – https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en (02.10.2024), p. 79, 82–85 239, 254.

[108] The Joint Institute for Innovation Policy. Trends and developments in artificial intelligence: Challenges to the Intellectual Property Rights Framework: Final report, p. 36–39, 57, 109–114; The Royal Society. Science in the age of AI: How artificial intelligence is changing the nature and method of scientific research. – https://royalsociety.org/-/media/policy/ projects/science-in-the-age-of-ai/science-in-the-age-of-ai-report.pdf (23.11.2024), p. 35, 58, 88.

the application of AI, including generating creations involving AI. The European Parliament has stated that patent protection is an essential incentive for innovation involving AI.[109] Besides, promoting an AI ecosystem in the EU to become a leader in the field is one of the priorities for the European Commission.[110] As all EU Member States are also parties to the EPC,[111] harmonized and centralized patent protection is of paramount importance in incentivizing the generation of creations involving AI and facilitating the building of the respective AI ecosystem within the EU.

Nevertheless, specifics of creations involving AI cause tension in complying with the patentability requirements under the EPC. The mentioned difficulties are related to aspects of AI:[112]

1) ML models that are based on sophisticated architecture or are built in numerous layers that iterate the input data to generate an output might be hard to comprehend and explain (the so-called "black box" paradigm).[113] Thus, it might become difficult for creations involving AI to comply with the "sufficient disclosure" requirement under Article 83 of the EPC;

2) the increasing use of AI in the generation of creations raises the question of recognizing the role of AI in patent applications in order to ensure technological stability. The EPO BA[114] and various other jurisdictions in the world have stipulated that only a human could be an inventor under their respective patent frameworks;[115]

3) Article 52 of the EPC limits patent-eligible subject matters also excluding "mathematical methods" and "computer programs". The exclusion in question does not apply to "computer-implemented inventions" which are "technical" or that are expressed in the "technical field" and have a "further technical effect".[116] The difficulty for creations involving AI is that they are based on algorithms or

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[109] The European Parliament. Motion for a European Parliament Resolution on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), 2020. The European Parliament. Report on intellectual property rights for the development of artificial intelligence technologies A9-0176/2020, Paragraph 12.

[110] The European Commission. Communication from The Commission to The European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Making the Most of the Eu's Innovative Potential an Intellectual Property Action Plan to Support the Eu's Recovery and Resilience. COM/2020/760 final.

[111] The European Patent Office. Member states of the European Patent Organisation. – https://www.epo.org/about-us/foundation/member-states.html (02.10.2024).

[112] The World Intellectual Property Organization. Background Document on Patents and Emerging Technologies.

[113] The Independent High Level Expert Group on Artificial Intelligence set up by the European Commission. Ethics Guidelines for Trustworthy AI, p. 15.

[114] EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraph 4.6.6.

[115] The Artificial Inventor Project. Patent.

[116] The European Patent Office. Guidelines for Examination G-II, 3.3.6. Programs for Computers. – https://www.epo.org/en/legal/guidelines-epc/2023/g_ii_3_6.html (02.10.2024).

computer programs when run on a computer.[117] Hence, creations involving AI may be considered non-patentable if they do not involve "technicality";

4) increasing involvement of AI in generating creations may not only entail the "black box" effect[118] but also encounter difficulties in achieving and assessing the inventive step according to Article 56 of the EPC.

Therefore, the **research problem of the thesis is** whether the existing EPC framework can be interpreted to address the patentability challenges of creations involving AI. **The objective of the research is** to identify and propose potential solutions to these challenges, thereby facilitating the compliance of creations involving AI with the patentability requirements under the EPC.

Addressing the research problem is crucial in determining the legal reality for the patentability of creations involving AI under the EPC and ensuring technical stability. Additionally, facilitating a harmonized and centralized approach to the patenting aspects would help to accelerate the development of an EU-wide AI ecosystem. Without considering the research problem, it would be difficult to obtain clarity on general policy concerns about the viability of the existing patent bargain.[119] Addressing the research problem allows the research objective to be achieved identifying the most efficient option to tackle compliance matters for creations involving AI under the EPC.

Each of the identified barriers triggers consideration of the research problem and objective. However, not all of the difficulties outlined give rise to the same degree of ambiguity regarding compliance with the patentability requirements under the EPC. For instance, fulfilment of the "sufficient disclosure" requirement under Article 83 of the EPC raises fewer concerns than compliance with other patentability aspects. The rest of the challenges are equal.

Additionally, some of the aspects might seem of little concern currently. Nonetheless, taking into account the rapid developmental pace of AI,[120] seemingly upcoming hurdles also have to be considered in the present. The respective aspect comprises an evaluation of the inventive step. Moreover, other issues might increase in tension if AI becomes more generalizable and closer to the general AI.[121] Namely, the recognition of the role of AI, the ability to sufficiently disclose a creation, and the substantiation of the definition of "technical fields" related to the patent-eligible invention under the EPC may even increase the tension.

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[117] The European Patent Office. Guidelines for Examination G-II, 3.3.1. Artificial Intelligence and Machine Learning.

[118] The Independent High Level Expert Group on Artificial Intelligence set up by the European Commission. Ethics Guidelines for Trustworthy AI, p. 15.

[119] The World Intellectual Property Organization. Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV.

[120] Samuelson, P. *et. al*. A Manifesto Concerning Legal Protection of Computer Programs, p. 2333.

[121] Hashiguchi, M. The Global Artificial Intelligence Revolution Challenges Patent Eligibility Laws. – Journal of Business & Technology Law, Vol. 13(1), 2017, p. 30–31.

Hence, the combination of the previously mentioned difficulties reflects the viability of interpreting the EPC and availing the protection for creations involving AI. Namely, since all patentability requirements are cumulative or must be fulfilled, compliance with only some of them would exclude protection. Furthermore, the EPC must be interpreted systemically. In other words, the interpretation of one aspect of patentability could have an impact on other criteria. In this respect, to ensure a sustainable, comprehensive and internally harmonized patent framework that can be interpreted in the light of foreseeable technological developments, all the above challenges need to be addressed in isolation and as a whole. The cumulative approach allows for achieving the objective of the research in determining the most efficient direction to tackle the identified issues meeting the patentability requirements under the EPC for creations involving AI.

Thus, considering the research problem involves addressing several research questions, simultaneously allowing the research objective to be achieved and the most effective approach to be identified. Since the aspect of the "sufficiency of disclosure" is with minor opacity, the respective criteria will be addressed first. The following conditions concerning "inventor" and "patent-eligible" requirements are currently equally important. The last aspect is the "inventive step", posing more upcoming challenges. In this regard, the outlined matter might be prioritized.

Nonetheless, in the light of future technological developments and the viability of the interpretation of the EPC, all requirements except the "sufficiency of disclosure" criteria would be of equal concern. However, without political support in addressing the "inventor" and "patent-eligible" aspects, the most pressing issue will become reaching and evaluating the "inventive step" requirement.

Therefore, to ensure legal and technological stability, facilitate the incentive to innovate and increase the generation of creations involving AI, it would be more efficient to address all the difficulties outlined as equal priorities. A step-by-step approach could intensify legal uncertainty and lead to technological stagnation. In this respect, the second approach could increase the administrative burden for legislators, creators and patent examiners if the interpretation of the relevant aspects under the EPC were to be re-evaluated several times.

Research Questions

The research questions are grouped by area and listed according to the current level of concern and ambiguity. However, all patentability requirements must be complied with to obtain a patent under the EPC. In this context, the following research questions are proposed as being of equal importance in concluding whether the EPC could be interpreted to overcome the outlined obstacles that creations involving AI encounter in meeting the patentability requirements under the EPC and achieving the objective of the research:

1) can creations involving AI fulfil the "sufficient disclosure" requirement under Article 83 of the EPC? The respective research question would allow for the conclusion of whether the existing requirements under Article 83 of the EPC

might be interpreted to ensure clarity regarding margins of compliance and protection for creations involving AI. Additionally, considering the interpretation of the EPC will enable the identification of potential solutions to overcome the compliance issue and achieve the research objective. In this regard, the underlying aspects that have to be determined include answering whether: a) it is possible to provide information about the invention, especially for deep learning with neural networks or due to the so-called 'black-box' effect[122]?; b) the implementation of the requirement to deposit an algorithm, training data or both to meet the criteria of "sufficient disclosure" could be efficient?; c) disclosure criteria are effective in terms of transparency and explainability, not only concerning the structure but also regarding the functionality of the invention?

2) Are mathematical methods and computational algorithms permanently excluded from patent protection under the EPC?

The research question allows the determination of margins of exclusion and attribution to creations involving AI under the EPC. Consideration of the research question also enables the evaluation of the limitations of the EPC and potential solutions to tackle the identified obstacles, thereby facilitating the achievement of the research objective. In this matter, the underlying aspects that have to be determined include answering whether: a) creations involving AI be treated as a "computer" or a "machine" and fulfil the requirement of the "technicality" under the EPC?; b) weights and biases constitute a "computer program" representing the ML model?; c) the "computer program" or "mathematical method" exclusion apply if the ML model has learned without human presence?; d) the EPC provide sufficient protection for creations involving AI in terms of "technical fields" and "technicality" requirements?; e) in case of non-compliance with the EPC requirements, do other industrial property regimes avail themselves of efficient protection for creations involving AI?

3) Is it possible to attribute the existing criteria of "human-made" invention to all creations involving AI?

Considering that, as previously mentioned, the EPO BA have also ruled that only a human can be an inventor under the existing EPC.[123] It allows observing whether recognition of the role of AI in generating a creation would be in line with the *ratio* of the EPC? Answering the research question allows not only considering the margins of interpretation of the EPC but also evaluating potential solutions to tackle the issue of creations involving AI and achieving the research objective. In this matter, the underlying aspect that has to be determined includes answering whether it is possible to distinguish inventorship or even co-inventorship as a result of the interrelationship between humans and AI, which would allow the role in creation to be recognized not only for humans but also for AI, as well as acknowledging ownership rights?

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[122] The Independent High Level Expert Group on Artificial Intelligence set up by the European Commission. Ethics Guidelines for Trustworthy AI, p. 15.

[123] EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraph 4.6.6.

4) Is the existing method of assessing the inventive step sufficient to examine the obviousness of exponentially sophisticated creations involving AI?

The research question allows for determining whether the EPC can be interpreted to address potential challenges that creations involving AI might encounter regarding reaching and evaluating inventiveness under the EPC. The research question also allows for considering the necessary adjustments to the interpretation and other potential solutions to tackle the issue, while achieving the research objective. In this regard, the related underlying question that must be addressed is what additional guidelines should be issued, or should criteria be altered to address the patentability of AI creations?

5) Is there a necessity to "conclude" a new patent social contract regarding patent protection for creations involving AI?

As outlined previously, the mentioned aspects have to be considered in isolation and together to reveal the comprehensive legal reality of the potential margins of interpretation of the EPC for the creations involving AI to avail the compliance. Only by considering all the hurdles can the research questions be answered. Namely, the research question allows for determining whether the EPC can be interpreted in the light of the challenges presented by creations involving AI. In addition, considering the limitations of the EPC about each of the previously outlined research questions also allows for the evaluation of potential solutions to address the identified issues. The probable approaches also include assessing whether: a) other existing industrial property regimes could provide sufficient protection for creations involving AI? b) mechanisms outside the realm of industrial property could provide sufficient protection? The evaluation allows for achieving the research objective and addressing the thesis hypothesis.

1.3. The Hypothesis of the Thesis

The thesis hypothesis posits that the patent social contract regarding patent protection possibilities under the EPC for creations involving AI must be reconceptualized and incorporated with a *sui generis* mechanism.

The hypothesis of the thesis is based on the following assumptions: 1) the existing framework of the EPC has shortcomings in its interpretation in the light of the presented hurdles in meeting the patentability requirements for creations involving AI; 2) addressing the specifics of creations involving AI to avail patent protection would require conceptual amendments of the EPC that might not be supported; 3) existing other protection mechanisms within and outside the industrial property framework might not ensure comprehensive protection in all cases; 4) a *sui generis* mechanism would provide a harmonized, preferably, EU-centralized patent-like protection, existing in parallel with other industrial property regimes, specific to creations involving AI in terms of scope, evaluation criteria and period, duration of protection, without imposing additional administrative burdens on creators and evaluators, agile for future technological developments, not concurring with other industrial property regimes but allowing them

to be used with the original rationale and other aspects; 5) a *sui generis* mechanism, preferably centralized and harmonized in the EU, is dependent on the international recognition that might encounter tensions of interest driving the legislative process.

1.4. The Scope of the Thesis

The scope of the thesis is limited to the analysis of patent law in the context of the EPC. The EPC is a centralized, EU-wide mechanism integrated into the legal systems of all EU Member States.[124] Accordingly, the analysis also concerns the legal framework of the respective countries.

Approaches developed in other jurisdictions are also considered for comparative purposes. Additionally, the thesis analysis *mutatis mutandis* can be used to conduct the respective research in jurisdictions outside the EPC. Furthermore, the dissertation focuses on the obstacles that creations involving AI have regarding compliance with patentability aspects under the EPC. For substantiation, the thesis touches on other forms of protection and related difficulties under the current industrial property regimes, such as copyright and related rights, trade secrets, and utility models.

The thesis discusses data protection, competition, contractual protection, and other industrial property regimes. The respective avenues are analyzed for comparative purposes and outline other crucial aspects related to the patentability of creations involving AI. The dissertation does not examine the other fields mentioned more extensively because they constitute separate subject matter. Further research may also concern specific types of data, such as genetic and health data, and fields of application of ML models, for example, biotechnology and others, that constitute a separate *lex specialis* legal framework under the EPC. The respective research could be built upon the thesis as a *lex generalis* analysis.

The scope of the AI Act only touches on IP issues in terms of what information needs to be disclosed or what steps need to be taken to ensure compliance with copyright licences.[125] Nonetheless, the thesis touches on aspects of the AI Act to demonstrate that if the regulatory sandboxes, certification and designation of competent authorities outlined therein could be unified with a *sui generis* certification mechanism proposed by the thesis, it could reduce the potential administrative burden for creators, examiners and legislators. Additionally, the dissertation emphasizes the necessity of ensuring compliance with the requirements of

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[124] The European Patent Office. Member states of the European Patent Organisation.

[125] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Recitals 48, 104–109, Article 25, Paragraph 5, Article 53, Paragraph 1, Clause (b), (c). Annex VII, Paragraph 4.5.

the AI Act when analyzing potential solutions. Further research could be conducted on aspects of licensing under the EPC, compliance with the AI Act, and the administrative burden regarding the potential involvement of standards. These aspects might be particularly relevant for standard essential patents.

The research builds on and further elaborates previous academic proposals for a *sui generis* mechanism for creations involving AI[126] as well as the existing *lex specialis* legal regimes such as the utility models,[127] and semi-conductor protection.[128] The proposed certification mechanism provides a preliminary description of the respective legal framework for the jurisdiction of the EPC and, subsequently, under the EU as a starting point for the ongoing discussion on the subject matter. The potential tension of conflicting interests and opinions driving the legislative process in initiating the incorporation of the *sui generis* mechanism as a legal instrument does not change the above. The thesis could also be used to consider the respective aspects in other jurisdictions.

Further research might be required if a level of general AI is attained or AI becomes considerably generalizable, and the same creation is applicable in various fields without conceptual adjustments. At that point, the correlation between AI-generated inventions and the requirements under the EPC might be affected. Namely, the respective technology development level might require re-evaluating:

1) hurdles regarding compliance with the "sufficient disclosure" requirement considering the ability of explainability (exponential "black box" effect). The difficulty could lie in the sufficiency of only mentioning some of the training and input data to obtain the output. Namely, the training phase and the disclosure of the relevant information may not reflect the potential range of applications and capabilities of a creation involving AI if it continues to learn and adapt. Thus, more detailed information might be required to be revealed to fulfil the "sufficient disclosure" requirement under the EPC. Consequently, the revelation of excessive information might negatively impact the competitive advantage of the respective creators;

2) recognition of AI as an "inventor" or the role of its contribution in generating a creation. Additionally, applicable economic rights might be re-evaluated in line with the accountability and liability;

3) applicability of the "patent-eligible" invention requirement under the EPC for creations involving AI and AI-generated creations. Evaluation might also

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[126] Norvig, P. Bridging AI's trust gaps, fireside chat 'Responsible AI', Panel discussion; Samuelson, P. *et al*. A Manifesto Concerning Legal Protection of Computer Programs, p. 2423, 2426–2429.

[127] The World Intellectual Property Organization. Utility models. – https://www.wipo.int/patents/en/topics/utility_models.html (11.08.2024).

[128] Samuelson, P. *et al*. A Manifesto Concerning Legal Protection of Computer Programs, p. 2423, 2426–2429; Picht, G. P, Thouvenin, F. AI & IP: Theory to policy and back again policy and research recommendations at the intersection of artificial intelligence and intellectual property, p. 15–17.

require considering the validity of aspects of the "computer program" exception for AI-generated creations as well as the scope of the "technical field" and "technicality" requirement;

4) definition of "inventiveness" and evaluation of "obviousness" in line with the public availability of all data, ML models. Another aspect that would have to be determined may be the consideration of the level of knowledge of the person skilled in the art and the perception of the involvement of AI. In addition, a combination of "inventive step" and "novelty" criteria could be considered;

5) licensing and infringement aspects in line with the applicable moral and economic rights of the respective systems and assessment of the possibility of infringement. Potentially, the application of AI in determining the infringement might be considered in correlation with the applicable standard for identifying the violation.

Due to the conceptual nature of the respective hurdles regarding the patentability of creations involving AI, the *sui generis* certification mechanism might also be the preferable approach to avail patent-like protection.

1.5. Methodology and Sources

The scope of the thesis comprises the EPC. The respective framework is chosen because the EPC provides for the grant of the patent within the designated territories of its contracting states by means of a centralized procedure without the need to file separate national patent applications.[129] Considering that all Member States of the EU are parties to the EPC,[130] the respective convention has an impact on the mentioned jurisdictions. The EPC is also, to some extent, an instrument for harmonization and centralization of national and EU regulations. Namely, the EPC provides validation and maintenance in each country of the patent granted under the convention.[131] Since the adoption of the Agreement on a Unified Patent Court[132] starting from 1 June 2023,[133] patents under the EPC could be granted with unitary effect, having simultaneous force in the respective countries without national validation and maintenance.[134] Additionally, the EPC has a respective

[129] The European Patent Office. The Convention on the Grant of European Patents. 17th Ed., Articles 1–3, 64(1), 66–67, 74, 79.

[130] The European Patent Office. Member states of the European Patent Organisation.

[131] The European Patent Office. The Convention on the Grant of European Patents. 17th Ed., Articles 1–3, 64(1), 66–67, 74, 79.

[132] The Agreement on a Unified Patent Court. – OJ C 175, p. 1–40.

[133] Information of the European Commission pursuant to Article 18(3) of Regulation (EU) No 1257/2012 of the European Parliament and the Council of 17 December 2012, implementing enhanced cooperation to the area of the creation of unitary patent protection. – OJ L 361, p. 1, 2023/C 116/02.

[134] Regulation (EU) No 1257/2012 of the European Parliament and of the Council of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary

role[135] in relation to the Patent Cooperation Treaty.[136] Furthermore, the EPO is part of the initiative between the five largest patent offices in the world to also harmonize aspects of the patentability of creations involving AI.[137] Thus, the EPC and the EPO significantly impact the interpretation of patentability aspects of creations involving AI, not only within their respective legal frameworks but also towards the EU region and on a global scale. Therefore, the framework of the EPC is analyzed within the thesis.

The thesis is chosen as an article-based dissertation taking into account the rapidly changing technological development in the field of AI[138] that also affects the legal landscape. The thesis comprises traditional legal methods, including analytical, comparative, historical, and a model- approach method, to substantiate the main argument of the research.

Considering that the thesis focuses on aspects of AI, the dissertation maps its respective technical elements as a basis for the legal analysis of the IP protection of various AI elements. The respective comprehensive analysis is crucial also in the light of the recent controversial case law in the UK.[139] Namely, the diametrically opposed views of the courts are based on the underlying perception of the building blocks of AI. Furthermore, the mentioned case law only considers one area of AI – ML and one type of algorithm – artificial neural network (hereinafter – ANN). Nonetheless, the thesis provides an overview of the scientific division of AI and the differences between related branches as well as constitutive aspects of ML and its learning approaches. The analysis serves as a basis for considerations regarding the legal perception of protecting the respective elements in isolation and as an ensemble. The respective approach is taken by analyzing each of the patentability criteria.

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patent protection. – OJ L 361, p. 1–8, Article 3, 7; 2011/167/EU: Council Decision of 10 March 2011 authorising enhanced cooperation in the area of the creation of unitary patent protection. – OJ L 76, 22.3.2011, p. 53–55, Recitals 6, 7, 11; The European Patent Office. The Convention on the Grant of European Patents. 17th Ed., Article 142.

[135] The European Patent Office. The Convention on the Grant of European Patents. 17th Ed. 2020, Article 150(2).

[136] Patent Cooperation Treaty (19.06.1970). – https://www.wipo.int/edocs/pubdocs/en/wipo-pub-274-2022-en-patent-cooperation-treaty-pct.pdf (30.10.2024).

[137] The European Patent Office, fiveIPoffices. Report from the IP5 expert round table on artificial intelligence. (31.10.2018). – https://www.fiveipoffices.org/material/AI_roundtable_2018_report (30.10.2024).

[138] Samuelson, P. *et. al*. A Manifesto Concerning Legal Protection of Computer Programs, p. 2333.

[139] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH); *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036.

The thesis is based on the identified patentability implications for creations involving AI summarized, for instance, by WIPO[140] – 1) explainability; 2) patent-eligible subject matter; 3) inventorship and 4) inventive step. Another issue that arises from the number and substance of the hurdles that creations involving AI encounter is the consideration of general policy issues or the viability of the current patent social contract.[141] The thesis analyzes each of the outlined hurdles in isolation and ensemble to identify: a) the conceptual level of the respective implications; b) whether and to what extent the existing legal framework could be interpreted to address these challenges; c) potential solutions and their effectiveness in overcoming the outlined patentability obstacles.

The respective analysis concerns the primary and secondary legal sources to evaluate the meaning of the various provisions of the law, their applicability, and the underlying principles, thus considering their effectiveness. Primary sources involve written laws of the states, as well as the texts of the international conventions, guidelines, and recommendations adopted by the IP organizations, offices, and institutions linked to the thesis topic.

The thesis analyzes the EPC, its preparatory documents, and the explanatory guidelines by the EPO interpreting various patentability aspects, particularly related to creations involving AI, such as the Guidelines on Artificial Intelligence and Machine Learning[142] and others. Analyzing the relevant primary sources is essential due to the rapid development of AI, which outpaces the slower evolution of hard laws. For example, various existing guidelines provide a state-of-the-art interpretation of patentability aspects of creations involving AI and other IP issues. The crucial part is also the analysis of secondary legal sources comprising monographs, explanatory documents, scientific publications, conference presentations, reports and others related to the thesis topic.

The respective sources are chosen regarding the analysis of the outlined patentability hurdles of creations involving AI. Literature, mainly monographs, analyzing the patentability criteria of the EPC as well as preparatory documents were observed to obtain an overview of the substance of each of the patentability aspects complying with which creations involving AI encounter challenges.

In addition, key case law of the EPO and the EPO BA interpreting the EPC in the light of patent applications, particularly of creations involving AI, is analyzed. For instance, the so-called "*Dabus* cases"[143] (hereinafter – *Dabus* cases) or the first cases concerning the issue of AI inventorship are observed. Furthermore,

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[140] The World Intellectual Property Organization. Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV.

[141] *Ibid*.

[142] The European Patent Office. Guidelines for Examination G-II, 3.3.1. Artificial Intelligence and Machine Learning.

[143] EPO BA J 0008/20, *Designation of inventor/DABUS*, EPO BA J 0009/20, *Designation of inventor/DABUS II*.

case T 0161/18[144] is discussed, in which the view was expressed that input, output, and training data should be disclosed for inventions involving ML to comply with the requirement of sufficient disclosure under Article 83 of the EPC. Another case concerned is T 0702/20,[145] which outlines that ML is a mathematical algorithm or a computer program and does not express the "technical" effect. The respective analysis allows for understanding how the EPO and the EPO BA interpret the EPC regarding creations involving AI and whether the challenges outlined by WIPO could be resolved. Additionally, an analysis of the mentioned case law provides an understanding of whether amendments to the EPC are necessary and feasible. In this regard, various primary and secondary sources interpreting the EPC in light of the hurdles that creations involving AI encounter are also observed.

For example, the perception by R. Abbott is analyzed as a pioneer in addressing the tension of AI inventorship for evaluation by the EPO and other jurisdictions around the world, as well as reviewing and editing scientific publications related to various aspects of the hurdles for the creations involving AI, including patentability.[146] Furthermore, the vital sources are also referenced reports, amongst them "Trends and developments in artificial intelligence: Challenges to the Intellectual Property Rights Framework: Final report"[147].

Various primary and secondary legal sources are analyzed, outlining possible solutions for overcoming the obstacles that creations involving AI encounter in meeting the requirements for patentability. The analysis provides an understanding of the potential directions of solutions. In addition, the consideration of possible approaches in conjunction with the analysis of the patentability criteria of the EPC and their interpretation in the relevant case law of the EPO and the EPO BA allows conclusions to be drawn regarding their feasibility and effectiveness in overcoming the aforementioned challenges. The respective comprehensive analysis demonstrates that it is necessary to consider whether the EPC still provides an adequate patent bargain or patent social contract in light of the challenges posed by creations involving AI.

Furthermore, the respective analysis and consideration of the solutions to overcome the patentability hurdles for creations involving AI led to the conclusion that a separate industrial property protection mechanism for creations involving AI is necessary. In addition, sources outlining the introduction of a *sui generis* mechanism for creations involving AI are analyzed to understand the respective proposals and build upon them the preliminary certification mechanism suggested in the thesis.

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[144] EPO BA T 0161/18, *Äquivalenter Aortendruck/ARC SEIBERSDORF*, ECLI:EP:BA:2020:T016118.20200512.

[145] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*.

[146] For example, Abbott, R. The reasonable robot. Artificial intelligence and law; Abbott, R. (Ed.). Research Handbook on Intellectual Property and Artificial Intelligence.

[147] The Joint Institute for Innovation Policy. Trends and developments in artificial intelligence: Challenges to the Intellectual Property Rights Framework: Final report.

Given the interrelationship between the EPC and the EU, their regulatory frameworks for IP and AI, for example, the AI Act[148] and others, are also analyzed. The respective analysis allowed for a comprehensive perception of the subject matter of the thesis. Namely, the analysis of not only the EPC framework but also the obligations of the EU Member States within the EU landscape allows to conclude whether certain interpretations under the EPC could correlate with the direction taken by the EU, whether the introduction of potential solutions to meet the patentability criteria under the EU landscape could encounter caveats regarding compatibility, political support, administrative burden and others.

Albeit the focal point of the thesis is an interpretation of patentability aspects of creations involving AI under the EPC, other jurisdictions are also observed for comparative purposes. The respective comparisons are made between the EPC, regulation and practice in Germany, the UK, the USA, South Africa, New Zealand, Ukraine and Australia.

The analysis of the UK regulation and practice is conducted within the article "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process"[149] and in the introductory chapter because it is one of the countries where the patent application naming an AI as an inventor in the patent application within the so-called Artificial Inventor Project[150] was filed first. Besides, the outcome of the mentioned patent application in the UK is also observed because it, compared to the EPC, has a common law system[151] and a different perception of certain patentability aspects compared to the EPC.[152] Furthermore, an analysis and comparison of the regulation and practice within the UK is also conducted to observe whether its withdrawal from the EU[153] has shifted aspects of patentability, particularly towards recognizing the role of AI in generating a creation. Namely, the hard and soft laws of the EU and the case law by the Court of Justice of the European Union also reflect the policy and public order matters towards IP aspects. Thus, no longer being a part of the EU could also impact the perception of the UK in IP aspects, including the patentability of creations involving AI.

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[148] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act).

[149] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 122.

[150] The Artificial Inventor Project. Patent.

[151] O'Connor, V. Common Law and Civil Law Traditions (17.02.2012). – SSRN. – https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2665675 (30.10.2024), p. 11, 14.

[152] Paterson, G. The European Patent System. The Law and Practice of the European Patent Convention. 2nd Ed., p.566–567.

[153] Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community2019/C 384 I/01, XT/21054/2019/INIT. – *OJ C 384I, p. 1–177.*

The deviation between the EPC and the regulation and practice in the UK is also reflected in its recent, controversial case law[154] regarding AI, creations involving AI and interpretation of the patent-eligible subject matter. Thus, the respective viewpoint is analyzed within the thesis and compared with the approach under the EPC. The rationale behind the respective comparison is also substantiated by the fact that the UK advocated for including the "computer program" exception within the EPC, and its interpretation of the respective exclusion was accepted.[155]

Besides, the direction taken by the UK is also analyzed in isolation and together or systemically with the technical interpretation of the concerned aspects, in conjunction with other patentability criteria and the resulting impact on the legal and technological stability of the prevailing view. The respective analysis and comparison allow the conclusion of whether the approach taken by the UK could also be viable under the EPC to address patentability aspects of creations involving AI. Furthermore, the mentioned divergence is also analyzed as one of the aspects that signalizes the necessity to consider specific patentability criteria and raises more general policy concerns in the context of the creations involving AI regarding the viability of the existing patent social contract or patent bargain.

Furthermore, an analysis and comparison are also made regarding the perception of the recognition of the role of AI in generating a creation between the patent framework and copyright protection since there is an inconsistency. The comparison allows reflection on general policy concerns of the validity of the patent bargain or patent social contract from a broader perspective. Namely, the inconsistency between various industrial property regimes in recognizing the role of AI in generating a creation is analyzed in the context of its potential impact on legal and technological stability.

The analysis of the regulation and practice in the USA is undertaken because, unlike the EPC, the respective jurisdiction initially foresaw that anything under the sun created by a man could be patentable and later adjusted the provision through case law.[156] Furthermore, the viewpoint towards patentability in the USA has deviated from the EPC concerning *ordre public* and morality.[157] Since the

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[154] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH); *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036.

[155] The European Patent Office. Minutes of the Munich Diplomatic Conference for the Setting up of a European System for the Grant of Patents, Munich 10 September to 5 October, 1973, M/PR/I, p. 28. The European Patent Office. Article 52 E Travaux Préparatoires. – https://www.epo.org/en/legal/epc/archive/travaux (30.10.2024), p. 19–22.

[156] O'Sullivan, K. L. Returning Patentable Subject Matter to Anything Under the Sun Made by Man. – UCLA Journal of Law & Technology, Digest 1 Issue 3, 2018. – https://uclajolt.com/returning-patentable-subject-matter-to-anything-under-the-sun-made-by-man/ (30.10.2024), p. 2.

[157] USPTO Patent Application No. US4736866A, *Transgenic non-human mammals*. – https://patents.google.com/patent/US4736866A/en (30.10.2024); EPO BA T 0315/03, *Transgenic animals/HARVARD*, ECLI:EP:BA:2004:T031503.20040706; EPO BA T 0791/96, *Pseudorabies/UPJOHN*, ECLI:EP:BA:1999:T079196.19991115.

USA has been more lenient on patentability even in sensitive cases, as the practice mentioned above shows, the approach to recognizing the inventive role of AI in generating a creation could have been different from the EPC. Besides, the USPTO also initiated the Request for Comments on Patenting Artificial Intelligence Creations[158] as well as other related surveys.[159]

Furthermore, the USPTO has issued guidelines on evaluating whether patent claims concerning creations involving AI are directed to excluded subject matter[160] and Inventorship Guidance for AI-Assisted Inventions.[161] The first guidance clarifies aspects of patent claim interpretation, including with respect to the "mathematical method" and "computer program" exceptions. However, the second guidance introduces a novel global perspective on the necessary contribution level for a human to be considered an inventor. In this context, the perception by the USA is analyzed in a vacuum and in conjunction with the interpretation under the EPC to conclude whether the respective direction could address obstacles that creations involving AI encounter regarding patentability.

In addition, an analogous analysis of the UK and a comparison of perceptions of the role of AI in generating a creation in the patent and copyright frameworks is undertaken in the USA. Namely, a similar paradigm exists in the USA on the respective issue.

The approach taken by Germany towards recognition of the inventive role of AI is analyzed in the article "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process"[162] and in the introductory chapter because: 1) Germany had a considerable influence on the drafting of the EPC;[163] 2) Germany is the EU country where most patent applications are filed; thus, national

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158 The United States Patent and Trademark Office, Department of Commerce. The Request for Comments on Patenting Artificial Intelligence Creations, (27.08.2019). –https://www.federalregister.gov/documents/2019/08/27/2019-18443/request-for-comments-on-patenting-artificial-intelligence-inventions (30.10.2024).

159 The United States Patent and Trademark Office, Department of Commerce. Request for Comments Regarding the Impact of the Proliferation of Artificial Intelligence on Prior Art, the Knowledge of a Person Having Ordinary Skill in the Art, and Determinations of Patentability Made in View of the Foregoing (30.04.2024). – https://www.federalregister.gov/documents/2024/04/30/2024-08969/request-for-comments-regarding-the-impact-of-the-proliferation-of-artificial-intelligence-on-prior (30.10.2024).

160 The United States Patent and Trademark Office, Department of Commerce. 2024 Guidance Update on Patent Subject Matter Eligibility, Including on Artificial Intelligence (17.07.2024). – https://www.federalregister.gov/documents/2024/07/17/2024-15377/2024-guidance-update-on-patent-subject-matter-eligibility-including-on-artificial-intelligence (30.10.2024).

161 The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions (13.02.2024). – https://www.federalregister.gov/documents/2024/02/13/2024-02623/inventorship-guidance-for-ai-assisted-inventions (30.10.2024).

162 Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 121.

163 Griset, P. The European Patent. A European Success Story for Innovation. Munich: The European Patent Office 2013, p. 72, 79.

patent law and court practice also have an influence on the interpretation of the EPC;[164] 3) the decision of the patent application in the so-called DABUS case[165] involved a unique perspective that the role of AI could be indicated in the patent application describing it by a specific wording. In this regard, the approach taken by Germany is also compared with the perception in other jurisdictions, notably the EPC and the USA, since they involved different directions. Besides, the approach by Germany regarding recognition of the role of AI in generating a creation is also compared and analyzed with the direction taken by the UK towards the same patent matter and patent-eligible invention. The respective consideration allows observing the mentioned patentability aspects not only in isolation but also as a whole. The approach also provides a more comprehensive view of the impact of different legal directions on technological stability and general policy issues.

Furthermore, one of the arguments outlined regarding the necessity of amending the legal framework for industrial property protection of creations involving AI is the solid economic incentive.[166] Since none of the countries have incorporated the respective amendments of the patent legal framework, no consistent research has yet been conducted on the impact of the respective changes on the economic incentive of generating creations involving AI. Several studies discuss some aspects of the respective economic endorsements.[167]

The analysis of the efficiency of utility model protection is carried out, and the corresponding analogy is drawn between countries because the preliminary

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[164] Timmann, H. Foreword. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. V.

[165] Bundespatentgerich Beschluss 11 W (pat) 5/21 betreffend die Patentanmeldung 10 2019 128 120.2. – https://juris.bundespatentgericht.de/cgi-bin/rechtsprechung/document.py?Gericht=bpatg&Art=en&sid=d842ef62d4a4a3090810f84d3ada7a18&nr=42859&pos=0&anz=1&Blank=1.pdf (30.10.2024), s. 11–15, 17; Bundespatentgerich Beschluss 18 W (pat) 28/20 betreffend die Patentanmeldung 10 2019 129 136.4. – https://juris.bundespatentgericht.de/cgi-bin/rechtsprechung/document.py?Gericht=bpatg&Art=en&Datum=Aktuell&Sort=12288&nr=43747&pos=1&anz=159&Blank=1.pdf (30.10.2024), s. 7–8; *Bundesgerichtshof* Beschluss X ZB 5/22 betreffend die Patentanmeldung 10 2019 128 120.2 (11.06.2024). – https://artificialinventor.com/wp-content/uploads/2024/07/Beschluss_beglaubigte_Abschrift_a_00_5b9824d38c004afdab187db9de100654.pdf (30.10.2024), s.10, 13–15.

[166] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 22.

[167] For example, Kahn, B. M. Economic reasons to recognize AI inventions. Abbott, R. (Ed.). Research handbook on intellectual property and artificial intelligence, p. 385–398; Cuntz, A., Fink, C., Stamm, H. Artificial Intelligence and Intellectual Property: An Economic Perspective. Economic Research Working Paper No. 77/2024. – https://www.wipo.int/edocs/pubdocs/en/wipo-pub-econstat-wp-77-en-artificial-intelligence-and-intellectual-property-an-economic-perspective.pdf (30.10.2024); The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 20–22; Fink, C. From patentability dilemmas to copyright conundrums: Economic prospective. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24 (05.11.2024).

sui generis certification mechanism is proposed in the thesis as a patent-like industrial property regime similar to and existing on par with utility model protection. Thus, research on the efficiency of utility model protection and its impact on the economy could *mutatis mutandis* be applied to other similar industrial property regimes, including the proposed certification mechanism. Conclusions on the efficiency of utility model protection and its positive impact on the incentive to innovate could be used to substantiate the potential effect of *sui generis* protection on technological development and *vice versa*.

In this aspect, an analysis is conducted regarding the attribution of conclusions on the efficiency of utility model protection in China as a significant economy compared to other utility-model-intensive countries.[168] Conclusions on the efficiency of utility model protection in China could, therefore, *mutatis mutandis*, be applied to Germany, which is also a utility model-intensive country.[169]

The legal approach taken by Australia is also analyzed in the article "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process"[170] and the introductory chapter because it involved a unique perception that AI should be recognized as an inventor in the patent legal framework.[171] Even though the higher court overturned the ruling stating that only a human can be an inventor,[172] the original perception of the lower instance court is still relevant to the thesis. Namely, the deviation in the interpretation signalizes that: 1) creations involving AI have implications for meeting patent requirements; 2) the respective difficulties are related to conceptual aspects of the patent legal framework; 3) the lack of *consensus* among judges on the fundamental aspects of patents also has implications for legal and technological stability; 4) not only the aspect of the inventor is at stake, but also more conceptual or general policy issues regarding the validity of the patent bargain or patent social contract are raised in other jurisdictions.

The perception taken by Australia is analyzed in a vacuum and compared with other jurisdictions mentioned above to conclude whether hardships of creations involving AI are a paradigm only under the EPC. In addition, the regulation and practice in the aforementioned jurisdictions are analyzed separately and together to compare perceptions of the patentability of creations involving AI and to

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[168] Ma, R. *et al*. The Impact of Utility Model Patent Quality on Export Performance in China: A Moderated Mediation Effect. Model. – Sustainability, Vol. 15 Issue 10, 2023. – https://doi.org/10.3390/su15108181 (30.10.2024), p. 2–12.

[169] *Ibid*., p. 13.

[170] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 122.

[171] *Thaler v. Commissioner of Patents*. Federal Court of Australia [2021] FCA 879. – https://www.judgments.fedcourt.gov.au/judgments/Judgments/fca/single/2021/2021fca0879 (30.10.2024), p. 124, 126, 189, 198, 226.

[172] *Commissioner of Patents v Thaler*. Federal Court of Australia [2022] FCAFC 62. – https://www.judgments.fedcourt.gov.au/judgments/Judgments/fca/full/2022/2022fcafc0062 (30.10.2024), p. 105–122.

analyze potential solutions and their legal and technological feasibility to overcome the challenge of recognizing the role of AI in generating a creation. In this respect, perceptions are compared between Germany, Australia and the EPC, as each jurisdiction has a different approach to recognizing AI as an inventor.

Furthermore, the viewpoint towards inventorship is also compared with the perception regarding patent-eligible subject matter in the UK to analyze how the shift in perception of one aspect of patentability affects other criteria and could be mirrored in other jurisdictions. The respective systemic analysis is crucial because all elements of patentability must be satisfied to obtain a patent. Thus, each patentability aspect in isolation and as a whole constitutes part of the patent bargain or patent social contract. Therefore, only an analysis of each patentability criteria, separately and together with others, provides a comprehensive overview of the cohesion and viability of the existing patent framework to address the hurdles posed by creations involving AI.

The analysis of the practice in South Africa is conducted in the article "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process"[173] and in the introductory chapter regarding recognition of the role of AI in generating a creation. The example of South Africa is analyzed because it accepted the patent application naming AI as an inventor.[174] Additionally, South Africa foresees recognition of computer-generated works under the copyright framework.[175]

Analysis and comparison to New Zealand is conducted because it also recognizes computer-generated works under the copyright framework[176] but does not admit computer-generated inventions under patent protection.[177] Analogously, Ukraine has introduced a separate *sui generis* protection for non-original creations generated by the computer in parallel with the copyright framework.[178] However, it does not recognize computer-generated inventions under patent

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[173] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 122.

[174] *DABUS*, ZA2021/03242, 2021. Patent Journal, 54(7). – https://iponline.cipc.co.za/Publications/PublishedJournals/E_Journal_July%202021%20Part%202.pdf (30.10.2024), p. 255.

[175] Copyright Act, 1978. – https://www.wipo.int/wipolex/en/text/130429 (03.05.2024), 'author' Section 1(1)(h).

[176] Copyright Act 1994. – https://www.legislation.govt.nz/act/public/1994/0143/latest/DLM345639.html (30.10.2024), 'computer-generated', Section 2(1) in conjunction with Sections 5(2), 22(2), 97(2)(c), 100(2)(b).

[177] High Court of New Zealand. *Thaler v Commissioner of Patents* [2023] NZHC 554. – http://www.nzlii.org/nz/cases/NZHC/2023/554.html (30.10.2024), Paragraphs 32–34.

[178] Закон України. Про авторське право і суміжні права. Відомості Верховної Ради (ВВР), 2023, № 57, ст.166. – https://zakon.rada.gov.ua/laws/show/en/2811-20?lang=uk#Text (30.10.2024), с. 33.

protection.[179] The respective divergence is analyzed to demonstrate the differences between countries and within the state in recognition of the role of AI in generating a creation in various industrial property protection regimes, leading to systematic ambiguity.

As a result, countries are trying to adapt the existing industrial property regimes to creations involving AI. On the other hand, the direction taken lacks systematicity, leading to greater opacity. Thus, the respective endeavours demonstrate the necessity of introducing separate protection for creations involving AI. However, the direction needs improvement.

1.6. The Structure of the Thesis

The thesis is an article-based dissertation consisting of five articles, in which issues that creations involving AI regarding patentability under the EPC encounter and potential solutions are analyzed. The respective patentability difficulties are related to fulfilling criteria of: 1) explainability; 2) patent-eligible subject matter; 3) inventorship; 4) inventive step. The mentioned hardships raise general policy concerns on the viability of the patent social contract.[180] The aspects entail the same hierarchy as was outlined regarding the research problem. Besides, chronologically, the outlined elements are listed based on the date of publication of the corresponding article.

Articles and the research paper each separately focuses on one of the first four issues and respective part of general policy concerns:

1) explainability – observed in the article "Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention"[181] and the research paper "The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives";[182]

2) patent-eligible subject matter – considered in the article "Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence";[183]

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[179] Закон України. Про охорону прав на винаходи і корисні моделі. Відомості Верховної Ради України (ВВР), 1994, № 7, ст. 32. – https://zakon.rada.gov.ua/laws/show/3687-12#Text (30.10.2024).

[180] The World Health Organization in Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV.

[181] Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention, pp. 126–135.

[182] Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. In New Legal Reality: Challenges and Perspectives, pp. 400–408.

[183] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, pp. 249–278.

3) inventorship – observed in the article "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process";[184]

4) inventive step – considered in the article "Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence".[185]

Considering that the thesis focuses on creations involving AI and their patentability, the introductory chapter first provides an overview of AI. The respective analysis provides an understanding of the constitutive technical aspects or building blocks of AI, which serve as the backbone for the legal analysis of the patentability of creations involving AI. Particularly crucial, the respective technical overview comes within the analysis of the patent-eligible subject matter, as the examination of the controversial UK case law[186] demonstrates.

Afterwards, the introductory chapter focuses on the analysis of general policy concerns. The general policy matters involve observing the validity of the existing patent bargain or patent social contract. The introductory chapter briefly considers the rationale for a patent bargain or a patent social contract. The analysis is continued outlining hurdles that creations involving AI encounter in complying with patentability requirements.

The focal point of the analysis is the recent controversial case law of the UK[187] that demonstrates how different perceptions towards constitutive aspects of creations involving AI impact their patentability. The analysis of the mentioned case law is combined with considerations regarding the first four patentability aspects previously outlined in the articles and the research paper. As a result, the systemic analysis reflects how changing perceptions of one patentability criteria impact other related aspects. The comprehensive view outlines the level of difficulties that creations involving AI encounter in complying with the patentability requirements and reflects the increasing need to overcome them. The approach taken by the UK is analyzed not only in isolation but also in the light of the EPC to consider the potential outcome thereof.

Furthermore, the analysis is paired with an observation of the direction taken within other jurisdictions. The respective analysis enlightens the increasing opacity and deviation in the perception of IP protection aspects for creations involving AI amongst countries. In other words, the respective controversy outlines the viewpoint towards general policy aspects or the validity of the existing

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[184] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, pp. 112–128.

[185] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, pp. 139–154.

[186] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH); *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036.

[187] *Ibid*.

patent bargain in the light of creations involving AI. Potential alternative approaches are analyzed, and their advantages and disadvantages are outlined.

The analysis continues with a consideration of the *sui generis* certification mechanism. The analysis is based on and builds upon the preliminary overview presented in the articles and the research paper. The introductory chapter considers additional aspects, such as the economic or competition perspective. The *sui generis* certification mechanism is proposed as a patent-like or similar to utility model protection, existing in parallel with other industrial property regimes. In this context, criticisms of the outlined drawbacks of utility model protection are addressed, and other related aspects are analyzed.

The analysis in the introductory chapter is based on the considerations set out in the relevant articles and the research paper, combining and building on their respective findings. In this respect, the introductory chapter provides a comprehensive and systemic analysis of the barriers to the patentability of creations involving AI and the general policy concerns arising from them. Through a comprehensive and systemic analysis, the introductory chapter highlights the necessity for a reconceptualization of the existing patent social contract and the implementation of the *sui generis* mechanism, as outlined in the above-mentioned articles and the research paper. The corresponding publications, together with the analysis conducted within the introductory chapter, answer the research questions, allow for achieving the research objective, resolve the research problem and confirm the hypothesis of the thesis. The publications outline the following considerations:

Explainability

The research paper "The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives"[188] and the article "Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention"[189] address the respective aspects. Namely, the research paper and the article concern the difficulties in providing information about the ML models, including their most sophisticated forms. The publications also touch upon the aspects of the validity of the requirements under Article 83 EPC in correlation with the structure and functionality of a creation. Additionally, the publications also analyze the proposed solutions to tackle the issue, such as the implementation of the deposit mechanism of the algorithm, training data or both, similar to the case of microorganisms. The conclusion is drawn that the proposed mechanisms would not be efficient. Namely, the deposit mechanism cannot substitute the written description required under the EPC. On the contrary, disclosing excessive information about a creation involving AI could hamper a

[188] Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. In New Legal Reality: Challenges and Perspectives, pp. 400–408.

[189] Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention, pp. 126–135.

competitive advantage in the market for a creator. Instead, a *sui generis* certification mechanism is proposed to resolve the challenges.

In this respect, the certification is suggested to involve the so-called "sandbox" instrument and experts who could make the necessary examination in a confidential manner. Additionally, the certification is suggested as a complementary or stand-alone mechanism to protect creations involving AI. The certification would allow the protection to be availed without the necessity to opt for alternative approaches that, in turn, would not facilitate the enrichment of the common general knowledge.[190]

Inventorship

The article "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process"[191] addresses the legality of recognition of the role of a human in all cases. Furthermore, the publication outlines the potential approaches to how the role of AI in generating a creation could be recognized, including naming AI as a "contributor" or a "co-contributor". The article also concerns the division of ownership rights between humans and AI. The article analyzes proposed solutions and suggests other options to address the respective aspects. It concludes that none of these solutions are feasible because they require conceptual changes to the EPC that are unlikely to be supported by the EPO. As a result, a *sui generis* certification mechanism is proposed as an efficient approach to address the issues in question, complementing the aspects outlined in relation to the "sufficient disclosure criteria". The *lex specialis* approach would enrich the knowledge of society by informing about the true capabilities of AI, humans and scientific progress. In this respect, certification will facilitate technological development and reduce the risk of developers seeking other means of protection.[192]

Inventive Step

The article "Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence"[193] analyzes the efficiency of the existing evaluation

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[190] Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. In New Legal Reality: Challenges and Perspectives, pp. 400–408; Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention, pp. 126–135.

[191] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, pp. 112–128.

[192] *Ibid*.

[193] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, pp. 139–154.

criteria under the EPC in light of the peculiarities of creations involving AI. The publication considers the potential hardships of defining the prior art, the person skilled in the art, the use of ML as an auxiliary tool, or even the replacement of the person skilled in the art by ML. It is concluded that adjustments to the EPC will also be required concerning the proposed solutions that might not be supported. In this regard, a *sui generis* certification mechanism is proposed apart from aspects of "sufficient disclosure" and "inventorship," addressing the matter of the "inventive step" under the same regime. A preliminary overview of the certification mechanism is provided. Certification is proposed preferably as an EU-wide mechanism, which could potentially and most efficiently be made consistent with the approach set out in the AI Act. The suggested direction would not require adaptation of the EPC or force creators to choose alternative means of protection, which could consequently hinder scientific progress.[194] The proposed approach would not impose a considerable additional administrative burden on creators, examiners and legislators or disrupt the framework of the EPC.

Patent-Eligible Subject Matter

The article "Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence"[195] analyzes the aspects of the "technicality" requirement as well as a "computer program" and "mathematical" method exception and their implications for creations involving AI. It concludes that if the level of "technicality" is insufficient or too high, the respective creations may not benefit from protection under the EPC or copyright, respectively. Apart from the fundamental amendments to the EPC and the option of trade secret or contractual protection, which may not be welcomed, an alternative or introduction of a *sui generis* certification mechanism is proposed. The suggestion is consistent with and complementary to the certification mechanism outlined in previous articles.[196]

Furthermore, an introductory chapter addresses the recent, controversial case law of the UK regarding the patent-eligible subject matter[197] and builds upon the analysis outlined in the mentioned article. Namely, aspects of the understanding of the notion of a "computer program", a "computer", "mathematical method" (algorithm), their relationships with the ML model, its parameters and patent-eligible subject matter are concerned. An analysis is also conducted regarding the

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[194] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 139–151.

[195] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 249–278.

[196] *Ibid*., p. 249–273.

[197] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 54–63; *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 64–66, 68.

perception that the ability of the ML model to learn without human presence reverses its exclusion from patentability. The mentioned aspects are viewed in isolation in the UK jurisdiction and systemically in light of the impact on other patentability criteria and other jurisdictions, including the EPC. It is concluded that there is no *consensus* between jurisdictions and judges in the same country. Furthermore, any changes in the interpretation of one patentability criteria must be analyzed in light of others to avoid legal conundrums. Moreover, it is outlined that the paradigm might negatively impact developmental stability and force the choice of alternative protection options.

Nonetheless, other protection modes might be insufficient and would not facilitate technological progress. Thus, apart from considerable amendments to the EPC, the previously outlined *sui generis* certification mechanism is concluded to be the most efficient protection mode.

General Policy Concerns

In the light of the difficulties outlined for creations involving AI in terms of patentability under the EPC, general policy questions arise regarding the sufficiency of the current patent social contract between creators and society. Namely, whether technological development still justifies the incorporated balance between gaining exclusive rights in exchange for disclosure of genuine labour (invention) is of concern. It is also a matter of considering the necessary adjustments, their scope and the level of jurisdictions involved, as well as taking into account previous experience with various initiatives.[198]

The introductory chapter discusses the respective difficulties in light of the issues analyzed in the outlined articles, previous experience with various initiatives, including the regulation of utility models in the EU, and the general policy matters of the validity of the patent bargain or patent social contract. The introductory chapter also discusses the economic implications and incentives of opting for a *sui generis* protection mechanism. The analysis affirms the hypothesis of the thesis that the patent social contract regarding patent protection possibilities under the EPC for creations involving AI must be reconceptualized and incorporated with a *sui generis* mechanism. Besides, the mentioned conclusion is also reflected in legal and economic considerations. An introductory chapter also provides an overview of AI and ML, which serves as a backbone for the legal analysis of patentability aspects of creations involving AI. Since the EPC was written concerning traditional computer programming, it is necessary to understand the difference between AI and computer programs. Observation of the respective differences allows for analyzing whether the current EPC framework can be interpreted to overcome the hurdles that creations involving AI encounter in obtaining a patent.

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[198] *Mutatis mutandis* The World Health Organization. Conversation on Intellectual Property and Artificial Intelligence: Second Session. Revised Issues Paper on Intellectual Properties Policy and Artificial Intelligence. – WIPO/IP/AI/2/GE/20/1 REV, p. 7.

2. ARTIFICIAL INTELLIGENCE

2.1. The Difference Between Artificial Intelligence and Computer Program

Generally, ML or the subfield of AI,[199] refers to the study of how a program[200] iterates statistical models and algorithms relying on patterns and correlation instead of a particular task and specific instructions.[201] Building an ML model (*mutatis mutandis* a "mechanical") requires writing an algorithm, assigning the necessary parameters, weights and other values, all of which, together with training data, form a program.[202] In other words, an "algorithm" refers to a specific, consecutive method to achieve the desired outcome. It could be expressed mathematically or non-mathematically. An algorithm can exist *per se* and be incorporated as an element of a program or software (a bundle of programs). Even a neural network is a mathematical function.[203] Simply put, the term "program" or "software" refers to any piece of code that instructs a computer to conduct something expressed in computer language. The practice of AI lies in computer programs or software.[204] Simultaneously, the notion of AI models incorporates both computations expressed in computer programs or software and connectionism or cognition (inner, unplanned correlation of patterns in a network).[205] ML differs from the traditional software because it embodies an interconnection between a code, data and artefacts of both.[206]

Although ML differs from traditional programming because data and output form the program,[207] algorithms still underlie ML. Thus, ML is a function expressed mathematically or otherwise in generic terms. At the same time, the term "program" in the context of ML has various meanings. Namely, a "computer program" refers to instructions that a computer has to execute. The term also

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[199] Maini, V., Sabri, S. Machine Learning for Humans. – 2017, https://everythingcomputerscience.com/books/Machine%20Learning%20for%20Humans.pdf (28.11.2020), p. 9–11.

[200] Raynor, W. Machine Learning. The International Dictionary of Artificial Intelligence. Chicago: The Glenlake Publishing Company, Ltd. 1999, p. 175.

[201] Kang, M., Choi, M. Machine Learning. Concepts, Tools and Data Visualization, p. 17.

[202] Charniak, E. Introduction to Deep Learning, p. 18–19.

[203] Gerrish, S. How Smart Machines Think. London: The MIT Press 2018, p. 109; Frana, F. L. Klein, M. J. (Eds.). Deep Learning. Encyclopedia of Artificial Intelligence. The Past Present and Future of AI. California: ABC-CLIO, LLC. 2021, p. 112–114.

[204] François, C. (Ed.). Artificial intelligence. International Encyclopedia of Systems and Cybernetics. München: Saur 1997, p. 29.

[205] *Ibid*., p. 29.

[206] Huyen, C. Designing Machine Learning Systems. An Iterative Process for Production-Ready Applications. Sebastopol: O'Reilly Media, Inc. 2022, p. 22.

[207] Drexl, J. *et. al*. Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective. Version 1.0. – Max Planck Institute for Innovation and Competition Research Paper Series, 2019. – https://ssrn.com/abstract=3465577 (02.10.2024), p. 4.

describes a knowledge transducer that converts input know-how into output knowledge, provides insights about input know-how and produces output knowledge.[208] At the same time, the word "program" is also used to describe an algorithm. Notwithstanding the mentioned differences, it is established that algorithms, including mathematical expressions of ML *per se* and ML models, can be incorporated into a computer program or software for execution on a computer.[209] In this respect, technically, the expression of ML is a "computer program". A "computer program" can be written for a particular machine or, in the form of software, for any device. Thus, a "computer program" is also a machine in this regard.[210] To understand ML, it is necessary to observe the structure of models, their internal functioning and the learning process.

2.2. Basic Concepts of Artificial Intelligence and Machine Learning

AI is the study of agents that perceive the surrounding environment, create plans, and enact decisions to achieve the stated goals. AI comprises various fields such as ML, robotics, computer vision, natural language processing and others. AI can be divided into narrow or weak intelligence, which refers to the limited task or simulated thinking, and general or strong intelligence, which describes the ability to perform any task that a human can accomplish, including learning, decision-making under uncertainty, and reprogramming itself. Self-learning should be distinguished from self-improvement exceeding human intelligence or singularity.[211] The narrow intelligence currently dominates; namely, many applications are created to automate tasks by making computers produce the output from the input or raw data.[212]

ML focuses on enabling computers to self-learn by identifying data patterns, building explaining models and conducting predictions without previously programmed models and rules.[213] Generally, ML can be divided into supervised, unsupervised, semi-supervised, reinforcement, and active learning.[214]

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[208] François, C. (Ed.). Program (computer). International Encyclopedia of Systems and Cybernetics, p. 284.

[209] For more information on technical distinction, see: Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 252–255.

[210] Nack, R. Inventions and their amenability to patent protection. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 115.

[211] Maini, V., Sabri, S. Machine Learning for Humans, p. 9–11.

[212] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System. – Journal of the American Health Association, Vol. 9 No.4, 2020. – doi: 10.1161/JAHA.119.013924 (28.11.2020), p. 1.

[213] Maini, V., Sabri, S. Machine Learning for Humans, p. 9.

[214] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 1.

Supervised learning aims to learn a function mapping input data to targeted labels. The focus is on regression problems when variables are values of continuous numbers and classification problems when variables are categorical values. Algorithm types are – parameter models such as linear regression, logistic regression, support vector machine and non-parameter as k-nearest neighbours, artificial neural network. The difference lies in a pre-defined structure for parameter models, which results in interpretability issues due to the more flexible structure for non-predefined models.[215]

1) Linear regression – is the approach to a model correlation between a scalar response and one or more explanatory variables in a linear form. The model parameters aim to learn the optimum minimization error rate in the prediction by the model. Gradient descent is applied to find the minimum loss function that iteratively allows increasing the potential approximation. [216]

2) Logistic regression – is a classification method that calculates the probability in a binary form of a categorical target variable belonging to a particular class.[217]

3) Support vector machine – a parameter model applied to classify variables in clusters and optimize the separating margin.[218]

4) K-nearest neighbours – algorithms stand for labelling test data by the average correlation between the mode or mean of the closest label of a data point. The algorithm is useful for identifying valuable training datasets, proximity determination, and substantiating missing variables by proposing the nearest potential values.[219]

5) Decision trees – aim to reach an output by pyramid-type categorization of the split datasets, overcoming the entropy. Decision trees are efficient even with disorderly, mixed, and easily readable data. However, the main drawbacks are resource extensiveness, overfitting and displaying the local optimum not involving subjectivism, which requires numerous models to overcome the noise or non-systematic errors and inadequacy.[220]

6) Random forests – is a model aggregating numerous decision trees by adding the additional element of randomness; thus, minimizing overfitting, limiting the slicing percentage not relying on the individual feature but considering elements in entirety preventing excessive correlations. Random forests

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[215] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 1.

[216] Seber, G. A. F., Lee, A. J. Linear Regression Analysis. 2nd Ed. New York: Willey Interscience: A John Willey & Sons Publication 2003. – https://onlinelibrary.wiley.com/doi/book/10.1002/9780471722199 (28.11.2020), p. 4.

[217] Hosmer, D. W. J. *et al*. Applied Logistic Regression. 3rd Ed. – New York: Willey Interscience: A John Willey & Sons Publication 2000. – http://resource.heartonline.cn/20150528/1_3kOQSTg.pdf (28.11.2020), p. 1.

[218] Maini, V., Sabri, S. Machine Learning for Humans, p. 36–41.

[219] *Ibid*., p. 41, 48.

[220] Quinlan, J. R. Introduction of decision trees. – Machine Learning, Vol. 1, 1986. – doi: 10.1023/A:1022643204877 (28.11.2020), p. 8–12.

can be applied for process modelling and seeking for the most essential features.[221]

7) Artificial neural network – is a computing system that mimics the biological neural network of animal brains that consists of interconnected nodes or artificial neurons. The artificial neural network can be applied to predict numerous classes that can be achieved by for-feed learning or multi-layer perception by adding the hidden layer in the model.[222]

Unsupervised learning aims to discover patterns from a dataset consisting of input variables without targeted labels, for instance, reducing dimensionality, discovering natural clustering or clustering of data, and identifying the distribution that underlies data. Common unsupervised learning algorithms are k-means clustering, hierarchical clustering, principal component analysis, singular value decomposition, auto-encoders. The performance mainly is domain-specific[223] and the approach is applied for data pre-processing as input for supervised learning algorithms.[224]

1) K-means clustering – focuses on grouping data points defined by the group's centroid. The method allows, for instance, to group closely-related images and other data.[225]

2) Hierarchical clustering – embody clustering by making a pyramid or a hierarchy. The model allows the selected desired number of clusters.[226]

3) Principal component analysis – aims to select the main components and measure the captured data variance that helps to reduce dimensionality or complexity.[227]

4) Singular value decomposition – a decomposition of a matrix to constituent parts.[228]

5) Auto-encoders – a type of artificial neural network that aims in an unsupervised manner to learn the representation of data or encoding to reduce dimensionality as well as to reconstitute the representation to the original input.[229]

Semi-supervised learning and active learning focus on partially labelled data as input. Semi-supervised learning by an aim is analogous to supervised learning, but applied techniques also contain unlabeled data, improving supervised

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[221] Maini, V., Sabri, S. Machine Learning for Humans, p. 52–53.

[222] Krogh, A. What are Artificial Neural Networks?. – Nature Biotechnology, Vol. 26 No. 2, 2008. – https://www.nature.com/articles/nbt1386 (28.11.2020), p. 195–197.

[223] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 1–2.

[224] Maini, V., Sabri, S. Machine Learning for Humans, p. 57–59.

[225] *Ibid*., p. 67.

[226] *Ibid*., p. 59.

[227] *Ibid*., p. 63.

[228] *Ibid*., p. 64.

[229] Pinaya, W. H. L. *et al*. Autoencoders. Mechelli, A., Vieira, S. Machine Learning. Methods and Application of Brain Disorders. Amsterdam: Elsevier Inc., 2019. – doi: https://doi.org/10.1016/B978-0-12-815739-8.00011-0 (28.11.2020), p. 193–208.

learning performance.[230] Semi-supervised learning is useful, for instance, in image classification.[231] Meanwhile, under active learning, the algorithms select the necessary labelled data to improve the model as such.[232]

Reinforcement learning focuses on learning from experience and corresponding performance, even without training data to maximize obtainable rewards. Most of the models are used in the game industry [233] but also in other applications containing a degree of autonomous nature such as self-driving cars[234] and other that can be achieved by applying, for instance, deep reinforcement learning, which is a combination of the sequential, trial-error method as reinforcement learning and deep learning that could lead closer to the general or strong AI.[235]

Application of ML typically consists of: a) data acquisition; b) normalization; c) feature extraction; d) feature selection; e) respective ML model.[236] It may be a resource-intensive task. The main drawbacks of ML application are: a) overfitting that may appear due to the model complexity and underfitting due to model simplicity and results with well-analyzed trained data but lacks generalization on unforeseen data; b) bias that describes the error rate or false positives and false negatives that may appear approximating real data with the simplified model; c) variance that displays the error rate depending on a variance of testing and training data. To overcome the challenges, more training data as an input is required or regularization – a set of limitations to minimize training data intake or range of explanation.[237] Hence, the proper feature representation is the most challenging task for ML, which, before the introduction of deep learning, was mainly conducted manually.[238]

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[230] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 2.

[231] Peikari, M. *et al*. A Cluster-then-label Semi-supervised Learning Approach for Pathalogy Image Classification. – Nature, Vol. 8 No. 7193, 2018. – doi: 10.1038/s41598-018-24876-0 (29.11.2020), p. 1–13.

[232] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 2.

[233] Russel, S. J., Norvig, P. Artificial Intelligence: A Modern Approach. – New Jersey: Prentice-Hall, Inc. 1995, p. 598.

[234] Chen, C. *et al*. An Intelligent Path Planning Scheme for Autonomous Vehicles Platoon Using Deep Reinforcement Learning on Network Edge. – IEEE Access, Vol. 8, 2020, doi: 10.1109/ACCESS.2020.2998015 (29.11.2020), p.99059–99069.

[235] Arel, I. Deep Reinforcement Learning as Foundation for Artificial General Intelligence. Wang, P., Goertzel, B. Theoretical Foundations of Artificial General Intelligence. – Paris: Atlantis Press, Vol 4. 2012. – https://doi.org/10.2991/978-94-91216-62-6_6 (29.11.2020), p. 89–102.

[236] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 2.

[237] Maini, V., Sabri, S. Machine Learning for Humans, p. 26–28.

[238] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 2.

2.3. Neural Networks and Deep Learning

The idea of neural networks is to mimic biological networks where the connection lies on nodes or neurons with a specific activation level or weigh. Similar to biological processes in the brain, which achieve a level of abstraction through deeper correlations and associations, neural networks learn to recognize abstract concepts through hidden layers, ultimately concepts that capture the most critical information with minimal loss of accuracy.[239] Hence, deep learning, which is a field of ML, differs from the previously observed traditional ML models by how representations are learned from raw data; namely, learning of representation is conducted with multiple neural networks or levels of abstraction. The number of neural networks, along with the connectivity between the layers and the resulting potential to learn meaningful abstractions from the inputs, differentiate deep learning from traditional ANN. Namely, commonly ANN contains up to three layers and is aimed to provide supervised representation with optimization for a task that mainly is not generalizable. In contrast, deep learning produces representation optimizing data from the previous layer and, in an unsupervised self-learning manner produces generalizable output that has not initially been designed by a human.[240]

The most notable neural network classes that deploy deep learning are the deep neural network, convolutional neural network, recurrent neural network and deep belief network.[241]

1) Deep neural networks – aim to process the input data in a non-linear, layer-wise or feedforward manner to prepare the neurons in consecutive hidden layers to learn a generalizable representation of the deep structure. The representation is followed by a supervised layer, after which applying backpropagation or the training algorithm that uses gradient descent to calculate the permissible error rate respecting weigh between the input and output of each layer,[242] the accuracy of the whole neural network is improved.[243]

2) Convolutional neural network (hereinafter – CNN) – is inspired by biological processes as the visual cortex of animals that relate to the organization of neurons. CNN is designed with minimal processing to recognize visual patterns directly from images with pixels.[244] Hence, CNN is effective for sequential data

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[239] Maini, V., Sabri, S. Machine Learning for Humans, p. 71–76.

[240] Kuman, U. *et al*. Deep Learning for Healthcare Biometrics. Kisku, D. R. *et al*. Design and Implementation of healthcare biometric systems. – The USA: IGI Global 2019. – doi: 10:4018/978-1-5225-7525-2.ch004 (29.11.2020), p.79.

[241] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 4.

[242] Russel S. J., Norvig P. Artificial Intelligence: A Modern Approach, p. 578–580.

[243] Kuman, U. *et al*. Deep Learning for Healthcare Biometrics. Kisku, D. R. *et al*. Design and Implementation of healthcare biometric systems, p. 79.

[244] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 4.

analysis, image analysis or computer vision tasks, and instrumental in deep reinforcement learning.[245]

3) Recurrent neural network (hereinafter – RNN) – assists in sequential data modelling by building a network of temporal sequences in directed graph form where the connection is designed to comprise not only the input data but also previously hidden nodes or the output from the former layer. Thus, the output contains the current and previous input that constitutes a sense of built-in memory.[246] Therefore, RNN is suitable for sequential data analysis as language processing and germane in reinforcement learning to memorize the historical pattern or maintain an overview of the current layout.[247]

4) Deep belief network (hereinafter – DBN) – comprises a graphical model that learns presumable connections between layers and produces the possible input reconstruction.[248] The probability allows for the determination of input features that are robust and unalterable to noise or other impacts.[249] Thus, DBN is effective in clustering, pattern recognition and generation and is applied, for instance, in natural language processing and others.[250]

To obtain the desired generalization and performance, a large amount of input data must be used to train the deep learning model. The training process contains: 1) pre-training – comprises unsupervised learning of the data distribution pattern and future representation creation. The step allows for the model to self-learn from the data with the same modality data that does not pertain to the respective data set and, as a result, to improve the performance or to apply a transfer learning approach; 2) fine-tuning focuses on future adjustment for a specific task to maximize the performance. The crucial aspect to verify the accuracy of the model is a generalization on input training data on previously unseen test data. Hence, the validation is applied for hyperparameter tuning, for instance, cross-validation and others, before the final assessment of the testing data.[251]

The accuracy of the output in neural network architectures that apply deep learning can be attained by increasing the number of hidden layers. However, the increasing complexity of the model structure augments the probability of the so-

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[245] Maini, V., Sabri, S. Machine Learning for Humans, p. 77.

[246] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 4.

[247] Maini, V., Sabri, S. Machine Learning for Humans, p. 77.

[248] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 4.

[249] Navamani, T. M. Efficient Deep Learning Approaches for Health Informatics. Sangaihan, A. K. Deep Learning and Parallel Computing Environment for Bioengineering Systems. – Amsterdam: Elsevier Inc. 2019. – doi: https://doi.org/10.1016/B978-0-12-816718-2.00014-2 (29.11.2020), p. 123.

[250] Sarikaya, R. *et al*. Application of Deep Belief Networks for Natural Language Understanding.– IEEE/ACM Transactions on Audio, Speech, and Language Processing, Vol. 22 No. 4, 2014. – doi: 10.1109/TASLP.2014.2303296 (29.11.2020), p. 778–784.

[251] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 4–5.

called “black-box” problem or the inability of a model designer to explain or interpret the correlation between the achieved output and input data since the more inner layers are added, the more abstract representations are produced.[252]

Due to the ability to process large-scale data that, in many cases, is high dimension or random as images, sounds and others, the application of ML and particularly deep learning models in various fields has increased. The significant step that has alleviated application was the reduction of model building, data processing and training costs vastly due to the introduction of the graphics processing units (hereinafter – GPU). GPU facilitates speed learning and building deeper networks that considerably improve the resulting performance. Hence, especially deep learning models have become extremely capable of learning feature representations and may even outperform traditional machine learning models.[253] As a result, ML and particularly deep learning have widened application fields and rendered possible large-scale data processing also in health care, the meaningful area of which is biotechnology, which concerns developing new products.[254]

Mapping the technical aspects of AI allows for legal analysis of the respective creations and their patentability. The importance of understanding the structural components of AI and the difference between “computer programs” is reflected, for example, in recent UK case law.[255] Namely, different perceptions of the structural aspects of AI and “computer programs” lead to controversial results. Moreover, the UK decisions only concerned ANN and were not applied to other ML algorithms.

Combined with differing views on other patentability aspects, the controversy in the case law raises concerns about general policy issues or the validity of the patent social contract. Divergent approaches in other jurisdictions compound these concerns.

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[252] Maini, V., Sabri, S. Machine Learning for Humans, p. 77.

[253] Sevahula, R. K. *et al*. State-of-the-Art Machine Learning Techniques Aiming to Improve Patient Outcomes Pertaining to the Cardiovascular System, p. 3.

[254] Amarakoon, I. I. *et al*. Biotechnology. Badal, S., Delgoda, R. Pharmacognosy. Amsterdam: Elsevier Inc. 2017. – doi: https://doi.org/10.1016/B978-0-12-802104-0.00028-7 (29.11.2020), p. 549–563.

[255] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH); *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036.

3. THE PATENT SOCIAL CONTRACT UNDERLYING THE EUROPEAN PATENT CONVENTION

3.1. General Policy Concerns

Overall, the general policy concerns entail balancing the public domain and private rights. Regarding creations involving AI, the paradigm appears in two aspects – 1) as a patent social contract between the actors involved or the granting of exclusive rights in exchange for the disclosure of an invention and the enrichment of the general knowledge, and 2) through the protection possibility, justification and the extent of it. Both dimensions are linked to the question of the extent to which creations involving AI should be protected or excluded from the public domain. Additionally, the issue appears of the measuring criteria or a standard value to determine the public interest or to find a balance.[256] As global harmonization is proposed as a precondition for the development of a legal framework adapted to creations involving AI,[257] engagement should also include globalization of the desired standard of protection and approach to the matter.[258]

General policy considerations are essential because they reflect the principles on which the respective system stands. Nonetheless, the patent system under the EPC has been designed to pursue human happiness by rewarding genuine labour in exchange for the disclosure of a unique social value or invention.[259] Simultaneously, general policy considerations may change over time due to the development of modern technologies.[260] Since respective considerations cannot alter the written law but flow within its limits through interpretation, the only approach is to reconceptualize the patent social contract or a patent bargain.[261]

If the development and promotion of technologies serve the freedom and well-being of others, then also technologies *per se* allow them to act.[262] Namely, recognizing the role of AI in generating creations could set the record straight on the technological evolution, the respective contribution, and capabilities as

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[256] Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 104–105.

[257] Hervey, M. The World Intellectual Property Organization. Webinar on WIPO Guide to Generative AI and Intellectual Property WIPO/WEBINAR/FT/24/1.

[258] Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 106.

[259] EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraphs 4.3.9., 4.4.1., 4.6.4; The European Patent Office. What to expect.

[260] EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.2.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraph 4.6.2; EPO BA T 0315/03, *Transgenic animals/HARVARD*, ECLI:EP:BA:2004:T031503.20040706, Paragraph 12.2.4; EPO BA T 0019/90, *Onco-mouse*, ECLI:EP:BA:1990:T001990.19901003, Paragraph 5.

[261] Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 166; EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraphs 4.3.9., 4.4.1., 4.6.4.

[262] Ang, S. The Moral Dimensions of Intellectual Property Rights, p. 196.

indicators for others. Considering the ability of AI to enhance human welfare and the diversity of its applications,[263] a harmonized, comprehensive and coherent industrial property framework is paramount to ensure technological development.

Nevertheless, scientific progress also challenges the interpretation of legal regulation, particularly if it was written before respective developments were present. Besides, technological progress also causes tension with the adequacy of the existing reward system, thus understanding the nature of the compensation *per se*.[264] However, the market combines two conflicting interests– innovators that are seeking to legally protect their creations and actors willing to have unrestricted access to knowledge.[265] Thus, the regulation should balance bothinterests.

The recent controversial case law in the UK[266] reflects that creations involving AI pose challenges towards interpreting various patentability aspects. The decisions are also crucial for other jurisdictions, including the EPC, as they introduce a unique perspective on patent-eligible inventions and AI. In conjunction with different perceptions of patentability aspects of creations involving AI in other jurisdictions, the respective paradigm leads to consideration of more general policy issues. Namely, whether the existing patent social contract still balances the involved interests and provides an adequate bargain or a reward concerning creations involving AI.

3.2. Application of the Fair Balance in the Patent Legal Framework Regarding the Patent-Eligibility of Creations Involving AI

3.2.1. The Practice in the United Kingdom

In the case [2023] EWHC 2948 (Ch),[267] the High Court of Justice of the United Kingdom (hereinafter – the case 2948) the patent application concerned a creation consisting of two ANN that were deployed to obtain a recommendation of new music tracks that were semantically and melodically similar to the input song. The court stated that the particular ML model involved ANN and had to be

[263] The Joint Institute for Innovation Policy. Trends and developments in artificial intelligence: Challenges to the Intellectual Property Rights Framework: Final report, p. 109–111.

[264] The White House. The 2024 Economic Report of the President (21.03.2024). – https://www.whitehouse.gov/wp-content/uploads/2024/03/ERP-2024.pdf (16.05.2024), p. 243, 275–278, 285–288.

[265] Free, R. Panel 5: Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22.

[266] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH); *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036.

[267] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH).

distinguished from the ordinary perception of algorithms. The distinguishing features are that: 1) the model is trained on the library of the vector of songs; 2) it takes as input the songs listened to, analyzed based on the vector of word semantics and property space and provides as output a file of suggested songs with similar vectors of word semantics and property space; 3) there is a gap between the programmed model and the output where the model learns itself the underlying logic of the vectors. Thus, the model *per se* should be deemed "technical" because it does not constitute "a computer program" and does not fall under the exception of patent-eligible invention.[268] The resulting AI system as such is not the "computer program" reflected in the algorithm, which evolved in correlation between instructions given (coded) by a human and aspects learned during training.[269]

The court held that the model goes beyond the "computer program" because of the self-learned correlations to produce an output. The court distinguished the role of a human from that of an AI, stating that the programmer could not have made the resulting model. Namely, the role of a human was limited to giving the initial instructions and setting up the training of the starting model. Since a human could not have predicted the underlying correlations between the data on which the model adapted itself to create the ready-to-use system, there is no "computer program".[270]

The judgement in case 2948 is extraordinary because it departs from the previous case law in several aspects. Namely, for instance, in the case EWHC 2412 (Pat) (2020)[271] (hereinafter – the case 2421), the court stated that only a human could be an inventor. Nonetheless, although the subject of case 2948 is not about an inventor, the reasoning by the court also raises the question of the role of AI in the inventive process. Thus, numerous aspects appear that are not *explicitly* outlined in the mentioned judgment: 1) whether different understanding could exist of the role of AI regarding the various criteria of patentability; 2) whether the term "computer program" in the context of the patent-eligible inventions also includes systems that are built on human created computer programs; 3) whether there can legally be systems that are not "computer programs" because they have self-learned some aspects of them.

Nonetheless, the Court of Appeal in case No. CA-2024-000036[272] (hereinafter – case No.CA-2024-000036) overturned the conclusions in case 2948 and held that both hardware and software ANN were "computer programs" even

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[268] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 54–63.

[269] *Ibid*., Paragraphs 33.d, 61.

[270] *Ibid.*, Paragraphs 25, 50, 54–63.

[271] *Thaler v. The Comptroller-General of Patents, Designs And Trade Marks*, EWHC 2412 (Pat) (2020). – https://www.bailii.org/ew/cases/EWHC/Patents/2020/2412.html (10.10.2023), Paragraph 40.

[272] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, Paragraphs 64–66, 68.

though not all the weights and biases (instructions or a "program") for a machine ("computer") were explicitly programmed. Furthermore, it was considered irrelevant that a human had to use technical equipment to understand all the underlying computations and calculations to qualify the creation as a "computer program". The comparison between the machine-readable code and the human-readable code was outlined.[273] Besides, no technicality was identified in the resulting file and consequently, the "computer program" exception and the "mathematical method" exclusion was found to apply to the creation.[274]

Furthermore, case No.CA-2024-000036 outlined several aspects towards the understanding of the patent-eligible inventions: 1) weights and biases *per se* are a "computer program" or at least a "mathematical method"; 2) ANN in both software and hardware form is a "computer".[275]

It must be said that ML is based on computer programs or mathematical algorithms, aiming to teach computers or computer systems to perform specific exercises.[276] In other words, ML creates models deploying data. Models iterate inputs to produce outputs.[277] Algorithms represent the sequence of commands that must be executed to solve a given problem.[278]

Besides, the term "computer" refers to a "machine" capable of processing the output from the given input according to provided instructions.[279] A "program", on the other hand, defines the rules that direct a computer (and other mechanical or peripheral devices) to perform a particular task.[280] In general, a "machine" is a sequence of physical components used to enable performing a particular operation.[281] Nevertheless, in ML, a "machine" refers to a "computer" that can be programmed and deployed as a server.[282] Overall, AI is used to direct a machine, such as a computer, to act in a human-like intelligent manner.[283] A "computer" executes a "computer program" containing an algorithm.[284]

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[273] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, Paragraph 64.

[274] *Ibid*., Paragraphs 81, 84.

[275] *Ibid.*, Paragraphs 64, 70, 84.

[276] Alpaydin, E. Introduction to Machine Learning. 4th Ed. Cambridge: Massachusetts Institute of Technology 2020, p. 1–3.

[277] Kneusel, R. T. How AI Works: From Sorcery to Science. San Francisco: No Starch Press, Inc. 2024, p. 7.

[278] Mueller, J. P., Massaron, L. Algorithms for dummies, 2nd Ed. Hoboken: John Wiley & Sons, Inc. 2022, p. 11.

[279] Nader, J. C. Prentice Hall's Illustrated Dictionary of Computing. 3rd. Ed. Sydney: Prentice Hall of Australia Pty Ltd. 1998, p. 125.

[280] Nader, J. C. Prentice Hall's Illustrated Dictionary of Computing. 3rd. Ed., p. 541.

[281] François, C. (Ed.). International Encyclopedia of Systems and Cybernetics, p. 213.

[282] Kang, M., Choi, E. Machine Learning: Concepts, Tools and Data Vizualization. Singapore: World Scientific Publishing Co., Pte. Ltd. 2021, p. 17.

[283] Kneusel, R. T. How AI Works: From Sorcery to Science, p. 5.

[284] *Ibid*., p. 5.

In this respect, ML or the underlying computer programs can also be seen metaphorically as a "machine" and be included in the general definition. However, to be built, ML, especially in its most sophisticated forms, needs a "machine" as a peripheral apparatus.[285] Thus, an ML model, its underlying computer programs, and algorithms enable computers ("machines") or computer systems ("connection machines"[286]) as peripherals to act as servers and conduct particular tasks. Consequently, ML models, related computer programs and algorithms are not understood as "computers" in the context of representing something to be created and released. Since the patent framework is concerned with the existence of the invention and not its further execution or application,[287] also for patent-eligibility purposes, ML models, underlying computer programs and algorithms should not be treated as "computers". Hence, the conclusions in the case No. CA-2024-000036[288] cannot be supported.

Furthermore, in building an ML model, weights and biases are applied as parameters to train and improve the model.[289] As such, they could be treated as creating a separate "computer program" or "algorithm" if they are expressed outside of a "computer" or linked to others underlying the ML model. However, weights and biases alone do not constitute the ML model. Therefore, the separation of weights and biases is irrelevant when an invention is considered to be the ML model. In this sense, the approach taken in the case No. CA-2024-000036[290] cannot be followed. However, if claimed in isolation, weights and biases can be considered as a separate "computer program" for patentability purposes.

In the case No. CA-2024-000036, it was argued that weights and biases could be treated as a "mathematical method" if not a "computer program". However, the analogy was not applied to the ML model *per se*.[291] In contrast, the EPO BA treats the ML model as a "computer program" or a "mathematical method" and not as a "computer".[292] The perception of the ML model as a "computer" in the patent framework creates ambiguity about the status of the ML model and "computer program" as well as "mathematical algorithm". Namely, a "computer" (apparatus) as such is considered "technical", whereas a "computer program" and

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[285] Goodfellow, I. *et al*. Deep Learning. Cambridge: The MIT Press 2016, p. 443–444.

[286] François, C. (Ed.). International Encyclopedia of Systems and Cybernetics, p. 73.

[287] Abbott, F. M. *et al*. International Intellectual Property in an Integrated World Economy. 2nd Ed., p. 262.

[288] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68.

[289] Maini, V., Sabri, S. Machine Learning for Humans, p. 71–76.

[290] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68, 70, 84.

[291] *Ibid.*, Paragraphs 68, 70, 84.

[292] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraph 14

a "mathematical method" are not.[293] Therefore, if the ML model is perceived as a "computer", it is unnecessary to consider an exception for "computer programs" and "mathematical methods". In other words, the ML model consists not only of algorithms, but also of data (both training and input data).[294] Thus, training and input data become integral to the ML model. Since the ML model is based on computer programs or algorithms and data, it can be said that the ML model itself is a "computer program" or "mathematical algorithm" when expressed outside the computer.[295] Consequently, the ML model cannot simultaneously be a "computer" and a "computer program" or a "mathematical method".

Apart from the underlying computer programs or algorithms, only data exists in the construction and execution of the ML model. Nevertheless, since the ML model learns from the data, training and input data become inseparable from the ML model or part of the "computer program" or "mathematical method". Therefore, even though the ML model is ready to be used on the real data after training, and could be metaphorically treated as a "computer" about not yet inserted input data, overall, without "technicality", it is still a "computer program" or "mathematical method" and excluded from patentability. Treating the ML model as a "computer" for patent purposes has no added value. On the contrary, the respective approach causes ambiguity regarding the meaning of a "computer" and a "computer program" or a "mathematical method". Instead, the ML model should be treated as a "computer program" or "algorithm" for patent purposes when expressed outside the computer, regardless of the level of readiness or data inserted.

Furthermore, if the view is taken that the ML model is a "computer" running a separate "computer program", amendments in the patent legal framework would be necessary. Namely, either a separate exclusion from patentability for ML models (all, not just ANN) would be required, or the terms "computer", "computer program" and "mathematical method" would have to be revised in order to distinguish them from other "computer-implemented inventions".

Additionally, the perception that the ML model has learned without a human, which distinguishes it from a "computer program"[296] or that only a human presence is relevant[297] also triggers the aspect of obviousness.[298] Namely, it has been stated that the more sophisticated the technology, the harder it is for a human

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[293] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68, 70, 84.

[294] Charniak, E. Introduction to Deep Learning. Cambridge: The MIT Press 2018, p. 18–19.

[295] Lee, J. A. *et al.* (Eds.). Artificial Intelligence & Intellectual Property, p. 1, 26.

[296] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 25, 50, 54–63.

[297] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 66, 68.

[298] See: Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 140–145.

to predict and explain the outcome.[299] The UK does not apply the problem-solution approach[300] but evaluates the inventive step based on the criteria of obviousness to the person skilled in the art.[301] In this regard, the approach taken in case 2948 and case No. CA-2024-000036 requires the ability of a person skilled in the art to assess the obviousness against the prior art. As ML models become increasingly sophisticated due to the amount of data processed,[302] the assessment of the inventive step may become cumbersome and require adjustments.[303]

Furthermore, the reasoning outlined in case 2948, based on which the "computer program" exception was held to be inapplicable, was that the resulting system was formed at the more general level of a self-generated structure and did not implement the code created by a human.[304] The reasoning is consistent with the earlier understanding of the "principle of the machine" in the USA. Namely, an "invention" is a machine of a concrete structure, the *modus operandi* of which achieves a particular purpose. In this regard, invention is an "idea of means". In other words, the "rule of the machine" lies in itself or "machines", which, unlike other "mechanical instruments", are "self-acting" and not merely "tools".[305] Thus, there is a distinction between the "conception" and the "perception" of an invention.

In this respect, it is stated that a "computer program" has not been created because a human has not built it. Thus, the judgment also creates a legal conundrum between the argumentation of reasons for the non-applicability of the "computer program" exception and the rationale behind case 2421. The case 2421 explicitly stated that only a human can be an inventor. Conversely, case 2948 outlines that the resulting system was not programmed by a human but was self-generated by the AI. Therefore, the conclusions lean towards the direction of the

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[299] *Evans Medical Ltd's Patent,* R.P.C 1998. The Intellectual Property Office. Reports of Patent, Design and Trade Mark Cases, Vol. 115 Issue 16, 1998. – https://doi.org/10.1093/rpc/1998rpc517 (11.08.2024), p. 550.

[300] EPO BA T 0641/00, *Two identities/ COMVIK*, ECLI:EP:BA:2002:T064100.20020926.

[301] The Intellectual Property Office of the United Kingdom. Manual of Patent Practice, April 2024. – https://www.gov.uk/guidance/manual-of-patent-practice-mopp/section-3-inventive-step (25.08.2024), Sections 3.48.–3.51.1, 3.72.–3.74.

[302] Eche, T. *et al*. Toward generalizability in the deployment of artificial intelligence in radiology: Role of computation stress testing to overcome underspecification. – RSNA, Vol. 3 No. 6:e21009, 2021, https://doi.org/10.1148/ryai.2021210097 (11.05.2024), p. 1; Feldmann, C., Bajorath, J. Compounds with multitarget activity: Structure-based analysis and machine learning. – Future Drug Discovery, Vol. 2 Issue 3, 2020, https://doi.org/10.4155/fdd-2020-0014 (11.05.2024), p. 1–3.

[303] See *mutatis mutandis* Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 140–145.

[304] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 25, 50, 54–63.

[305] Pottage, A., Sherman, B. Figures of Invention. A History of Modern Patent Law. New York: Oxford University Press 2010, p. 76, 79.

approach by the USPTO on the necessary level of human contribution to be named an "inventor"[306] even though the USA perceive that only a human could be deemed an inventor under the patent legal framework.[307]

Besides, although case No.CA-2024-000036 overturned the respective aspects mentioned in case 2948, it stated that only the presence of instructions provided by a human is relevant regardless of how explicit the weights and biases are.[308] However, the judgment in case CA-2024-000036 did not address the "inventor" aspect; it only emphasized the role of a human in creating a "computer program." Thus, the controversial aspects are still relevant even after the respective ruling.

Furthermore, although the judge in case 2948 limited the scope of assessment to "computer programs", the "mathematical method" exception was also touched upon.[309] In this respect, the applicants argued that "every computer program is a mathematical method". However, in this case, the resulting file had a "further technical effect".[310]

Although the judge refrained from evaluating the "mathematical method" aspect because it was not claimed, the exception has to be observed in the context of the conclusions regarding "computer program". The term "mathematical method" is broader than "computer program" because it does not comprise only computer programs.[311] Thus, without a "computer program", a "mathematical method" could still exist. Simultaneously, the question arises whether the logic that a "computer program" can only be human-generated should not be attributed to "mathematical methods". It was argued that the system existed on top of the underlying computer programs and was not a "computer program" *per se*. Consequently, it should not have triggered a "mathematical method" exception.[312] In this regard, it would not have mattered whether the resulting system was claimed "as such" to conclude that the said exclusions were not triggered. The outcome of the case outlines the said logic. At the same time, to qualify as an "invention", the system would have to fulfil "technical" requirements *per se*.[313] Hence, there has to be an appropriate legal assessment criterion for these creations.

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[306] The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions, Section IV, B.

[307] The United States Court of Appeals for the Federal Circuit, *Thaler v Vidal*, 43 F.4th 1207 (Fed. Cir. 2022) (05.08.2022). – https://cafc.uscourts.gov/opinions-orders/21-2347.OPINION.8-5-2022_1988142.pdf (30.10.2024), p.10.

[308] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, Paragraphs 66, 68.

[309] *Ibid*., Paragraphs 79, 81–82.

[310] *Ibid*., Paragraphs 79, 81–82.

[311] Gerrish, S. How Smart Machines Think, p. 109; Frana, F. L. Klein, M. J. (Eds.). Deep Learning. Encyclopedia of Artificial Intelligence. The Past Present and Future of AI, p. 112–114.

[312] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 79, 81–82.

[313] *Ibid*., Paragraphs 25, 50, 54–63.

3.2.1.1. The Legality in the Difference of the Role of AI in Various Aspects of Patentability in the United Kingdom

Interestingly, the patent application, based on which case 2948 was decided, did not *expressis verbis* name AI as an inventor.[314] On the one hand, this could be due to the viewpoint outlined in case 2421 that only a human can be an inventor.[315] On the other hand, the issue appears to be more profound than the mere formality of filling in an "inventor" section in the patent application. In other words, based on the reasoning stipulated in case 2948 by the applicant and the judge, there appears to be an understanding that a human is not an inventor following the conclusions that a "self-learned system was not programmed by a human".[316] Moreover, not only was AI not named as an inventor, but it was argued that a "computer program" exception did not apply because AI generated the resulting system.[317]

Thus, the outcome of case 2948 not only distorts the criteria for patentable inventions by stating that the "computer program" exclusion applies solely to human-made computing, which is not the concerned subject matter. Namely, the case without *expressis verbis* naming AI as an inventor also twists the understanding that only a human can be a creator.[318] In this respect, case 2948 creates a gap between the connection of an "inventor" and a "patent-eligible creation" in the sense that an "inventor" could be an individual, but a "patent-eligible creation" could not be made by a human. Alternatively, the case departs from the view that a creation made by AI cannot be a "computer program" without a human presence and from the reasoning behind case 2421 that only an individual can be an "inventor". As previously stated, the patent application in case 2948 did not mention AI as an inventor.[319] However, the judge still stated that there is no "computer program" without a human presence,[320] which marks a gap between these aspects. Namely, by seemingly limiting the assessment about the subject matter of the appeal (the scope of the "computer program" exception), the judge opened the doors to an unconventional effect on the understanding between the

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[314] The Intellectual Property Office decision No. BL O/542/22, *Emotional Perception AI Limited*, Paragraph 1. – https://www.ipo.gov.uk/p-challenge-decision-results/o54222.pdf (01.05.2024); UK Patent Application GB 2583455 A. https://patentimages.storage.googleapis.com/cc/40/85/7e3954c325b9fe/GB2583455A.pdf (01.05.2024).

[315] *Thaler v. The Comptroller-General of Patents, Designs And Trade Marks*, EWHC 2412 (Pat), Paragraph 40.

[316] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 25, 50, 54–63.

[317] *Ibid*., Paragraphs 25, 50, 54–63.

[318] *Thaler v. The Comptroller-General of Patents, Designs And Trade Marks*, EWHC 2412 (Pat), Paragraph 40.

[319] UK Patent Application GB 2583455 A.

[320] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 66, 68.

relation to the criteria of patentability and the elements of "inventor", "creation", "computer program" and their assessment.

Conversely, case No.CA-2024-000036 did not follow the conclusion in case 2948 of the non-existence of a "computer program".[321] Nonetheless, the *ratio* was not directed towards evaluating the "inventor". At the same time, only the role of a human providing even not explicit instructions was outlined to find that creation was a "computer program" irrespective of the role of AI.[322] In this regard, the UK with the decision in case No.CA-2024-000036 confirmed the importance of the mere involvement of a human in the generation of an invention regardless of the level of its input. The approach differs from the perception, for instance, by the USPTO, which distinguishes the amplitude of the contribution of a human in the generation of an invention.[323]

Consequently, on the one hand, the UK follows the segmented approach, according to which the assessment of an "inventor" and an "invention" is different concerning the involvement of a human. Namely, from an "inventor" perspective, only the role of a human is important.[324] Moreover, the creation process is irrelevant for assessing the existence of an "invention", as long as it can be sufficiently disclosed or explained.[325]

On the other hand, there is controversy over the outcome of case 2948 and case No. CA-2024-000036, which demonstrates that the courts disagree on attributing these aspects to creations involving AI. Besides, based on the outcome of case No. CA-2024-000036, the Intellectual Property Office of the United Kingdom (hereinafter – UKIPO) has issued new Statutory Guidelines[326] that replace the temporarily suspended Guidelines Examining patent applications relating to

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[321] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 66, 68.

[322] *Ibid.*

[323] The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions, Section IV, B.

[324] *Thaler v. The Comptroller-General of Patents, Designs And Trade Marks*, EWHC 2412 (Pat), Paragraph 40.

[325] *Evans Medical Ltd's Patent*, R.P.C 1998, p. 550; The Intellectual Property Office of the United Kingdom. Guidance: Guidelines Examining patent applications relating to artificial intelligence (AI) (22.09.2022) (temporarily suspended pending the outcome of the appeal of the case 2948). – https://www.gov.uk/government/publications/examining-patent-applications-relating-to-artificial-intelligence-ai-inventions (13.08.2024), Paragraphs 132–137; Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention, p. 134; Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. In New Legal Reality: Challenges and Perspectives, p. 405.

[326] The Intellectual Property Office of the United Kingdom. Statutory guidance Examining patent applications involving artificial neural networks (25.07.2024). – https://www.gov.uk/government/publications/examining-patent-applications-involving-artificial-neural-networks/examining-patent-applications-involving-artificial-neural-networks (13.08.2024), Paragraph 26.

artificial intelligence (AI).[327] However, the judgment in case no. CA-2024-000036 is not yet final, as it may be appealed to the UK Supreme Court.[328] In this context, changing guidance on assessing the relevant patentability aspects also creates ambiguity. The UK is one of countries where patent examiners differ in their understanding of the role of AI in generating a creation.

3.2.1.2. The Legality in the Difference of the Role of AI in Various Aspects of Patentability in Germany

The understanding of the role of AI has varied among the German courts. One authority has stated that the role of AI could be described as an addition to a human "inventor" in the "inventor" field of a patent application (for instance, "the applicant (..)", "the artificial intelligence called (..) caused the invention to be generated") even if the application does not specify that AI can create an invention.[329] Besides, the said role cannot be "co-inventor" and that would not cause any economic disadvantage. Namely, an invention is evaluated based on its objective criteria and not what caused the generation of it. The belief by an applicant that the inventor was not himself but rather a creation developed by AI is merely a genuine opinion. Since the expression of legal opinions is not subject to the obligation to tell the truth, there is no legal obstacle for the applicant to name himself as the inventor.[330]

Nonetheless, in another case,[331] the authority stated that only a human can be named as the inventor. If the role of the AI is considered to be more than just a tool, it could be omitted from the application, or it could be mentioned in the text that "the knowledge was obtained with the assistance of the machine", that "the invention was advanced by the involvement of the machine" and similar.[332]

Furthermore, the case X ZB 5/22[333] confirmed that only a human can be an inventor because it is always behind the AI. Thus, a human can only be named as an inventor in a patent application if his or her contribution to the overall success of an invention is significant. The court allowed the phrase "that a human caused AI to generate a creation" but not AI to be named an inventor or co-inventor in

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[327] The Intellectual Property Office of the United Kingdom. Guidance: Guidelines Examining patent applications relating to artificial intelligence (AI).

[328] The World Intellectual Property Organization. An International Guide to Patent Case Management for Judges, 2023. – https://www.wipo.int/edocs/pubdocs/en/wipo-pub-1079-en-an-international-guide-to-patent-case-management-for-judges.pdf (13.08.2024), Section 9.8.3.

[329] Bundespatentgerich Beschluss 11 W (pat) 5/21 betreffend die Patentanmeldung 10 2019 128 120.2, s. 11–15, 17.

[330] *Ibid*., s. 11–15, 17.

[331] Bundespatentgerich Beschluss 18 W (pat) 28/20 betreffend die Patentanmeldung 10 2019 129 136.4, s. 7–8.

[332] *Ibid*., s. 7–8.

[333] *Bundesgerichtshof* Beschluss X ZB 5/22 betreffend die Patentanmeldung 10 2019 128 120.2, Paragraph 21–26, 37–38.

the patent application.[334] At the same time, the court stated that the extent and intensity of the human contribution are not decisive for the recognition of inventorship.[335] Besides, the court disagreed on the tension between disclosure requirements and non-recognition of the role of AI in the patent application.[336] The approach goes hand in hand with the direction taken in Australia, where the higher court overturned the perception by the lower court that AI could be named an inventor[337] and stated that inventorship should be aligned with the right to obtain a patent that only a human has.[338]

In this regard, following the logic of the courts of Germany and Australia, it should not matter how the creation was built. Consideration is given to whether the creation meets the criteria for patentability. On the one hand, for instance, Germany requires that the contribution to the overall success of the invention be significant. On the other hand, it does not attribute the meaning to the degree and intensity of the respective contribution. In turn, Australia, in its latest judgment,[339] does not attribute a decisive role to a human contribution in the generation of creation but to the rights owner. The position of Germany and Australia is contrary to, for example, the approach of the USPTO, which requires a considerable contribution from a human to be named an inventor.[340] Additionally, the approach taken by Germany, which allows the role of AI in creating of an invention to be recognized but does not name it as the inventor, could not be supported by the EPO as being contrary to *ordre public* and morality.[341] Analogous conclusions could also be attributed to the interpretation by Australia.

In contrast, the rationale behind the non-applicability of the "computer program" exclusion in case 2948 was that the system was generated without human presence.[342] Hence, if the non-human presence is a decisive criterion in assessing one aspect of patentability, it should also be taken into account in deciding on other requirements. *Conversely, if it is considered* that the creation could exceed human capability, the question arises as to the appropriate assessment criteria for the respective creations. The pivotal case 2948 sheds light on one approach to evaluating a creation within the existing legal framework.

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[334] *Bundesgerichtshof* Beschluss X ZB 5/22 betreffend die Patentanmeldung 10 2019 128 120.2, Paragraph 38.

[335] *Ibid.*, Paragraph 39.

[336] *Ibid*., Paragraphs 43, 72–73.

[337] *Thaler v. Commissioner of Patents*. Federal Court of Australia [2021] FCA 879, Paragraph. 124, 126, 189, 198, 226.

[338] *Commissioner of Patents v Thaler*. Federal Court of Australia [2022] FCAFC 62, Paragraph. 105–122.

[339] *Ibid.,* Paragraph. 105–122.

[340] The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions, Section IV, B.

[341] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.2.

[342] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 25, 50, 54–63.

However, there appears to be a tension between technological development (a creation) and the patent framework.

Since the analysis of the UK patent system is not the subject of the thesis, the aspects of the mentioned case law will be analyzed in light of the EPC and the case law of the EPO BA. Namely, it has to be analyzed whether the same outcome could be expected under the EPC to observe the potential effect of the understanding outlined in case 2948 on the protection of creations involving AI. In this regard, identical aspects have to be considered in the context of the EPC: 1) whether there could be a different understanding of the role of AI in relation to the various criteria of patentability; 2) whether the term "computer program" in the framework of the patent-eligible inventions also comprises systems that are based on computer programs created by humans; 3) whether there can legally be systems that are not "computer programs" because they have learned some aspects of them themselves.

3.2.2. The Practice Under the European Patent Convention

3.2.2.1. The "Computer Program" Exception under the EPC

Although there was controversy regarding the formulation,[343] the "computer program" exception was implemented and revised in the EPC as a "non-technical" matter *per se*. Initially, the protection for "computer programs" was advocated as a *sui generis* regime, but it was subsequently agreed that "computer programs" as such belong in the field of copyright. Under the EPC, the term "computer program" corresponds to the mentioned technical understanding of the respective matter.[344] Thus, legally, the term "computer program" does not focus on the learning process of ML, which is different from conventional programming,[345] but on the expression of the underlying mathematical algorithm (the UK delegation initiated the exclusion).[346]

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[343] Griset, P. The European Patent. A European Success Story for Innovation, p. 76; Administrative Council. Basic proposal for the revision of the European Patent Convention, Munich, 2000, MR/2/00. – https://link.epo.org/web/00002a_en.pdf (10.01.2024), p. 43–44; President of the European Patent Office. Revision of the European Patent Convention, Munich, 2000, CA/100/00. – https://link.epo.org/web/ec00100.pdf (10.01.2024), p.37–39; Administrative Council. Minutes of the 81st Meeting of the Administrative Council. Munich 2000, CA/PV/81. – https://link.epo.org/web/ecpv081-1.pdf (10.01.2024), p. 7–10.

[344] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–8.2., 10., 16.1.

[345] Buduma, N. *et al*. Fundamentals of Deep Learning. Designing Next-Generation Machine Intelligence Algorithms. 2nd Ed. Sebastopol: O'Reilly Media, Inc. 2022, p. 40–50.

[346] The European Patent Office. Minutes of the 9th meeting of Working Party I held from 12 to 22 October, 1971 in Luxembourg, BR/135 e/71 prk. The European Patent Office. Article 52 E Travaux Préparatoires, 1973, p. 51–52; Nack, R. Inventions and their amenability to patent protection. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 115.

Interestingly, during the preparatory process of the EPC, the English understanding of the term "computer" was accepted over the French and German interpretations.[347] The term "computer program" was not explicitly defined, leaving it to the discretion of the EPO given potential future technological developments.[348]

The "computer program" exception under the EPC is only relevant if the program is claimed as such. The term "computer" generally defines the "programmable apparatus", and the term "program" refers to the "consecutive instructions".[349] The wording "program" can be used as a synonym for "software",[350] which technically comprises several smaller computer programs.[351] Nonetheless, the EPO BA does not interpret the mentioned terms literally but in the light of the particular case or by the function. In this regard, the EPO BA considers the existence of the "computer program" irrespective of its structural complexity. Whether it is one program or a computer-executable method that triggers the functioning of further activities yielding a result, the perception of the EPO BA remains the same.[352]

Further analysis of the patentability under the EPC is only necessary if the computer program is claimed as such. Thus, the resulting product will be a "computer-implemented invention" and patentable if it demonstrates a "further technical effect".[353] The EPO BA considers that a "technical system" is one that "*implies that an object is created or a process is run with some purpose based on human creativity*".[354] Consequently, in conjunction with the conclusions on the findings in the *Dabus* cases[355] regarding compliance with the exception of *ordre public* and morality, it follows that the EPO BA also considers that there is always a human behind creations involving AI.

In case G0003/08,[356] the EPO BA stated that, based on the outlined features, claims to computer programs can be regarded as having the same scope as claims

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[347] The European Patent Office. Minutes of the Munich Diplomatic Conference for the Setting up of a European System for the Grant of Patents, Munich 10 September to 5 October, 1973, M/PR/I, p. 28. The European Patent Office. Article 52 E Travaux Préparatoires, p. 19–22.

[348] The European Patent Office. Minutes of the 9th meeting of Working Party I held from 12 to 22 October 1971 in Luxembourg, BR/135 e/71 prk. The European Patent Office. Article 52 E Travaux Préparatoires, 1973, p. 51.

[349] EPO BA G 0003/08, *Programs for computers*, ECLI:EP:BA:2010:G000308.20100512, Paragraph 9.1.

[350] *Ibid*., Paragraph 9.1.

[351] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 254.

[352] EPO BA G 0003/08, *Programs for computers*, Paragraphs 9.1., 10.1.–10.2.4.

[353] The European Patent Office. Guidelines for Examination G-II, 3.3.6. Programs for Computers.

[354] EPO BA G 0001/19, *Pedestrian Simulations*, ECLI:EP:BA:2021:G000119.20210310, Paragraph 47.

[355] EPO BA, J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.; EPO BA, J 0009/20, *Designation of inventor/DABUS II*, Paragraph 4.6.6.

[356] EPO BA G 0003/08, *Programs for computers*, Paragraph 11.2.1.

to computer-implemented methods. Namely, "method claims" comprise a set of steps or instructions carried out by the performing entity, for instance, a person, a machine, both of them or a computer. The "computer-implemented method" refers to cases where a computer performs the relevant actions. Whereas a "computer program" corresponds to the "series of instructions" or "steps" constituting a "method" that is carried out by a computer.[357] However, the interpretation is flawed because "instructions for the sequence of steps" have to be distinguished from the "steps" *per se*.[358] As a result, the EPO BA interprets a "program" as referring to the "series of steps describing a method for setting up the computer to perform the technique" and not to the "method" (even if computerized) as such.[359]

Furthermore, software-related or computer-implemented inventions having a "technical character" could be patentable.[360] Nonetheless, there still appear to be cases where creations involving computer programs might not avail IP protection under the current regimes.[361] As the observed case law of the UK[362] demonstrates, there may be a difference in the perception when the "computer program" is claimed as such and when it is part of an invention and patentable.

3.2.2.2. Application of the "Computer Program" Exception to Creations Involving AI in a Software Form

The EPO BA has stated that creations involving ML may be treated differently from other computer-implemented inventions if it can be convincingly demonstrated that there are differences which have not yet been presented but cannot be excluded in the future.[363] In the case law of the EPO, there have been unsuccessful attempts to demonstrate the distinction. For instance, in case T 0702/20,[364] the EPO BA did not support the view that the model differed from the state of the art and, as such, was a "technical effect" because it reduced the required storage

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[357] EPO BA G 0003/08, *Programs for computers*, Paragraph 11.2.1.

[358] *Ibid*., Paragraphs 11.2.3.–11.2.4.

[359] *Ibid*., Paragraphs 11.2.6.–11.2.8.

[360] Kur, A., Dreier, T. European Intellectual Property Law. Text, cases & materials. Cheltenham: Edward Elgar Publishing 2013, p. 137–139.

[361] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267.

[362] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 25, 50, 54–63; *Comptroller-General of Patents, Designs and Trade Marks -v-Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 66, 68.

[363] Müller, M. EPO Boards of Appeal case law on AI-related inventions. The European Patent Office. Conference on AI-related technologies: regulation, inventorship and patenting (JC01-2023).

[364] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraph 14; In contrast, EPO BA T 1326/06, *RSA Schlüsselpaarberechnung/GIESECKE & DEVRIENT*, ECLI:EP:BA:2010:T132606.20101130, Paragraphs 5.2, 6.2.–9.3.

space. It was also stated that a fully connected neural network would be more generalizable than the behaviour of the modified model. In this regard, the EPO BA rejected the argument that the ML model *per se could* be "technical" because it facilitates the automation of tasks.[365] However, the EPO BA rules within the margins of the particular case. Besides, the EPO BA did not follow the logic that ML algorithms *per se* are a "technical field and argued that a specific "technical implementation" is required.[366]

Additionally, the EPO BA also concluded that a neural network could be viewed (albeit with some practical difficulty) in terms of mathematical functions as the inputs to each neuron implemented by the nodes of the first layer and the output of the neural network resulting from the input.[367] Hence, *per se*, a neural network can be treated as a "mathematical method" or a "software program" if performed on a "computer". Subsequently, the patentability of these types of creations should be analyzed based on the rules governing the "computer-implemented inventions". Thus, as for all computer-implemented inventions, the decisive question for the process patent claims is whether, compared with the state of the art, the process solves a "technical problem" by producing a "technical effect" going beyond the mere implementation of a program on a computer.[368]

Thus, under the EPC, in contrast to the UK, the role of AI in generating a creation is irrelevant for it to be a patent-eligible invention. Moreover, under the EPC, the argument in case 2948[369] that there is no "computer program" because the AI created the resulting file on top of the existing program is unlikely to be followed by the EPO BA.

Additionally, the approach by the EPO also contradicts the opinion in case 2948 that the trained ML model is also "hardware" but not a "computer".[370] The mentioned view in case 2948 cannot be supported under the EPC because: 1) the trained ML model outside the virtual world is a "mathematical method" comprising one or more algorithms; 2) unless the respective ML model is specifically linked to concrete hardware, it requires an electronic device (computer) to be run on.[371] Furthermore, in case 2948, it was argued that there was no "program"

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[365] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 16–17, 19.

[366] *Ibid*., Paragraph 16–17, 19; Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 262–267.

[367] EPO BA T0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–7.3.

[368] The European Patent Office. Guidelines for Examination G-II, 3.3.6. Programs for Computers; EPO BA T 0258/03, *Auction method/HITACHI*, ECLI:EP:BA:2004:T025803. 20040421, Paragraphs 3.2., 4.7., 5.4., 5.8.

[369] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 50–51, 54–59.

[370] *Ibid.*, Paragraph 34.

[371] EPO BA T0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–7.3.

because the functioning of the ML model in the real world is at a level above the programmed instructions, as the model learns itself.[372] Following the case law of the EPO BA,[373] it appears that the term "computer program" is used to refer to the external instructions to the computer regarding the necessary adjustments to carry out the desired method, and the respective instructions also include trained ML models. In other words, the EPO BA does not consider the ML model, including those based on ANN and deep learning, to be a "program" because the model has learned the relevant aspects. Even the most sophisticated forms of ML are considered "programs" because they have been given instructions by a human, which the ML model has automated and adapted.[374]

Under the case law observed in the UK,[375] the resulting product and the related process would be considered "computer-implemented inventions" since they were conducted on the computer.[376] In turn, under the EPC the "computer program" exception would not apply if the claim is for the resulting file when run on a computer.[377] Moreover, the "computer program" exception may not be triggered under the "inventive step" requirement because the claimed file, even though it contains the "computer program" in question, may be found to solve a "technical problem"[378] or even produce a "further technical effect" going beyond the said "computer program".[379] However, if the model is claimed, "as such", the "computer program" or the "mathematical method" (when outside the computer) exception would be triggered.[380] Namely, the logic that there is no "computer program" because AI develops the program would be doubtful under the EPC.

The EPO BA has clarified that there is a possibility that AI inventions will not be analyzed as "computer-implemented inventions" if the necessity for an

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[372] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 50–51, 54–59.

[373] EPO BA G 0003/08, *Programs for computers*, Paragraphs 11.2.6.–11.2.8; EPO BA T0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–7.3; EPO BA T 1173/97, *Computer program product/IBM*, ECLI:EP:BA:1998:T117397.19980701, Paragraph 9.6.

[374] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–8.2., 10., 16.1; EPO BA G 0001/19, *Pedestrian Simulations*, Paragraph 47.

[375] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH); *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036.

[376] The European Patent Office. Artificial Intelligence: AI and Patentability.

[377] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraph 11.1.

[378] *Ibid.*, Paragraph 17.

[379] EPO BA G 0003/08, *Programs for computers*, Paragraphs 10.13.1.–10.13.2.

[380] The European Patent Office. Guidelines for Examination G-II, 3.3.6. Programs for Computers; EPO BA T 0761/20, *Automated script grading/UNIVERSITY OF CAMBRIDGE*, ECLI:EP:BA:2023:T076120.20230522, Paragraphs 9–11.

exception is convincingly demonstrated.[381] As noted above, the court in case 2948 took a respective leap that was temporarily followed by the UKIPO[382] until the outcome of the appeal.[383] Nonetheless, the EPO BA does not consider ML models to be independent hardware, a "computer",[384] or that there is no "computer program" because the AI has performed certain activities.[385] Conversely, the EPO treats inventions involving AI as "computer-implemented inventions" which require the presence, for instance, of the computer and a program.[386] The case 2948 leaves open aspects also: 1) whether in the case of an ML model as "hardware", there is even a "computer program" exception;[387] 2) the "mathematical method" exception as not reaching the necessary threshold of abstraction.[388]

Furthermore, for the EPO, the understanding of "computer program" in cases such as 2948 would not depend on the creation process, but on the result.[389] In case 2948, the creation was a structure given by a human to be implemented on a computer. Thus, the activities of a human in building an AI model and performing other steps were inextricably linked to the aspects that the AI "learned" to produce the result.

Given the outlined intricacies, it is improbable that the EPO would interpret the "computer program" exception in a manner analogous to the approach taken in case 2948. The EPO BA views that even entirely automated computer programs are deprived of patentability under the EPC. Not all achievements in

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[381] Müller, M. EPO Boards of Appeal case law on AI-related inventions. The European Patent Office. Conference on AI-related technologies: regulation, inventorship and patenting (JC01-2023).

[382] The Intellectual Property Office of the United Kingdom. Statutory Guidance. Examination of patent applications involving artificial neural networks. Information on changes to IPO practice on examination of inventions involving Artificial Neural Networks (19.07.2024). – https://www.gov.uk/government/publications/examination-of-patent-applications-involving-artificial-neural-networks (19.07.2024); The Intellectual Property Office of the United Kingdom. Guidance Examining patent applications relating to artificial intelligence (AI) inventions.

[383] Comptroller-General of Patents, Designs and Trade Marks v Emotional Perception AI Limited.

[384] Ibid., Paragraph 68.

[385] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–8.2., 10., 16.1.

[386] The European Patent Office. Artificial Intelligence: AI and Patentability.

[387] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraph 43.

[388] *Ibid*., Paragraphs 79, 82.

[389] *Mutatis mutandis* EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.2.; EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2–8.2., 10., 16.1.

programming are considered "technical".[390]Thus, the mere use of unsupervised or reinforcement learning in training the ML model and neural network algorithms as such does not constitute an invention and does not depart from the "computer program" exception.[391]

Moreover, the EPO BA has recognized that a "computer program" can also be a "machine" or "hardware" if the claim is directed to the "technical process", for instance, modifying the computer setup, or the "technical effect", such as manipulating the image.[392] However, if no "technical" elements are involved, such as minor improvements to the ML model, the "computer program" would be considered non-patentable.[393]

Hence, even without explicit instructions and differences between conventional programming and ML, algorithms (also in a very abstract form) underlie ML.[394] ML cannot yet program itself, so it relies on algorithms or human instructions.[395] Thus, the backbone of ML or the basis of the operating process of the ML model is not self-learning but human-directed.[396] In this context, the learning and operating process of the ML model (including the ANN) is limited to the actions it has been programmed and trained to perform.[397] As a result, the ML model, even if expressed in a long sequence of multiplications and summations,[398] is still an algorithm (expressed mathematically or otherwise) which is different from a "computer", as compared to the conclusions in case No. CA-2024-000036,[399] and defined by a programmer. Besides, the further operation of the ML model is still constrained by the activities on which it was trained. Thus, the behaviour of the ML model outside the training environment is still

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[390] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2.–8.2., 10., 16.1; MacQueen, H. *et al*. Contemporary Intellectual Property. Law and Policy. Oxford: Oxford University Press 2008, p. 511.

[391] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2.–8.2., 10., 16.1.

[392] EPO BA T 208/84, *Vicom/Computer related invention*, ECLI:EP:BA:1986:T020884. 19860715, Paragraph 7.

[393] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2.–8.2., 10., 16.1.

[394] François, C. (Ed.). Program (computer). International Encyclopedia of Systems and Cybernetics, p. 284.

[395] Kim, D. 'AI-Generated Inventions': Time to Get the Record Straight?. – GRUR International, Vol. 69 Issue 5, 2020. – https://doi.org/10.1093/grurint/ikaa061 (11.09.2024), p. 447, 450–451.

[396] Buduma, N. *et al*. Fundamentals of Deep Learning. Designing Next-Generation Machine Intelligence Algorithms. 2nd Ed., p. 39.

[397] Kim, D. 'AI-Generated Inventions': Time to Get the Record Straight?, p. 447, 450–451.

[398] *Ibid*., p. 451.

[399] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68.

inextricably linked to the underlying algorithm.[400] Even evolutionary and genetic programming do not alter the building blocks of the ML.[401] Namely, the amount of input data does not change the built-in functionality of the ML model. What differs is the quality of the functionality of the ML model and the outputs it provides.

As was mentioned previously, the term "computer program" is interpreted broadly by the EPO, referring to the computerized expression of an algorithm.[402] In this regard, the stage of the ML model running outside the training environment and producing real-world outputs is still a "computer program" or an algorithm depending on the form of expression. Analogous, the fact that parents have taught their children how to recognize or build a chair does not change the nature of the object learned. Namely, a child can identify or even construct various types of chairs based on the learned knowledge. However, the acquired skills of the offspring do not alter the meaning and the essence of the chair. The same is attributed to mathematical algorithms, regardless of their level of abstraction, contrary to the direction in case 2948.[403]

Hence, no amendments to the EPC are necessary regarding the outlined matter at the present state of the art of ML. If the term "computer program" is deemed to be interpreted narrowly as in case 2948, an additional exception could be introduced in the patent framework, for instance, "ML model", "computational model", and similar to comprise the situation related to ML. Nevertheless, changes may be necessary if the concepts of "algorithm" and "mathematical method" are to be interpreted by limiting them to a certain level of abstraction.

An alternative view that ML models are "technical" as such would not be supported in various countries, as demonstrated by the previously mentioned case law of the EPO BA and the Proposal for a Directive on the patentability of computer-implemented inventions (hereinafter – the Proposal for a Directive).[404] The Proposal for a Directive was initiated due to the discrepancies in the interpretation of the scope of the patentability of the computer-implemented inventions, mainly between the EPO, the UK and Germany.[405] The proposal did not

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[400] See, *mutatis mutandis*, EPO BA T 2803/18, ECLI:EP:BA:2022:T280318.20221213, Paragraphs 3.2.2. 4.2.

[401] Koza, J. R. *et al*. Genetic Programming IV: Routine Human-Competitive Machine Intelligence. 1st Ed. Massachusetts: Kluwer Academic Publishers 2003, p. 11–13.

[402] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 7.2.–7.3.

[403] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 79, 82.

[404] The European Commission. Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions COM/2002/0092 final – COD 2002/0047, OJ C 151 E/129, pp. 129–131, Part I, Paragraph 1.1., Part II, Article 1(1).

[405] The European Commission. Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions. The Explanatory Memorandum. – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52002PC0092 (20.04.2024), Paragraph 24.

define the term "computer program" considering the correlation between the EPC and the Directive on Legal Protection of Computer Programs.[406] As it is unlikely that the conclusions drawn in the case law of the UK regarding the exception for "computer programs" in software form under the EPC will be followed, it is necessary to analyze whether an analogous view could also be taken concerning the corresponding exception in hardware form.

3.2.2.3. Application of the "Computer Program" Exception to Creations Involving AI in a Hardware Form

Another aspect raised in case 2948 about ML, which distinguished the ML model from the "computer program", was that the model itself could be "hardware" (emulated ANN).[407] Analogous, in case No. CA-2024-000036,[408] the ML model was considered to be a "computer". In general, a "machine" in ML is referred to as a "computer" that can be programmed and used as a server.[409] Whereas a "computer" could be any device.[410] The notion behind case 2948 was that no "computer program" exception exists because the emulated ANN *per se* is a "hardware" supported by a computer but not a "computer program" because it learns itself.[411]

Under the EPC, the ML model expressed as software is not considered to be hardware.[412] In this regard, according to the EPC, ML models as such would fall under the "computer program" exception unless they bear the "technical effect". The "technical effect" has to be related to the "technical" purpose or to "technical changes" in a computer.[413] Changes to a neural network, the training of the ML model and the use of the ML model as such are not considered "technical" under the EPC.[414]

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[406] Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs (Codified version), OJ C 91, pp. 4–16.

[407] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 9, 18, 23–25, 33–34, 36–59.

[408] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68.

[409] Kang, M., Choi, M. Machine Learning. Concepts, Tools and Data Visualization, p. 17.

[410] Wilks, Y. Artificial Intelligence. Modern Magic or Dangerous Future? London: The Icon Books Ltd. 2023, p. 70.

[411] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 33, 51, 58–59.

[412] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 6.–6.1.,16.1.–19; EPO BA T 0761/20, *Automated script grading/UNIVERSITY OF CAMBRIDGE*, Paragraphs 10.2.–11., 20.5.–22.

[413] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 6.–6.1.,16.1.–19–20; EPO BA T 0761/20, *Automated script grading/UNIVERSITY OF CAMBRIDGE*, Paragraphs 10.2.–11., 20.5.–22.

[414] *Ibid*.

The "hardware" approach under the EPC is consistent with the notion that an invention must have a specific "technical application" to avoid overly general or abstract claims.[415] Nonetheless, the reason for the view in case 2948 that the particular ML model is "hardware" and excluded from the "computer program" exception is not because of the "technical" considerations behind the algorithm. The *ratio* is because the learning by the ML model without human presence is deemed "technical".[416] By comparison, the "technicality" aspect was relevant in case No. CA-2024-000036[417], where the ML model itself was considered to be a "computer".

The reasoning of the approach taken in case 2948 cannot be accepted under the EPC based on the arguments outlined above regarding the "computer program". Namely, the fact that the ML model can learn aspects laying on the training of a human does not change the nature of the "computer program". Moreover, the acquisition of knowledge without the presence of a human is not unique to ANN, as simpler ML algorithms can also be trained using, for example, unsupervised learning.[418] Thus, the opinion taken by the UKIPO that only ANN are falling outside the exception from patentability[419] is too narrow. Additionally, attributing the exclusion from the exception only to ANN in the form of a "computer program" but not to the ML model outside the computer or to the "mathematical methods[420] is too minimal approach. Namely, the only difference is that a computer conducts the necessary activities. Simultaneously, no *consensus* exists on whether "ANN" is a term that defines all neural networks[421] or is only one subfield of them.[422] Besides, the view that ANN is not a "computer program" because it learns itself is contrary to the human-centric approach

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[415] EPO BA T 0814/20, *Adapted Visual Vocabularies/CONDUENT*, ECLI:EP:BA: 2023:T081420.20230320, Paragraphs 13.–13.5.; EPO BA G 0001/19, *Pedestrian Simulations*, Paragraphs 82–83.

[416] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 54–58.

[417] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68, 80.

[418] Krohn, J. *et al*. A. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence. New York: Addison-Wesley 2020, p. 54.

[419] The United Kingdom Intellectual Property Office. Guidelines for examining patent applications relating to artificial intelligence (AI), Paragraph 37.

[420] *Ibid*., Paragraph 38.

[421] Foster, D. Generative Deep Learning. Teaching Machines to Paint, Write Compose and Play, p. 33; Engelbrecht, A. P. Computational Intelligence: An Introduction. 2nd Ed. West Sussex: John Wiley & Sons Ltd. 2007, p. 7; Munakata, T. Fundamentals of the New Artificial Intelligence: Beyond Traditional Paradigms. New York: Springer-Verlag 1998, p. 7.

[422] Gurney, K. An Introduction to neural networks. London: UCL Press Ltd. 1997, p. 21; Esen, H. *et al*. A. Artificial neural network and wavelet neural network approaches for modelling of a solar air heater. – Expert Systems with Applications, Vol. 36 Issue 8, 2009. – https://doi.org/10.1016/j.eswa.2009.02.073 (11.03.2024), p. 11243–11244.

underlying the EPC.[423] Thus, amendments to the EPC relating to the perception of ML algorithms as "computer programs" or "mathematical methods" or their treatment as "computer-implemented inventions" seem unnecessary at the present stage of technological development.

Another approach would be to consider the ML model as "hardware" in the context of the "technical aspects" of the underlying algorithm.[424] Namely, the issues that are not mentioned *expressis verbis* in case 2948, but could be at the heart of the interpretation outlined, are related to the difference between the expression of the ML in the form of a "computer program" and the behaviour of the ML model as well as their protection under the patent legal framework.[425] If the algorithm as such has a "technical effect", then it does not fall under the exceptions of "mathematical methods" and "computer programs" and can itself be considered as "hardware". Analogous, if the behaviour of the ML model were to be protected, the model could be considered as "hardware" and patent-eligible. Nonetheless, in both instances, the ML model would be treated as "hardware" due to its protectable features, not because it has learned aspects without human presence. In this regard, the perception of the ML model as "hardware" under the EPC would differ from the reasoning outlined in case 2948[426] and case No. CA-2024-000036.[427]

From the analyzes outlined above, it can be concluded that the EPO is unlikely to follow the UK approach to applying the "computer program" exception to creations involving AI in the form of hardware. The observed UK case law concerns the absence of a human being as a decisive aspect for accepting the patentability of a creation involving AI. It is therefore necessary to analyze whether analogous considerations could also be made with regard to the recognition of the role of AI in the generation of the creations under the EPC. The approach taken in other jurisdictions should also be considered for comparative purposes.

3.2.2.4. Indicating the Role of AI in the Generation of the Creation

The EPO BA has ruled that in the current framework of the EPC, only humans can be inventors.[428] The system embodies conceptions of the status of work and its value in society. The development of the EPC patent framework has also

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[423] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.4.

[424] See: *mutatis mutandis* Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 253–254, 262–267.

[425] *Ibid*., p. 253–254, 262–267.

[426] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 54–58.

[427] *Comptroller-General of Patents, Designs and Trade Marks -v- Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraph 68, 80.

[428] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.6.

included a debate on whether protection encourages innovation or hinders progress. Nonetheless, caution about the effect on the trade of copying creations in other countries prevailed.[429] The notion of the "patent" embodied human labour or the creation of objects beneficial to society as a commodity of technical knowledge and, consequently, a facilitator of progress. The patent concept was based on crediting an inventor and an incentive to innovate. Later, the legal framework of the EPC was the socially created reality rather than recognizing natural rights.[430]

According to the EPO, the creation approach, even without specifically programmed instructions or human presence, is not decisive for evaluating whether there is an "invention" under Article 52 of the EPC (patent-eligible invention). Thus, *prima facie*, a non-human actor could be a "creator" but not an "inventor". Nevertheless, by analogy with Article 53 EPC (exception based on *ordre public* and morality), the EPO BA argues that the interpretation that a non-human made invention cannot be patentable under Article 60 EPC (rights to a patent) but can be patentable under Article 52 EPC (patent-eligible invention) is not unjustified.[431]

Four-fold reasoning could be derived from the outlined perception by the EPO BA: 1) that such a coexistence of a difference in patentability depending on human involvement in generating a creation could be deemed as contrary to Article 53 of the EPC; 2) that through the viewpoint that only a human can be regarded as an "inventor" all approaches of generating creations are attributed to a human (irrespective of the actual contribution); 3) that only human-made inventions can be patentable under both Articles 52 and 60 of the EPC; 4) all the previously mentioned aspects combined. The EPO BA does not *expressis verbis* endorse any of the mentioned approaches.[432]

Nevertheless, the EPO BA agrees that the manner in which the invention is made is not decisive. However, the EPO BA is unsure whether AI-generated inventions are patentable under Article 52 of the EPC.[433] Besides, the EPO BA states that in the case of Article 53, it is sufficient that the exploitation of an invention is offensive, regardless of how it is further classified.[434] Therefore, it seems that if the third reason outlined above were the case, the EPO BA would explicitly state that only a human-made invention could be patentable under Article 52 similar to its interpretation that only a human can be an inventor under Article 60 of the EPC.[435] Therefore, it appears that the EPO BA is instead arguing

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[429] Griset, P. The European Patent. A European Success Story for Innovation, p. 7, 12.–13.

[430] *Ibid*., p. 16–17, 20–21, 28.

[431] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.2.

[432] *Ibid*., Paragraph 4.6.2.

[433] *Ibid*., Paragraph 4.6.2.

[434] *Ibid*., Paragraph 4.6.2.

[435] *Ibid*., Paragraph 4.6.6.

in favour of the second motive, which is supported by the first reason outlined above.

As a result, the perception by the EPO creates a legal conundrum. Namely, on the one hand, the EPO BA states that Article 81 EPC (designation of the inventor) is only a formality and that Article 60 is triggered if it is not fulfilled.[436] On the other hand, the EPO BA does not resolve in the same way the tension between Articles 52 and 60 EPC in the case of recognition of the role of AI in generating creations. The interpretative conclusions outlined in the previous paragraph and the view of the relationship between Articles 52 and 60 EPC signal that Article 81 is not a mere formality. In other words, Articles 52, 60 and 81 of the EPC, at least in cases of the recognition of the role of AI in generating creations, must be interpreted in conjunction and not in a vacuum, as the EPO BA states.[437] In this respect, the designation of the inventor under Article 81 is deemed to be the same person who also satisfies the requirements of Article 60. Furthermore, since an inventor is a human, it is unequivocally assumed that the same person is responsible for the creation of the claimed invention under Article 52. The approach is only logical to the extent that a designated person is assumed to have made the claimed invention or to be the legal successor to a human-made creation. However, even in the case of sheer luck in stumbling upon the invention, the understanding of the role of an "inventor" is different about the efforts made than regarding the creative efforts in all the processes of making an invention.[438]

The interpretation by the EPO BA has even more shortcomings when considering the possibility of non-human-made creations. Namely, there is ambiguity as to whether it is correct to identify a natural person as the inventor but not to classify the creation as human-made.[439] Similarly, in the case of non-human-created inventions, Articles 52, 60, and 81 of the EPC can still be interpreted in isolation.

It has to be noted that the argument against the necessity of changes in written law for AI is based on the perception that a human is always behind AI.[440] Nonetheless, case 2948 distinguishes between "inventor" and "invention" in terms of the role of a human in the generation of creation or existence of an invention. As previously mentioned, Article 52 EPC could be interpreted in isolation in light of the general reasoning underlying case 2948. However, looking more closely at the reasoning in the mentioned case and the respective interpretation under the EPC, the result in a vacuum might be analogous in both jurisdictions. However, when considered in the context of Article 53, the result under the EPC may differ from the approach taken in the UK.

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[436] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.2.3.

[437] *Ibid*., Paragraphs 4.2.3., 4.6.6.

[438] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 117–119, 121–122.

[439] *Ibid*., p. 117–119, 121–122.

[440] Kim, D. 'AI-Generated Inventions': Time to Get the Record Straight?, p. 447, 50–451.

From the outlined analyzes, it can be concluded that the key to further analysis are conclusions by the EPO BA.[441] Namely, it could be anticipated that the interpretation according to which the invention could be attributed to AI under Article 52 but, simultaneously, not according to Articles 81 and 60, might be contrary to Article 53 of the EPC.

At the same time, the decisive role in the context of Article 53 EPC lies not only with the EPO but also with the respective Member States.[442] None of the EPC member states in which patent protection has been claimed in the context of the Artificial Inventor Project[443] has expressly considered the issue in the light of *mutatis mutandis* Article 53 EPC. Nevertheless, the previously mentioned approach by Germany and the UK demonstrates that various interpretations of the role of AI in different aspects of patentability may not trigger the *ordre public* and morality exception. Moreover, the understanding of Germany and the UK signals that, on the contrary, the acceptance of the role of AI in generating creations may have become part of their public order. At the same time, the acceptance by both countries does not include mentioning AI as an inventor but outlines the role of AI in other aspects of patentability. Thus, not disclosing the truth is tolerated.

Therefore, it appears that the view of the EPO BA is stricter on the aspect than, for instance, that of Germany and the UK in the matter. Namely, the EPO BA doubts that the controversy regarding the role of AI within Articles 52, 60 and 81 of the EPC is consistent with Article 53 of the EPC.[444] At the same time, the respective approaches by Germany and the UK do not trigger the exception of the *ordre public* and morality.

As noted above, the UK does not consider AI to be inventive under the patent framework.[445] Simultaneously, for instance, the UK copyright framework allows for the protection of computer-generated works without the involvement of a human author.[446] Nonetheless, the respective provision has not been applied yet since human contribution is still perceived as a prerequisite even under the respective framework.[447]

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[441] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.2.

[442] Paterson, G. The European Patent System. The Law and Practice of the European Patent Convention, p. 433–434.

[443] The Artificial Inventor Project.

[444] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.2.

[445] The Intellectual Property Office of the United Kingdom. Manual of Patent Practice, April 2024, Section 13: Mention of Inventor.

[446] The UK Copyright Designs and Patents Act (CDPA 1988). –https://www.legislation.gov.uk/ukpga/1988/48/section/178 (03.05.2024), 'computer-generated', Section 178 in conjunction with Sections 9(3), 12(7), 78(2)(c), 81(2).

[447] Parish, J. Intervention. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24 (06.11.2024). – https://webcast.wipo.int/video/WIPO_IP_CONV_GE_2_2024-11-06_PM_123868 (06.11.2024).

Analogous, the legal regulation of, for instance, New Zealand[448] foresees protection of computer-generated works under the copyright framework. However, it does not recognize AI as an inventor under the patent law. In comparison, South Africa, on the other hand, recognizes copyright in "computer generated" works[449] and allows indicating in the patent application that "an artificial intelligence autonomously generated the invention".[450]

It has been noted that under the current EU framework, copyright protection does not apply to AI-generated creations.[451] As a result, creators either have to refrain from using AI to generate creations[452] or hide that the work is AI-generated. To resolve analogous tensions at the national level, for example, Ukraine has introduced a new *sui generis* protection regime for non-original computer-generated output in parallel with copyright protection, granting only economic rights to the respective owners.[453] The regime recognizes the role of AI in generating creations and the distinction between human and computer-generated creations without disrupting the copyright framework. Nevertheless, the patent law in Ukraine[454] does not provide for an analogous direction, creating systematic ambiguity.

The approach taken by the USA aligns with the previously mentioned rationale that IP protection is only possible with human contribution. Namely, the USA, although refusing to recognize AI as an inventor,[455] has issued Inventorship Guidance for AI-Assisted Inventions (hereinafter – the Guidance).[456] The

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[448] High Court of New Zealand. *Thaler v Commissioner of Patents* [2023] NZHC 554, Paragraphs 32–34; Copyright Act 1994, 'computer-generated', Section 2(1) in conjunction with Sections 5(2), 22(2), 97(2)(c), 100(2)(b).

[449] Copyright Act, 1978, 'author' Section 1(1)(h).

[450] *DABUS*, ZA2021/03242, 2021. Patent Journal, 54(7). – https://iponline.cipc.co.za/Publications/PublishedJournals/E_Journal_July%202021%20Part%202.pdf (03.05.2024), p. 255.

[451] Vezina, B. Intervention. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24 (06.11.2024). – https://webcast.wipo.int/video/WIPO_ IP_CONV_GE_2_2024-11-06_PM_123868 (06.11.2024).

[452] Fink, C. From patentability dilemmas to copyright conundrums: Economic prospective. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24.

[453] Закон України. Про авторське право і суміжні права. Відомості Верховної Ради (ВВР), 2023, № 57, ст.166, с. 33.

[454] Закон України. Про охорону прав на винаходи і корисні моделі. Відомості Верховної Ради України (ВВР), 1994, № 7, ст. 32.

[455] The Supreme Court of the United States. *Stephen Thaler, Petitioner v. Katherine K. Vidal, Under Secretary of Commerce for Intellectual Property and Director, United States Patent and Trademark Office, et al.*, No. 22–919, 24. – https://www.supremecourt.gov/search.aspx?filename=/docket/docketfiles/html/public/22-919.html (03.05.2024); The United States Court of Appeals for the Federal Circuit, *Thaler v Vidal*, 43 F.4th 1207 (Fed. Cir. 2022) (05.08.2022) p. 9–10.

[456] The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions.

Guidance stipulates the criteria based on which a human in creations involving AI could be considered an inventor or joint inventor, the decisive criteria of which is a significant contribution to the invention by a human. Furthermore, the Guidance outlines that only a human can be considered an inventor or co-inventor, even if the role of AI in creating an invention was instrumental. Simultaneously, the Guidance states that AI is capable of producing creations that, conducted by a human, would be considered an invention under the patent legal framework.[457]

Similar to the USA,[458] the patent system under the EPC[459] has been designed to support of human ingenuity. At the same time, the USPTO[460] and the EPO[461] cannot recognize the inventive role of AI simply because the patent systems were designed with the human inventor in mind, not because AI is incapable of producing creations.

According to the Guidance, human inventorship under the patent framework is based on the argument of the creative conception of the entire invention.[462] Simultaneously, a patent claim could not be made in the case where no human has significantly participated in the conception of the matter, including: 1) only providing a problem to be solved from the produced output. However, formulating the problem could be considered a significant contribution; 2) merely recognizing or applying the produced output without further adaptation to produce an invention; 3) not providing essential building blocks for the AI from which the inventive creation results. A human presence is not required at every step to determine a significant contribution; 4) simply owning the relevant ML model.[463] The implication is that without a significant human contribution, even if the result may be inventive, patent protection would not be available in the USA.

On the one hand, the Guidance attempts to clarify the actual division of roles in the creation of inventions between humans and AI with regard to moral rights. On the other hand, the Guidance offers the alternative of non-patentability. According to the Guidance, either a human would have inventorship in the circumstances outlined in case 2948, and a "computer program" exception would apply, or the creation would not be patentable if the logic that an invention is created without human presence is followed. In fact, the Guidance focuses on the

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457 The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions, Sections II and III.

458 *Ibid*., Section IV; the United States Court of Appeals for the Federal Circuit, *Thaler v Vidal*, 43 F.4th 1207 (Fed. Cir. 2022), p. 9–10.

459 EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraphs 4.3.6., 4.6.2.

460 The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions, Sections II–IV.

461 EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraphs 4.3.6., 4.6.2., 4.6.4–4.6.6.

462 The United States Patent and Trademark Office. Inventorship Guidance for AI-Assisted Inventions, Section III, B.

463 *Ibid*., Section IV, A.

formal naming of an inventor in the patent application and how an invention was actually conceived.

Interestingly, the UK takes a different approach. It does not state that the exclusion of ANN from the exception of "computer programs" means insufficient human contribution and unpatentability.[464] However, since the patent framework is human-centric, the divergence in approach raises the question of the contribution of an individual in building a creation. If there is a logic that ANN learned itself, then the respective output would also be treated as non-human-made.

However, under the EPC,[465] similar to the approach of the UK in case 2948, naming an inventor in the patent application is not related to the way of generation of an invention. In other words, an invention could be created by sheer luck, accidentally or otherwise and still be treated as human-made regardless of the actual contribution.[466] Thus, contrary to the position taken by the USPTO, the approach creates a legal conundrum with the foundational principle of human ingenuity underlying the patent system of the EPC.[467] In this regard, if it is permissible for a human to claim inventorship for the serendipitous generation of an invention, it would have been equally permissible to recognize the role of AI in the inventive process.[468] Namely, in the case of an "inventive spark" due to accident or sheer luck, a human and an AI would have equal awareness (control) of the conception and contribution in the generation of a creation.[469] Nonetheless, under the existing framework of the EPC,[470] AI is not recognized as an inventor or co-inventor. Similarly, even if AI learns aspects of producing output, the "computer program" exception would apply.[471]

It can be concluded that none of the aspects outlined regarding the UK approach would be followed under the EPC. Moreover, as the above analyzes show, the perception under the EPC differs from other jurisdictions, not only concerning certain aspects of patentability considered in isolation but also systematically with respect to other criteria. Moreover, the approach under the patent framework, which does not recognize the role of AI, also differs from the

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[464] The United Kingdom Intellectual Property Office. Guidelines for examining patent applications relating to artificial intelligence (AI), Paragraphs 37–39.

[465] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.3.6.

[466] *Ibid*., Paragraph 4.3.6.

[467] *Ibid*., Paragraph 4.6.2.; Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 114–122.

[468] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 122.

[469] See: *mutatis mutandis* Wilks, Y. Artificial Intelligence. Modern Magic or Dangerous Future?, p. 208–209.

[470] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraphs 4.6.4–4.6.6.; The European Patent Office. Guidelines for Examination A-III, 5.5.1. General remarks. – https://www.epo.org/en/legal/guidelines-epc/2023/a_iii_5_1.html (03.05.2024).

[471] EPO BA T 0702/20, *Sparsely connected neural network/MITSUBISHI*, Paragraphs 6.–6.1.,16.1.–19–20.

approach under copyright protection in various jurisdictions outlined above. In this regard, the respective perspective creates a legal opacity. As all patentability criteria have to be fulfilled to obtain a patent, it is necessary to consider whether there are other implications for creations involving AI under the EPC that the previously outlined legal standpoint could accelerate.

3.2.2.5. Other Implications for Creations Involving AI

Another aspect of the "invention" that has to be taken into account under the EPC is its repeatability or reproducibility with a statistically frequent rate.[472] In case 2948, it was argued that a "program" was not a "human-made" and that the underlying algorithm was based on ANN.[473] The mentioned raises the question of the repeatability of the output, since the "program" is supposed to learn from itself. Therefore, if the input data has been inserted to produce an output this will cause the ML model to learn or adapt further, and the subsequent result, inserting the same data sets, may not be analogous. Thus, in the case of ML models that do not statically memorize the trained aspects but dynamically continue to learn,[474] it would be necessary to determine the acceptable margin of deviation from the initial output to constitute "repeatability". Furthermore, the ML model might need to be re-trained after a while to remain accurate. Conversely, with traditional software, revisions must be trained on the ML model, not just added to the base architecture.[475] Since training data only needs to be disclosed for patent purposes if it determines specific features of the claimed "technical effect",[476] the impact of the improvements to the ML model on patentability will have to be determined on a case-by-case basis. For the improved ML model to be patentable under the

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[472] Nägerl, J. S. H., Walder-Hartmann, L. Inventions and their amenability to patent protection. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 207–208, 210–211.

[473] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 54–58.

[474] See: *mutatis mutandis* Ramalho, A. Intervention by Google. WIPO Conversation on Intellectual Property and Frontier Technologies: Ninth Session WIPO IP CONV GE 24 Day 2 Afternoon. – https://webcast.wipo.int/video/WIPO_IP_CONV_GE_24_2024-03-14_PM_122140 (03.05.2024); The European Patent Office. Guidelines for Examination, F-III, 3. Insufficient disclosure. – https://www.epo.org/en/legal/guidelines-epc/2024/f_iii_3.html (03.05.2024); The European Patent Office. Guidelines for Examination, F-III, 3.12. Sufficiency of disclosure and inventive step. – https://www.epo.org/en/legal/guidelines-epc/2024/f_iii_12.html (03.05.2024).

[475] Prapas, I. *et al*. Continuous Training and Deployment of Deep Learning Models. – Datenbank Spektrum, Vol. 21, 2021. – doi: https://doi.org/10.1007/s13222-021-00386-8 (03.05.2024), p. 203–212.

[476] The European Patent Office. Guidelines for Examination, G-II, 3.3.1. Artificial Intelligence and Machine Learning; The European Patent Office. Guidelines for Examination, F-III, 3. Insufficient disclosure; Rudzite, L. Algorithmic explainability and sufficient disclosure requirement under the European Patent Convention, p. 133.

EPC, it would either have to fall within the scope of the claimed patented creation or be protectable as such.[477] In other words, since "computer programs" *per se* are excluded from patentability under the EPC, and the behaviour of the ML model is not protected,[478] the updated ML model may not be patentable under the EPC.

It follows that the existing patent framework, particularly under the EPC, recognizes the creative capacity of AI, but does not acknowledge the role of AI in the inventive process and treats AI as a "co-pilot".[479] Thus, the only alternative is either to hide the importance of the role of AI in the inventive process or not to seek patent protection.

Furthermore, in comparison, the USPTO *verbatim* does not allow the first option, thus leaving only the non-patentability approach. Simultaneously, the UK only refers to the role of AI in the creation of the invention but does not mention its role in the inventive process. At the same time, the UK and other countries indicate the role of computer-generated creations only in the copyright framework but not in the patent landscape. The difference in approaches creates a legal conundrum and affects the stability of technological development respectively.[480] At the same time, regional harmonization of patent protection should facilitate technological progress and the enrichment of public knowledge.[481]

Interestingly, in general, in the EU, one of the core principles that sets legal boundaries for AI is transparency and explainability of the inner workings and the role of AI in decision-making.[482] Moreover, also the AI Act emphasizes the

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[477] The European Patent Office. Guidelines for Examination, G-VII, 5.2. Formulation of the objective technical problem. – https://www.epo.org/en/legal/guidelines-epc/2024/g_vii_5_2.html (03.05.2024); The European Patent Office. Guidelines for Examination, F-III, 3.12. Sufficiency of disclosure and inventive step; The European Patent Office. Guidelines for Examination, G-VII, 5.4.1. Formulation of the objective technical problem for claims comprising technical and non-technical features. – https://www.epo.org/en/legal/guidelines-epc/2024/g_vii_5_2.html (03.05.2024).

[478] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 253–254, 262–267.

[479] See: *mutatis mutandis* Cooper, S. Generative AI and IP. WIPO Conversation on Intellectual Property and Frontier Technologies: Eight Session WIPO/IP/CONV/GE/2/23/1, Day 2 Morning. Panel 6: IP Strategies for Innovators and Creators in the Age of Generative AI. – https://www.wipo.int/meetings/en/details.jsp?meeting_id=78188 (03.05.2024).

[480] Free, R. Panel 5: Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22.

[481] Abbott, F. M. *et al*. International Intellectual Property in an Integrated World Economy, 2nd Ed., p. 1, 5.

[482] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). – *OJ L 119*, Article 22 and 25; The European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. COM(2020) 65 final (19.02.2020). – https://commission.europa.eu/document/download/d2ec4039-c5be-423a-

necessity of transparency to the public over the role of certain AI in the created output.[483] Thus, the legal perspective of *lex generalis* governance of AI emphasizes the need for transparency between human creative efforts and the respective role of AI. In this regard, there is a need to measure the capabilities of humans and AI.

Nonetheless, the *lex specialis* legal governance of patents under the EPC does not follow the exact transparency requirement to disclose the role of AI in a creation.[484] Thus, under the EPC, the public does not have a right to know the division between the roles of a human and an AI in a creation. However, the approach creates tension over the validity of the patent social contract or bargain underlying the EPC. Namely, the rationale of the patent is the enrichment of general knowledge through the disclosure of an invention in exchange for exclusive rights.[485] Moreover, the EPC focuses only on human-centric invention.[486] Thus, the disclosure requirement should cover the genuine obligation to reveal the role of a human in a creation. However, by allowing non-disclosure of the role of AI under Article 52(1) and mentioning only a human under Article 60(1) of the EPC[487] the disclosure requirement means usurping the creation of an invention by a human, even if it involves AI.[488] Hence, the human-centric approach becomes excessively human-centric, and the disclosure requirement for the enrichment of knowledge is not balanced.

Moreover, the situation becomes even more complex considering the differences between countries regarding protecting creations involving AI. For instance, as mentioned before, the UK regulates computer-generated works without human authorship under copyright protection. However, it does not recognize the role of AI in the inventive process under the patent framework.[489] In contrast, as noted above, the USPTO and Germany have moved towards clarifying the boundaries of the human-centric approach or transparency of the human role in

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81ef-b9e44e79825b_en?filename=commission-white-paper-artificial-intelligence-feb2020_en.pdf (05.05.2024), p. 9; The European Commission High-Level Expert Group on AI. Ethics Guidelines for Trustworthy Artificial Intelligence, p.14, 18.

[483] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Article 50, especially, (2), (4).

[484] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.3.6., 4.6.3.–4.6.6.

[485] Haedicke, M. Introduction. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 5.

[486] EPO BA J 0008/20, *Designation of inventor/DABUS*, Paragraph 4.6.4.

[487] *Ibid*., Paragraph 4.6.2.

[488] For more detail see Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 114–122.

[489] The Intellectual Property Office of the United Kingdom. Manual of Patent Practice, April 2024, Section 13: Mention of Inventor; The UK Copyright Designs and Patents Act (CDPA 1988), Section 178 in conjunction with Sections 9(3), 12(7), 78(2)(c), 81(2).

the inventive process, thereby taking steps to change the existing public order in the patent framework.

Legal certainty on the division of roles between humans and AI is also important for technological stability. Transparency about the division of roles behind the generation of creation is also crucial for market stability. For example, when a creation involving AI is placed on the market or licensed as an IP asset, it is essential to know whether the desired creation is made entirely by a human or also with the assistance of AI, which could affect the market price and value of the respective product. Human labour requires more effort than AI, which involves a certain degree of automation. In addition, creations using AI could have an increased risk of IP infringement due to the amount and source of data processed, especially if it is not disclosed.

Nonetheless, the existing differentiation between countries in recognizing the role of AI in the inventive process and the inconsistency with the copyright framework diverge from the centralization efforts and force inventors to seek alternative protection mechanisms. In addition, the changing interpretation of the basic concepts of "computer", "computer program", "mathematical method", and attribution to creations involving ML[490] by the courts in the UK affects the stability of technological development. The courts and the UKIPO have adjusted the valuation guidelines following the outcome in case 2948[491] and case No. CA-2024-000036[492] for ANN only or excluding other ML models. In light of the respective changes, it is cumbersome for the developers to build their P protection strategies.

The development of AI and ML is exponential.[493] Besides, patent protection for creations involving AI, particularly at the national level, is crucial even for developers that have previously opted, for instance, for trade secret protection.[494] Consequently, ambiguity regarding the fundamental aspects of the patentability of ML models could have a deterrent effect on technological progress. Namely,

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[490] *Emotional Perception AI v Comptroller-General of Patents*, EWHC 2948 (CH), Paragraphs 25, 50, 54–63; *Comptroller-General of Patents, Designs and Trade Marks -v-Emotional Perception AI*, EWCA Civ 825, Case No.CA-2024-000036, Paragraphs 68, 70, 84.

[491] Intellectual Property Office of the United Kingdom. Statutory Guidance. Examination of patent applications involving artificial neural networks. Information on changes to IPO practice on examination of inventions involving Artificial Neural Networks; Intellectual Property Office of the United Kingdom. Guidance Examining patent applications relating to artificial intelligence (AI) inventions.

[492] Intellectual Property Office of the United Kingdom. Statutory guidance Examining patent applications involving artificial neural networks.

[493] Eche, T. *et al*. Toward generalizability in the deployment of artificial intelligence in radiology: Role of computation stress testing to overcome underspecification, p. 1; Feldmann, C., Bajorath, J. Compounds with multitarget activity: Structure-based analysis and machine learning, p. 1–3.

[494] Vaibhav, H., Mitthatmeer, K. OpenAI's unconventional IP strategy for ChatGPT.

creators might refrain from a patent protection if there is a risk that it might be revoked in the future if the legal landscape changes.[495]

Furthermore, legal opacity also leads to precautionary measures by creators, for instance, by formulating claims involving extensively specific aspects of an invention to prevent the risk of infringement.[496] Another option is to file for patents in other countries or to seek alternative means of protection. One of these might be to make the creation open-source. Although open source products promote scientific progress and the development of products, they do not provide a competitive advantage in the marketplace.[497] Therefore, it may only be a desirable choice for some developers. In this respect, alternative forms of protection could be considered.

As a result, the national economy may not benefit from such an approach, as it would be necessary to import the missing creations instead of producing and benefiting from them domestically and through exports. This is particularly important within the EU when building an AI ecosystem. The EU is lagging behind other countries where the development of creations involving AI is higher.[498] Therefore, instead of producing and protecting the respective creations regionally, the EU needs to import them. The mentioned is particularly crucial in rapidly changing markets, such as digital innovations, which are interdependent.[499] Thus, instead of disclosing an invention to obtain a patent and risking a reduced market advantage or revocation in the event of regulatory changes, creators may seek alternative means of protection.

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[495] Fink, C. From patentability dilemmas to copyright conundrums: Economic prospective. The World Intellectual Property Organization. Conversation on Intellectual Property (IP) and Frontier Technologies: Tenth Session. – WIPO/IP/CONV/GE/2/24.

[496] For instance, USPTO Patent Application No. US11983488B1, *Systems and methods for language model-based text editing*. – https://patents.google.com/patent/US11983488B1/en?assignee=openai&country=US&status=GRANT&sort=old (01.09.2024), Claims 1, 10; USPTO Patent Application No. US11886826B1, Systems and methods for language model-based text insertion. – https://patents.google.com/patent/US11886826B1/en?assignee=openai&country=US&status=GRANT&sort=old (01.09.2024), Claims 1, 13; USPTO Patent Application No. US11922550B1, *Systems and methods for hierarchical text-conditional image generation*. – https://patents.google.com/patent/US11922550B1/en?assignee=openai&country=US&status=GRANT&sort=old (01.09.2024), Claim 1; Vaibhav, H., Mitthatmeer, K. OpenAI's unconventional IP strategy for ChatGPT.

[497] Kop, M. AI & Intellectual Property: Towards an Articulated Public Domain. – Texas Intellectual Property Law Journal, Vol. 28 No. 1, 2020. – https://tiplj.org/wp-content/uploads/Volumes/v28/Kop_Final.pdf (03.05.2024), p. 323.

[498] The European Commission. The future of the European competitiveness. Part A: A competitiveness strategy for Europe, p. 26, 29.

[499] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus. Cheltenham: Edward Elgar Publishing Inc. 2006, p. 39.

4. POTENTIAL SOLUTIONS

4.1. Trade secret protection

The existing industrial property framework and specifics of AI lead to the consideration of opting instead for trade secret protection for creations involving AI, particularly generative AI, for aspects of: 1) a human or entity as creator; 2) an underlying algorithm; 3) an output produced by AI, if it qualifies for trade secret protection; 4) keeping inputs and outputs secret or proprietary and protected from misappropriation.[500] Although trade secrets can provide protection for various aspects of creations involving AI, such as algorithmic behaviour, they cannot address all the challenges of, for example, patent and copyright protection.

Namely, the Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure[501] (hereinafter – Directive 2016/943) explicitly recognizes only a natural or legal person as the holder of the right, but at the same time, does not acknowledge the role of AI in generating a creation. Recital 4, in conjunction with Article 2(2) of the Directive 2016/943, links the status of the "trade secret holder" to its "innovation-related efforts" in the sense of the commercial value under its possession for which the protection is sought, regardless of the process how the respective asset was generated. In this regard, analogous criticism as for patent protection and recognition of the role of AI in generating creation is attributable to trade secret protection.

Furthermore, trade secrets are not recognized as IP rights; thus, they do not provide exclusivity and protection against misappropriation.[502] Trade secret protection cannot be considered equivalent to the protection provided by IP rights. Therefore, aspects of creations involving AI that are protected by trade secrets could risk losing their proprietary status due to: 1) reverse engineering, and 2) developing similar IP-protected creations; 3) obtaining similar information from other creations. Thus, proving infringement and maintaining information as

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[500] Kop, M. AI & Intellectual Property: Towards an Articulated Public Domain, p. 318–319; Hector, G. Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22. – https://www.wipo.int/meetings/en/details.jsp?meeting_id=72090 (03.05.2024).

[501] Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure. *OJ L 157, pp. 1–18, Article 2(2).*

[502] *Ibid*., Recitals 1, 2, 16; The European Commission. Commission Staff Working Document Impact Assessment Accompanying the document proposal for a Directive of the European Parliament and of the Council on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure SWD/2013/0471 final (28.11.2013). – https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013SC0471 (03.05.2024), p. 267.

a trade secret may be difficult, especially in rapidly changing sectors such as AI.[503] Moreover, since computer science relies heavily on other developments and synchronization or compatibility with other products and standards in the market,[504] opting for trade secret protection might hinder the ability to collaborate with other creators without disclosing the existence of trade secret protection. Consequently, creators may have to devote significantly more resources to developing solutions independent of others in the market. The respective paradigm could affect competitive advantage for small and medium-sized enterprises, especially when entering rapidly changing sectors such as software development and AI.[505] Therefore, even if entrepreneurs choose the approach, there may be a situation where the product is already or soon to be outdated by the time it is finalized.

Additionally, trade secret protection does not facilitate the enrichment of general knowledge because the creation is not disclosed to the public. Such protection, therefore, hinders technological development and leads to the monopolization or concentration of knowledge generated by a limited number of creators. Besides, trade secrets deprive algorithmic transparency and explainability;[506] therefore, could pose challenges in complying with the principles set out in Articles 22 and 25 of the General Data Protection Regulation[507] if the meaningful information about the logic involved (for creations embodying automated decision-making) cannot be provided.[508] Even more, creations involving AI deemed to be placed in the EU market, especially those posing a certain risk as stipulated within the AI Act,[509] may encounter obstacles related to disclosure and transparency.

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[503] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 6, 9.

[504] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 39.

[505] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 6, 9.

[506] Foss-Solbrekk, K. Three routes to protecting AI systems and their algorithms under IP law: The good, the bad and the ugly. – Journal of Intellectual Property Law & Practice, Vol. 16 Issue 3, 2021. – doi:10.1093/jiplp/jpab033 (11.03.2024), p. 257; EPO BA T 1669/21, Paragraphs 1.2–1.8; EPO BA T 1191/19, *Neuronal plasticity/INSTITUTGUTTMANN*, Paragraphs 4.1.–4.2.

[507] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

[508] *Opinion of Advocate General of 12 September 2024, the Court of Justice of the European Union, Request for a Preliminary Ruling Case No. C-203/22, Dun & Bradstreet Austria*. – https://curia.europa.eu/juris/document/document.jsf?text=&docid=290022&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=1943933 (13.09.2024), Paragraphs 72–80.

[509] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial

Trade secrets are generally used in cases where, for example, patent or copyright protection might not be available.[510] However, trade secrets do not guarantee protection for those aspects of creations involving AI that cannot meet the respective criteria.[511] Additionally, trade secret protection could be disregarded if the creation involving AI, obtained based on proprietary ML training or input data, is rendered public.[512] Therefore, trade secrets may not be the panacea for protecting creations involving AI in all cases, especially since misappropriation of trade secrets is described as one of the most common related to software.[513] Moreover, the protection by IP rights is stated to be the key incentive for innovation, which is also attributed to creations involving AI.[514] Thus, in all cases, trade secrets could not guarantee the necessary protection for creations involving AI. In this regard, other potential protection mechanisms need to be analyzed.

4.2. Contractual Protection

Another potential avenue for protection is contractual agreements. Although this approach allows us to select desirable contract terms and even aspects that are not yet regulated, it also has to consider the specifics of a particular jurisdiction. Like trade secret protection, contractual protection does not guarantee against reverse engineering or the development of on-par independent products in the market. Thus, this mechanism would not provide for an exclusive position in the market and, apart from general remedies, the possibility to seek compensation from competitors and non-contractual partners who have entered the market with a similar product.

Intelligence Act), Article 5, 6, 11, 13(1), 13(3), 40, 42, 43, 47, 50 51, 78, 111, Annex IV, particularly, points 2 (c), (d), Annex V, particularly, point 5, Annex VI, Annex VII, particularly, point 4.3., Annexes XI, XII, Recitals 88, 107.

[510] Free, R. Panel 5: Through the looking glass – IP professionals and attorneys' views. The World Intellectual Property Organization: Sixth session of the WIPO Conversation "Frontier technologies – AI Inventions", WIPO/IP/CONV/GE/2/22.

[511] Sandeen, S., K., Aplin, T. Trade Secrecy, Factual Secrecy and the Hype Surrounding AI. Abbott, R. (Ed.). Research Handbook on Intellectual Property and Artificial Intelligence, p. 452–460; Nordberg, A. Trade Secrets, Big data and Artificial Intelligence Innovation: a Legal Oxymoron? Schovsbo, J., Minssen, T. Riis, T. (Eds.). The Harmonization and Protection of Trade Secrets in the EU: An Appraisal of the EU Directive. Cheltenham: Edward Elgar Publishing 2020, p. 197–218.

[512] The World Intellectual Property Organization. Generative AI: Navigating Intellectual Property. IP and Frontier Technologies Factsheet, 2024, p. 6.

[513] Searle, N. The Economic and Innovation Impacts of Trade Secrets. Intellectual Property Office, 2021. – https://research.gold.ac.uk/id/eprint/30022/1/The%20Economic%20and%20Innovation%20Impacts%20of%20Trade%20Secrets%20published%20version.pdf (03.05.2024), p. 21.

[514] The World Intellectual Property Organization. AI Inventions Factsheet. WIPO Conversation, IP and Frontier Technologies, 2023. – https://www.wipo.int/about-ip/en/frontier_technologies/ (03.05.2024), p. 2.

Furthermore, entering the market in the EU with creations involving AI might still require disclosure of information about the product, similar to the case of trade secret protection.[515] Moreover, contractual protection could only serve as an approach as far as a specific partner is concerned. Namely, analogous to trade secret protection, the contract does not extend to building partnerships with non-contractual partners, which could also be a cornerstone in the AI sector.

Besides, contractual protection may not facilitate the enrichment of public knowledge if only limited partners are chosen who do not allow for the creation to be disclosed to the public. Moreover, contractual protection might even hinder adding value to the knowledge of society if only a few partners share a competitive advantage in the market. Thus, contractual protection may allow monopolization or oligopolization of the market concerned, which in turn may facilitate unfair competition, particularly in the case of strategic products. As non-regulatory approaches may not provide sufficient protection in all cases, an alternative is to change the legal framework.

4.3. Amendments to the Legal Framework of the EPC

Adjustments in the patent framework would not have to be related to the sufficiency of human involvement in creation, such as the number of prompts or other factors since the EPC already regulates the aspect.[516] Instead, alterations would have to concern the essence of the human-centric approach under the EPC. Nonetheless, the EPC does not, and it is hardly unlikely that it would follow the respective direction.[517] Additionally, Article 50(4) interpreted by Recital 134, of the AI Act does not either signalize or touch upon the respective aspect as *lex generalis* framework for those creations involving AI deemed patentable under the EPC and placed in the market in the EU.

Consequently, there is a necessity for the legal protection of creations involving AI that allows recognition of the role of AI. As concluded previously, amendments to the existing EPC framework are unlikely, and alternative pro-

[515] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), Article 22, 25; Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Article 5, 6, 11, 13(1), 13(3), 40, 42, 43, 47, 50 51, 78, 111, Annex IV, particularly, points 2 (c), (d), Annex V, particularly, point 5, Annex VI, Annex VII, particularly, point 4.3., Annexes XI, XII, Recitals 88, 107.

[516] *Mutatis mutandis* Hervey, M. The World Intellectual Property Organization. Webinar on WIPO Guide to Generative AI and Intellectual Property WIPO/WEBINAR/FT/24/1.

[517] For more details, see Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 121–122.

tection means, such as trade secrets and contractual protection, would not provide a comprehensive remedy. Besides, protection by IP rights of creations involving AI is a crucial economic incentive.[518] Furthermore, patent protection is seen as the main incentive for innovation in creations involving AI, promoting their interoperability.[519] The strength of the protection, particularly for creations involving software, also depends on the harmonization of the framework between countries.[520] It has been stated that without harmonization, genuine industrial property protection does not exist.[521]

Patents are country-specific,[522] and creations involving software can be circumvented or re-engineered in countries where patent protection is not granted.[523] Therefore, for such creations in particular, patentability of certain aspects of the innovative output must not be possible only in one country. The said is even more critical for creations involving AI that are deemed to be placed, for instance, in the EU market under the AI Act. Namely, since one of the founding principles of the EU is also the freedom of goods and services,[524] patent protection granted in the UK for the creation involving AI relying on ANN would not be binding in the EU. In this regard, either the ML model is not placed on the EU market, or there is a risk of reversion.

Hence, the situation where protection as such, for the creation involving AI relying on ANN, is only available in one country is more disruptive to technology development than non-eligibility for a patent. The only exception would be to significantly alter the patent framework by introducing exceptions for disclosure similar to inventions for defence purposes.[525] The approach is unlikely to be supported by the EPO as it would apply to all creations involving AI, except for

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[518] The World Intellectual Property Organization. AI Inventions Factsheet. WIPO Conversation, IP and Frontier Technologies, 2023, p. 2; *mutatis mutandis* Cuntz, A., Fink, C., Stamm, H. Artificial Intelligence and Intellectual Property: An Economic Perspective. Economic Research Working Paper No. 77/2024, p. 2.

[519] The European Parliament. Motion for a European Parliament Resolution on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), 2020.

[520] Hervey, M. The World Intellectual Property Organization. Webinar on WIPO Guide to Generative AI and Intellectual Property WIPO/WEBINAR/FT/24/1.

[521] Plasseraud, Y., Sauvignon, F. Genèse du droit unionist des brevets, Paris 1883. Paris: Litec 1983, p. 161.

[522] Haedicke, M. Introduction. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 54

[523] Penrose, T. (Ed). The Economics of the International Patent Systems. Baltimore: Johns Hopkins Press 1951, p. 138–139.

[524] Consolidated version of the Treaty on the Functioning of the European Union, OJ C 326, pp. 47–390, Articles 26(1), 29, 34, 36.

[525] Põld, L. Beyond Traditional Intellectual Property: The Necessity and Possibilities of Strengthening the Protection of Trade Secrets Through its Integration into the Modern Intellectual Property System. – International Comparative Jurisprudence, Vol. 9 Issue 1, 2023. – doi: http://dx.doi.org/10.13165/j.icj.2023.06.009 (03.05.2024), p. 133–135.

military purposes.[526] Namely, the non-disclosure would affect the core of the patent framework. It would require a substantial alteration of the regulations. If, for defence purposes, the primary aim for non-disclosure is security protection,[527] not all creations involving AI would fall under the said aim. Therefore, the purpose of the other creations involving AI would be commercial, similar to other inventions, which would not be sufficient to justify non-disclosure.

Thus, protection for creations involving AI has to fall under the IP framework and be harmonized to incentivize innovation effectively.[528] The development of AI is rapid.[529] In this regard, there is a risk that the creation will be mimicked, re-engineered or that an imitation will economically replace the protected invention. The respective obstacles, combined with the speed of development of AI and the lack of effective remedies against the circumvention of creations involving AI, substantiate the need for a patent shield.[530] However, the legal framework under the EPC, as outlined above, encounters various difficulties concerning the patentability of creations involving AI. Since the respective hardships are related to the core aspects of the EPC, it is unlikely that the EPO would support the amendments.

There is criticism of the over-protection of creations and patent monopolization, which creates an imbalance between patent holders (mainly large corporations) and others, as well as between countries (developed and developing) in terms of market segregation and competition.[531] Nonetheless, it is argued that patent protection promotes market economy and competition.[532] Thus, the observed controversial developments in the case law, which deviate from the previous interpretation of the notion of patentability of creations involving AI, signal that the existing patent social contract or patent bargain must be reconceptualized.

Considering the mentioned, introducing the harmonized *sui generis* certification IP regime for protecting creations involving AI is proposed. It has been approved that a separate protection regime for the respective creations would be the most effective in the long term.[533] Alternative approaches, without funda-

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[526] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 118, 120.

[527] *Ibid.*, p. 118, 120.

[528] Abbott, F. M. *et al*. International Intellectual Property in an Integrated World Economy. 2nd Ed., p.1, 5.; Haedicke, M. Introduction. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 6.

[529] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 6, 9.

[530] Haedicke, M. Introduction. Haedicke, M., Timmann, H. (Eds.). Patent Law: A Handbook on European and German Patent Law, p. 5.

[531] *Ibid*., p. 6.

[532] *Ibid*., p. 30.

[533] The World Intellectual Property Organization. Getting the Innovation Ecosystem Ready for AI: An IP Policy Toolkit, p. 31.

mental changes to the existing regime, would not guarantee uniform protection for all of the caveats that creations involving AI encounter regarding IP protection.

4.4. Certification

Amendments to the Legal Framework Fostering Competition

Innovations, especially in IT, are relatively incremental rather than intellectual leaps.[534] It is said that the publication and disclosure of inventions allow for obtaining knowledge and creating substitutes. In this respect, there is a view that the idea (utility) should remain open because it promotes competition.[535] The argument might be valid only towards society but not regarding the inventor. Although the inventor is rewarded with the patent, the rapid development of substitutes diminishes the competitive advantage that the patent holder has. The investment involved is considerably higher for the pioneer than for the subsequent one. Even the license serves to develop future and, possibly more advantageous, substitute or derivative innovations.[536] Nevertheless, a patent rather than trade secret protection serves to promote competition.[537]

There is an opinion that to foster competition, legislative amendments are necessary to allow the development of the same product utilizing a different, more efficient process.[538] The argument should be criticized because the patent aims to reward an inventor by not allowing others to use the patented invention freely.[539] In other words, to achieve analogous results by a different process towards the end product that directly competes with the patented invention. The same logic should be applied to not allowing the behaviour (functionality) of the invention to be patented. Namely, whether the product is obtained separately or by a particular process makes no difference. Non-similarities in the process may or may not distinguish the final product from others.

For example, environmentally friendly processes *per se* may not change the result if the raw materials are the same as those used in the patented invention. However, suppose biological materials and processes are used to make the product instead of synthetic materials and polluting processes. In this case, the result may be different depending on the market. If the results are objectively dissimilar, identical functionality will not be the decisive competitive factor. Instead, the two creations may be separate inventions. However, suppose that

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534 Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 23.

535 *Ibid*., p. 26.

536 *Ibid*., p. 26.

537 *Ibid*., p 27.

538 *Ibid*., p. 30.

539 Abbott, F. M. *et al*. International Intellectual Property in an Integrated World Economy. 2nd Ed., p. 131.

objective features do not distinguish the result. In this case, optimizing the creation process alone may not be sufficient to make the subsequent product different. Only using a different process with the same result could potentially infringe the patented invention. In this respect, the corresponding legislative amendments could not be supported.

Aspects of the Utility Model Protection

There is a criticism of the protection of creations using utility models. The main arguments are: 1) the tendency for inventions to become increasingly incremental, blurring the line between novelty and inventiveness; 2) the creation is either evident and inventive or not; there is no middle ground; 3) the term expressed in the Proposal for a Directive for the Utility Models[540] for protection of creations or six years with the possibility of extending it twice for a further two years, making a total of ten years, is sufficient to obtain adequate compensation for the investment; 4) the ineligibility for a patent does not limit the possibility of obtaining a utility model for the same creation; 5) utility models create unnecessary administrative burdens in addition to the cost of the patent and, ultimately, ambiguity regarding the application criteria and encourage protection for incremental creations.[541]

It should be noted that the opposition outlined above is mainly directed against the original Proposal for a Directive.[542] It can be agreed that this proposal contained an ambiguity with regard to the scope of protection afforded by the utility model. Namely, on the one hand, Article 3(1) of the initial Proposal for a Directive stipulated that the utility model could be granted for new inventions. On the other hand, Article 23(1) allowed the same invention to be the patent and utility model application subject simultaneously. Furthermore, Article 23(2) provided the discretion for the Member States not to grant simultaneous protection, which created even more confusion and moved away from the objective of harmonization. The Amended Proposal for a Directive[543] excluded the mentioned discretion and envisaged the validity of either the patent or the utility model protection. However, Articles 23(1) and 3(1) were not altered.

It can be argued that cumulative protection of the same subject matter by patent and utility model protection is excessive. Additionally, the initial Article 23 of the Proposal for a Directive was in conflict with the essence of novelty

[540] The European Commission. Proposal for a European Parliament and Council Directive approximating the legal arrangements for the protection of inventions by utility model, COM/97/0691 final – COD 97/0356, OJ C 36, p. 13.

[541] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 33–35.

[542] The European Commission. Proposal for a European Parliament and Council Directive approximating the legal arrangements for the protection of inventions by utility model.

[543] The European Commission. Amended proposal for a European Parliament and Council Directive approximating the legal arrangements for the protection of inventions by utility model, COM/99/0309 final – COD 97/0356, OJ C 248E, pp. 56–68.

stipulated within Article 54 of the EPC. Namely, it was considered that the priority provision contained in Articles 17 and 18 of the initial Proposal for a Directive allowed cumulative protection. However, Article 88(1) of the EPC allows claiming priority when filing a European Patent application over an earlier national patent, utility model or utility certificate. Nonetheless, the initial Proposal for a Directive intended to extend the scope in the opposite direction, allowing priority to be claimed when filing the utility model, irrespective of the previously filed or even granted patent, including under the EPC. Although the amended Article 23(2) of the Proposal for a Directive excluded obtaining a utility model for the same invention for which a patent was granted, it did not exclude simultaneous filing under both protection scopes. In this respect, either there is a priority between the patent and the utility model similar to that provided for in Article 88(1) of the EPC, or there can only be alternative protection. Namely, if the patent application is filed, the simultaneous filing of the utility model protection for the same subject matter should not be considered a novel invention.

In this regard, the Amended Proposal for a Directive intended to pave the approach of obtaining only utility model protection or for filing the national patent or the patent in the Member States of the EU and the utility model simultaneously in the respective countries, obtaining utility model protection and then moving on to patent protection. This interpretation and approach is also in line with the EPC when the patent is claimed under its scope.

The argument that utility model protection is obsolete because it facilitates merging the criteria of inventiveness and novelty cannot be supported. It is rightly pointed out that the roots of this tendency are to be found in the patent system, where it is also more evident.[544] Namely, for instance, the EPC does not require that the invention be invented in the classical meaning by consecutive hours of experimentation. Instead, the creation can be considered inventive even if it was discovered by sheer luck or without the ability to explain it.[545] The plausibility of an invention could also be substantiated by post-published evidence in cases of purported technical effect.[546] The fact that an invention has been discovered does not mean that it is not obvious to the person skilled in the art. Although the line between novelty and inventiveness may be narrow, both are relevant with the increasing development of modern technologies, including AI.[547] Only one of the criteria, as suggested, novelty,[548] would not distinguish evident creations.

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[544] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 33.

[545] Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process, p. 117–119, 121–122.

[546] EPO BA G 0002/21, *Reliance on a purported technical effect for inventive step (plausibility)*, Paragraphs 72–75, 77, 88–95.

[547] See, Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism or Creations Involving Artificial Intelligence, p. 143–144; EPO BA T 2803/18, Paragraph 4.2.

[548] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 33.

Moreover, every legal system has to adapt to the respective present-day requirements. Therefore, if technological developments make adapting the criteria for assessing inventions necessary, this will not render the whole system useless. Besides, as mentioned above, the patent system does not require that an invention be yielded by applying a particular approach as long as the invention is considered to be inventive (Article 52(1) EPC). It is, therefore, not decisive how a giant intellectual leap an invention presents. Thus, incremental creations as such do not disrupt the system if the framework has been designed without allowing the protection of the respective creations and *vice versa*. In this regard, if the legal framework is designed mainly for the protection of creations involving minor intellectual leaps or in isolation, it does not automatically mean that the evaluation criteria of such a system could and should be translated into regimes with higher standards. Therefore, it cannot be agreed that such a small system is inherently disruptive of other IP regimes. Although the criteria of the utility model and patent systems are similar, they are not identical. Just because there are some tendencies for utility models does not mean that these paradigms have a definite negative impact and that it would be transferred to other IP regimes.

Regarding the criticism of the "not very obvious"[549] criteria, it can be agreed that finding the ground between "obviousness" and "non-obviousness" could be challenging. For instance, Spain[550] applies the concept of reducing the knowledge of the person skilled in the art or the difficulty in identifying novel features in relation to the distance from normal progress.[551] In contrast, Germany has abolished obviousness criteria leaving only novelty.[552] However, the research in China, which has a considerable market size, demonstrates,[553] high-quality utility models, which represent the width and the depth of inventions have a significant impact on the growth of the national economy. Namely, high-quality utility models incentivize local entrepreneurs to develop incremental innovations that would otherwise have had to be imported. Consequently, the national economy benefits from the high-quality utility models. Correspondingly, the level of quality of utility models depends to a large extent on the substantive examination of a creation.[554] This statement applies to utility model-intensive countries, such

[549] The European Commission. Amended proposal for a European Parliament and Council Directive approximating the legal arrangements for the protection of inventions by utility model, Article 6(1).

[550] Ley N° 24/2015, de 24 de julio de 2015, de Patentes (modificada por la Ley N° 6/2018, de 3 de julio de 2018). – https://www.wipo.int/wipolex/en/legislation/details/16711 (27.07.2024), Artículo 140(1).

[551] Vega, L. Utility Models in Spain Part two. – https://abg-ip.com/prosecution-spanish-utility-models/ (27.07.2024).

[552] Gebrauchsmustergesetz 05.05.1936. – https://www.wipo.int/wipolex/en/legislation/details/21830 (01.08.2024), § 1(1).

[553] Ma, R. *et al*. The Impact of Utility Model Patent Quality on Export Performance in China: A Moderated Mediation Effect Model, p. 2–12.

[554] *Ibid*., p. 2–12.

as Germany,[555] to particularly capital-intensive industries, such as low and medium technology sectors,[556] for large companies in technology-intensive industries and creations with short lifecycle.[557]

Although the Amended Proposal for a Directive was not adopted due to the preference for the Community Patent,[558] the outcome *per se* does not mean that the utility model system is obsolete. On the contrary, research in China, which is also *mutatis mutandis* attributable to other utility model-intensive countries, suggests that high-quality utility models can be very beneficial for economic growth. Given that the areas in which utility models are considered effective include technology companies of different sizes, the conclusions drawn about economic benefits could also apply to creations involving AI. In this regard, novelty and inventiveness with standards similar to those of patents are required for high-quality utility models or substantive examination.

Aspects of the Proposed *Sui Generis* Certification Mechanism

For the protection of creations involving AI, particularly ML, entirely or in aspects where other fields of IP cannot be applicable, a *sui generis* certification approach is proposed.[559] Unlike utility models, certification is suggested as involving substantive examination similar to patents[560] to guarantee high-quality creations; hence, competitive advantage and maximize benefit to economy.

Certification protection is proposed for a shorter period than patent protection,[561] considering that the respective creations would be relatively incremental compared to inventions seeking patent protection. The respective creations, being relatively incremental and in technology-related fields, will likely have a shorter life cycle. Therefore, it can be assumed that shorter protection time will still

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[555] Ma, R. *et al*. The Impact of Utility Model Patent Quality on Export Performance in China: A Moderated Mediation Effect Model, p. 13; Heikkilä, J. T. S. Key performance indicators for utility model systems. – World Patent Information, Vol. 74 Issue 102222, 2023. – https://doi.org/10.1016/j.wpi.2023. 102222 (01.08.2024), p. 8.

[556] Ma, R. *et al*. The Impact of Utility Model Patent Quality on Export Performance in China: A Moderated Mediation Effect Model, p. 15.

[557] Radauer, A. *et al*. Study on the economic impact of the utility model legislation in selected Member States: Final Report, 2015. Luxembourg: Publications Office of the European Union, 2014. – doi: 10.2873/07203 (01.08.2024), p.132; Heikkilä, J., Lorenz, A. Need for Speed? Exploring the Relative Importance of Patents and Utility Models Among German Firms. – Economics of Innovation and New Technology, Vol. 27 Issue 1, 2018. – https://doi.org/10.1080/10438599.2017.1310794 (01.08.2024), p. 6, 28–29, 32.

[558] The European Commission. Utility Models. – https://single-market-economy.ec.europa.eu/industry/strategy/intellectual-property/patent-protection-eu/utility-models_en (20.07.2024).

[559] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 267–273.

[560] *Ibid*., p. 267–273.

[561] *Ibid*., p. 271–272.

provide an opportunity to gain adequate competitive benefit by not allowing the concentration of exclusive rights amongst a few enterprises and, simultaneously, not disrupting the market and other fields of industrial property protection.[562] In addition, the substantive examination of creations involving AI, using criteria analogous to patent examination, would also facilitate the assessment of infringement between creations.[563] Furthermore, the substantive examination of the respective creations would also relieve compatibility with the proposed Regulation, Establishing Framework Protection for Transparent Licensing of Standard Essential Patents.[564] The respective compatibility would be especially relevant if also the standard-essential utility models were included in the scope of the respective proposal[565] or in a separate document. Similarly, certification could be a part of the scope or addressed in a different framework.

Besides, unlike the Amended Proposal for a Directive,[566] the proposed certification[567] would not allow the same creation to be protected by both a patent and a certificate. The suggested *sui generis* regime[568] would not disrupt the patent and utility model systems. Moreover, a comprehensive examination of creations involving AI would not entail an administrative burden or ambiguity in the assessment standards, as has been criticized about utility models.[569]

Apart from registration,[570] certification could be expressed similarly to utility certificates.[571] The certificate will serve as an approval of the obtained rights.

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[562] See *mutatis mutandis* Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 35–36.

[563] *Ibid*., p. 35–36.

[564] Proposal for a regulation of the European Parliament and of the Council on standard essential patents and amending Regulation (EU) 2017/1001 COM/2023/232 final (27.04.2023). – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A232%3AFIN (01.08.2024).

[565] Contreras, J. L., Buggenhagen, M. Standards Essential Utility Models. University of Utah College of Law Research Paper No. 574. – Jurimetrics Vol. 64 Issue 1, 2023. – http://dx.doi.org/10.2139/ssrn.4567295 (01.08.2024), p. 33–34.

[566] The European Commission. Amended proposal for a European Parliament and Council Directive approximating the legal arrangements for the protection of inventions by utility model, Article 18(1).

[567] Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence, p. 150.

[568] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 35–36.

[569] *Ibid*., p. 32–35.

[570] See Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 146–150.

[571] The European Patent Office. Article 140: Utility models and utility certificates. – https://www.epo.org/en/legal/epc/2020/a140.html (01.09.2024).

The proposed certification[572] could preferably be rendered united not only with the system established under the AI Act[573] but also with other initiatives[574] to create a harmonized and centralized EU-wide mechanism. The certification could be mainly based either in one EU country or, for convenience, affiliated with various branches throughout the EU. A centralized system would allow multiple purposes: 1) not pose an additional administrative burden for entrepreneurs, alleviating compliance with various regulations;[575] 2) using already existing AI centres in the EU,[576] allocating resources to strengthening them; 3) combining the experts that are already linked with the current AI centres, allowing to exchange their experience, and obtain new knowledge by examining the creations involving AI. Additionally, universities could be involved, enabling the development of proficient experts who can combine their knowledge and improve it more rapidly. Thus, the currently underused potential of universities could be deployed, resulting in a robust, centralized AI ecosystem in the EU. The respective system would also be competitive globally.[577] Additionally, the centralized system would benefit the EU internal economy, allowing the deployment of creations involving AI and generated in the EU. As a result, the necessity to import foreign creations would be diminished.[578] Consequently, the approach could also attract investors to catalyze further AI development in the EU.

In this regard, the licensing under certification[579] could incorporate forced licenses, for instance, in cases, where a creation is funded or co-funded in the

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[572] See Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 146–150.

[573] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Article 29(2), 36(3), 36(8), 36(9), Section 5, particularly, Article 44, Article 53(3), Annex VII, Paragraphs 4.6.–4.7., 5.3., Annex VIII, Paragraphs 8, 9.

[574] The European Commission. The future of the European competitiveness. Part A: A competitiveness strategy for Europe, p. 26, 29–32; The European Commission. The future of the European competitiveness. Part B: In-depth analysis and recommendations, p. 79, 82–85 239, 254.

[575] The European Commission. The future of the European competitiveness. Part A: A competitiveness strategy for Europe, p. 26.

[576] *Ibid*., p. 30, 32; The European Commission. The future of the European competitiveness. Part B: In-depth analysis and recommendations, p. 79, 84–85.

[577] The European Commission. The future of the European competitiveness. Part A: A competitiveness strategy for Europe, p. 26, 29; The European Commission. The future of the European competitiveness. Part B: In-depth analysis and recommendations, p. 79, 84–85.

[578] The European Commission. The future of the European competitiveness. Part A: A competitiveness strategy for Europe, p. 26, 29–31.

[579] Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 148.

respective part by the EU funds as well as in cases with creations involving standard-important software.[580] The forced licenses could *mutatis mutandis* follow the approach incorporated under Article 31 of the Agreement on Trade-Related Aspects of Intellectual Property Rights.[581]

Thus, certification could alleviate the potential administrative burden in complying with license terms and standardization aspects. This is also important regarding in relation to compliance with various requirements under the AI Act[582] that engage IP aspects.

Considering the proposed scope of the certification, the suggested preliminary framework and the jurisdiction of incorporation,[583] the initiative might encounter difficulties in gaining international recognition. The respective support would be essential to initiate the adoption of the certification as an initiative of the European Commission at the EU level. Additionally, tension amongst various interests and opinions could also be encountered during the legislative process. Nonetheless, the respective difficulties go hand in hand with the democratic law-making process and are not necessarily specific to the proposal.

However, in the absence of support for the harmonized, EU-centralized approach, preferably aligned with the AI Act,[584] the proposed *sui generis* certification mechanism[585] could be pursued as a national initiative and, at least at the implementation level, unified with the requirements for AI in the EU. Nevertheless, the second approach could increase the administrative burden for creators, legislators and examiners.

Overall, creations involving AI provide an experience that differs from the existing view of economic value based on labour-intensive innovations. There is an opinion that the complex expressions of data produced by new technologies are a mechanization of mental labour.[586] It is a rationale that seemingly justifies a departure from the previous view of the necessary role of a human in the

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[580] Ghidini, G. Intellectual Property and Competition Law. The Innovation Nexus, p. 44.

[581] The World Trade Organization. Agreement on Trade-Related Aspects of Intellectual Property Rights (15.04.1994). – https://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm (02.10.2024).

[582] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), Recitals 48, 104–109, Article 25, Paragraph 5, Section 5, particularly, Article 40, Article 53, Paragraph 1, Clause (b), (c). Annex VII, Paragraph 4.5.

[583] See Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence, p. 146–150.

[584] *Ibid*., p. 147–148.

[585] *Ibid*., p. 146–150.

[586] Kazim, E. *et al*. Perspective On the sui generis value capture of new digital technologies: The case of AI. – Patterns, Vol. 3 Issue 7 No. 100526, 2022. – https://doi.org/10.1016/j.patter.2022.100526 (01.09.2024), p. 8, 11–12.

generation of a creation. Nonetheless, even the approach of the mechanization of mental labour requires taking steps. As the practice demonstrates, no *consensus* exists regarding the extent and form of the labour involved. However, aspects involving AI in generating a creation and recognising its role are triggered in several jurisdictions. Approaches to interpreting existing laws in light of specific creations involving AI demonstrate that a multifaceted approach is required to avoid potential hardships when applying systemic interpretation.

Patent protection is stated to be an essential protection mode for creations involving AI.[587] However, the analysis outlined in the thesis demonstrates that the protection of creations involving AI is country and IP regime-specific. The approach taken in different jurisdictions and the controversial interpretation of the core aspects of patentability concerning the protection of creations involving AI signal that there is no *consensus* on these issues. Different interpretations between jurisdictions and judges in the same country on the core aspects of patentability of creations involving AI pose a risk to the stability of technological development. Besides, the mentioned creations represent changing sectors that require constant adaptation to obtain a patent.

The existing patent system, without fundamental amendments, has many limitations in adapting to the rapidly changing aspects of creations involving AI. At the same time, other means of protection may not provide sufficient protection in all cases. The preliminary framework of the *sui generis* certification mechanism in the thesis could serve as a starting point for further discussion. The certification mechanism is proposed, preferably as an EU centralized mechanism, but could be used as a basis and applied in other jurisdictions to facilitate global harmonization.

The legal reality between jurisdictions demonstrates an increasing necessity for a uniform interpretation and protection of creations involving AI. Thus, the thesis confirms the hypothesis that the patent social contract regarding patent protection possibilities under the EPC for creations involving AI must be reconceptualized and incorporated with a *sui generis* mechanism.

The proposed certification mechanism would not disrupt the EPC or other industrial property regimes. Instead, it would provide appropriate protection for the rapidly changing creations involving AI. Certification could be considered an effective means of protection concerning the current state of development of creations involving AI, where it refers more to "AI-based" or "AI-assisted" creations. In addition, the framework could also provide protection upon reaching the level of "AI-generated" (autonomous). The detailed analysis of the protection aspects of "AI-generated" creations is a subject for further research.

[587] The European Parliament. Motion for a European Parliament Resolution on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), 2020.

CONCLUSIONS

1. It has not been convincingly demonstrated that creations involving AI should not be treated as "computer-implemented inventions" under the patent legal framework of the EPC, the UK, and potentially in other jurisdictions.

2. Aspects that differentiate AI from traditional programming pose challenges to interpreting the existing patent legal framework, for instance, of the EPC, in light of the respective technological developments. Creations involving AI cause tension to the mentioned regulation in aspects: a) fulfilment of the criteria of sufficient disclosure; b) inventor; c) patent-eligible invention regarding the exception from the patentability of "computer programs", "mathematical methods" and "non-technical" inventions as well as on the respective evaluation criteria; d) adaptability of the inventive step on exponentially sophisticated creations involving AI. The mentioned aspects lead to considering the general policy matters of the validity of the current patent bargain or patent social contract.

3. Regarding the "sufficient disclosure" requirement, creations involving AI might encounter hardships in comprehensively understanding the ML model, especially in its most sophisticated forms, to express it adequately. Additionally, difficulties might be encountered in determining the amount of information to be disclosed to fulfil the respective patentability criteria and, simultaneously, not lose the competitive advantage in the market.

4. Compliance with the "sufficient disclosure" requirement under the EPC could be reached by describing the architecture of the ML model, applied parameters, the internal working of the ML or the type of the ML model, the problem to be solved and the approach taken to reach the outcome, the training process, the training data, the type of input data and its source. For patent purposes, disclosing the underlying source code, object code, explicit algorithm, and all the data inserted in the ML model is unnecessary. If hardships are encountered disclosing certain aspects, an alternative is to demonstrate the reproducibility of the outcome of the ML model with a statistically frequent acceptance rate and rely on experts.

5. Perceiving an ML algorithm as not being a "computer program" because it has learned without human presence also raises the question of fulfilling the repeatability requirement. Namely, since ML algorithms learn and adapt to new data, the same data sets may not produce an analogous output. Currently, "sufficient disclosure" of an invention under the EPC also requires the ability to carry out the invention with a statistically frequent rate of success or reproducibility. In this regard, for ML algorithms that are not statically memorizing the trained aspects but dynamically continue to learn, it might be necessary to determine the permissible margin of deviation from the initial output to constitute "repeatability" or "sufficient disclosure".

6. The approach of depositing the ML algorithm, the training data, or both might not be a solution. Namely, the deficiency of incorporating deposit mechanisms similar to the case of microorganisms relies on the fact that Article 83 of the EPC requires a written description that cannot be substituted solely by the deposit. In the case of microorganisms, the deposit serves visual purposes, depicting distinction from others and complements the written description. Conversely, a deposit of the ML model would require a person skilled in the art to comprehend the creation and be able to repeat it. Without written guidance expressing the structure of the ML model and the inserted data, the respective task would not be manageable. Similarly, a deposit of the training data would not reveal sufficient information about the creation, especially in cases where the invention lies in the program and not in the data. Additionally, the deposit of the ML model, the training data, or both would negatively impact the potential competitive advantage of the developer and diminish the leading time in the market, forcing creators to opt for other modes of protection, such as trade secrets. In turn, trade secrets would not enable the enrichment of common knowledge.

7. Regarding inventorship, creations involving AI challenge one of the cornerstones of the patent legal framework under the EPC and in other jurisdictions. A few patent offices have attempted to interpret the patent legal framework in light of the specifics surrounding creations involving AI. Conclusions by the majority of the patent offices in the world demonstrate that the "first-come, first-served" principle prevails, which contradicts the Lockean Labour theory underlying the patent system, for instance, of the EPC. Nonetheless, the respective approach is deficient in the systemic interpretation towards creations generated by minors and substantiation for adults to usurp the outcome. *Mutatis mutandis*, even with exponentially sophisticated computations and calculations, is not guaranteed that a human would have initially consciously conceptualized an analogous outcome as yielded by AI.

8. The approach taken, for example, by the USA distinguishing the level of contribution by a human in generating a creation takes a step in another direction. Nevertheless, it still is not availing the recognition of AI in generating a creation. Other jurisdictions, including the EPC, do not follow the same logic. Non-recognition of the role of AI in the generation of a creation misrepresents the capability of a human and the level of scientific progress. Additionally, the viewpoint in the patent legal framework also creates ambiguity in the copyright field that, in many jurisdictions, recognizes computer-generated works and *vice versa*. Moreover, the approach forces developers to usurp unjustified labour, not disclose the contribution division behind the creation, or opt for other protection possibilities. In turn, the respective obstacle might negatively impact scientific progress.

9. Considering the perception by the EPC that acknowledges as an "inventor" only an individual and not even a legal person, it is hardly unlikely that the EPO would support any of the suggested solutions recognizing the role of AI in

generating a creation: a) a separate digital or electronic personhood for AI; b) mentioning the involvement of AI (the computer) represented by a human in a patent application in the section of an "inventor"; c) mentioning solely a legal person as an owner without filling information about the inventor in the patent application; d) designating as an owner a legal person; e) attributing legal personhood for AI analogous as in case of inanimate objects to acknowledge involvement of AI in generating creation without moral rights; f) legal personhood for AI analogous to the concept in Inheritance Law, for example, in the Republic of Latvia; g) recognizing the role of AI in generating output as a "contributor" or "co-contributor" in patent application.

10. Regarding the patentable invention, creations involving AI are constantly challenging the core of patentable invention. Namely, embodying a dual nature as a machine and a carrier of information puts the respective creations at the intersection of the patent, copyright and trade secret frameworks. Consequently, due to the mentioned specifics of creation involving AI, they might be too technical to avail copyright protection in the EU and lack the technicality to obtain patent protection, for example, under the EPC. For instance, creations involving AI might be otherwise "technical" but applied in a "non-technology" field be deprived of patentability under the EPC.

11. Furthermore, metaphorically, the ML model might be treated as a "computer" or a "machine" under the patent legal framework of the EPC, the UK and, potentially, also in other jurisdictions following the respective viewpoint that causes unsubstantiated conundrum. The ML model underlies computer programs or algorithms. In this regard, the ML model, after training and during execution, embodies a "computer program" or a "mathematical method" algorithm. Thus, the approach that the ML model is a "computer program" or "mathematical method" (algorithm) when expressed outside the "computer" has to be taken.

12. Weights and biases are only a part of the ML model. Hence, the ML model cannot be defined only by the respective features. The program and the data form the ML model. In other words, it can be stated that weights and biases constitute a separate "computer program" or "mathematical method" (algorithm) if stipulated outside the "computer". At the same time, weights and biases form a part of the ML model. Thus, the ML model is more than just weights and biases because other parameters and data also constitute it.

13. The ability of the ML model to learn aspects based on instructions provided by a human does not change the nature of the "computer program". Besides, applying the special patentability regime only to one type of ML algorithm due to the ability to learn without human presence is unjustified. Analogous should be attributed to all ML algorithms that can be trained using the same approach. Furthermore, the perception that the "computer program" exception is not applicable if the ML model has learned without human intervention should also be attributed to "mathematical method" exclusion. Namely, the only difference

is that a computer performs the respective steps. The perception that the "computer program" exclusion is not applicable because the ML algorithm learns itself is inconsistent with the human-centric approach underlying the EPC. In this regard, no amendments related to the perception of an ML algorithm as a "computer program" or "mathematical method" or treated as "computer-implemented inventions" appear necessary under the EPC at the current technological developmental level.

14. If the term "computer program" is deemed to be interpreted narrowly and applicable only to conventional computers and programs, another exception of the patent-eligible invention, for example, "ML model", "computational model", and similar comprising ML, could be implemented under the EPC. Moreover, if the concepts of "algorithm" and "mathematical method" are to be interpreted by limiting them to a certain level of abstraction, particularly in the case of ML algorithms, further amendments may be necessary.

15. The existing patent regime of the EPC does not avail sufficient protection for the behaviour (rationale of the building) of computer programs or algorithms apart from the claimed invention. The respective protection might also not be obtained by copyright framework. In other words, the current industrial property regime does not protect against cloning the functional value of the ML model, program or algorithm and applied in non-IP protected fields. Since present-day software is no longer intrinsically linked to concrete hardware, it entails the level of abstraction and alleviates application in various fields. The EPC grants protection only for the claimed "technical" invention. Nonetheless, the analogous functionality of, for instance, the ML model could be linked to the field of "technology" and "non-technical" area that, consequently, impacts the exclusive rights of the patent holder. Besides, since the invention requires sufficient disclosure, it gives a considerable advantage to competitors willing to use analogous functionality, for example, in "non-technical" fields. As a result, the patent might not provide an appropriate reward and inducement for developers compared to the involved efforts, thus forcing them to choose alternative protection modes. Nonetheless, the perception by the EPC might alter after creations involving AI reach a certain level of generalization and, as such, attribute the "technicality".

16. The case law of the EPO BA demonstrates that apart from the "functionality" (field of application) and "technical contribution" (problem-solution) approaches, the EPO has developed the third method for evaluating the technicality of the creation and its features – the "mathematical equation" method. According to the thinking, non-technicality could be added with technicality, resulting in a technical invention. The respective thinking surrounds self-opposition, allowing the result to alter the underlying starting product. Namely, no *consensus exists* on the reasoning behind generating a creation. The same creation might be yielded with various grounds, not only artistic but also technical. Only the expression does not, as such, reveal the respective rationale. Thus, computer-implemented inventions might involve technical considerations, even in coded form. Since

software is no longer intrinsically linked to hardware and has become more generalizable, determining the "technicality" should not have been linked to the expression.

17. Regarding the inventive step, creations involving AI pose challenges to the sustainability of the existing evaluation criteria towards the evolving sophistication of the ML models and the reliance on increasingly large amounts of data. As a result, either all data would have to be publicly available to make ML models equally capable, or secrecy between sources would have to be maintained to allow competition between development capabilities.

18. For the second approach, the evaluation would require: a) amendments to the EPC to implement an obligation to disclose ML models and their capabilities; b) consideration of the need to form a publicly available information system comprising all ML models and datasets and the prior art; c) setting the standard for the person skilled in the art about the capabilities that the ML model has to provide for evaluating patent claims and determining the prior art.

19. Additionally, prior art evaluation might require agreement on access to all available materials under the EPC. Furthermore, an agreement on evaluating the value of the ML output (raw data or information) would be required. A *consensus* would have to be reached on whether the evaluation is based on the already digested data in the ML model or the future potential (involving the same decision on raw data and conversion into information). Moreover, it would also require a common understanding of the activities that ML should be allowed to perform (only searching or determining relationships between sources) and how they should be perceived (only as raw information or the ML has updated itself as a result of the search).

20. Suggested solutions to encounter difficulties in evaluating obviousness (implementing inventive AI in place of the person skilled in the art) might require significant amendments in the EPC and encounter the risk of subjectivism. An alternative proposal ("obvious to try") would still require the person skilled in the art to provide an opinion and determine other aspects. Besides, the "obvious to try" standard can already be found in the EPC in the "problem-solution" or "would-could" approach. Furthermore, involving ML in evaluating the inventive step might pose barriers for developers that would not choose the ML application and involve risk for developers of ML not being able to predict future aspects.

21. The lack of unanimity on the core aspects of the patentability of creations involving AI hinders technological stability. The patent is deemed to be the main incentive for developing creations involving AI that the practice approves. However, the challenges that creations involving AI pose to the patent legal framework concern the fundamental aspects. Therefore, adjusting the respective regulation would require conceptual amendments that, as the history of the EPC and related aspects with the attempts by the EU demonstrates, might not be supported. Furthermore, the patent framework might lag with the agility to

address the specifics of creations involving AI and their rapid development pace. Analogous would also concern adjustments of the framework of the utility models accompanied by hardships of non-harmonization across countries.

22. Alternative protection opportunities, like trade secrets and contractual protection, might be observed. Nonetheless, both approaches reward limited protection conditioned by the necessity to maintain secrecy. The respective conditions might significantly impact the possibility of essential partnerships, especially in fields like AI, which must ensure compatibility with other products. As a result, the solution might not be a viable option for all entrepreneurs and would not add value to science and the economy by enriching the common general knowledge. Another option would be widening the scope of confidential evaluation under the EPC, which currently concerns inventions for defence purposes, to all creations involving AI, that might not be supported by the EPO. Hence, *a sui generis* mechanism for protecting creations involving AI is necessary.

23. The suggested *sui generis* certification mechanism builds upon the prior suggestions of a separate legal framework for protecting creations involving AI and the existing certification approaches in various fields, including IP (for example, utility certificates, supplementary protection certificates, certificate of patent grant) as well as other *sui generis* systems (protection for semi-conductors, utility models). A preliminary framework of the respective certification system is proposed as a starting point for further discussion. The suggestion concerns the scope of Member States of the EU as parties to the EPC. Nonetheless, the proposal could also be adopted in other jurisdictions.

24. The term "certificate" explicitly describes the proposed regime. Certification is suggested as another regime of industrial property and proposes acquiring patent-like rights along with the patent legal framework and utility models. Certification is aimed to complement the existing industrial property regimes mainly in aspects where creations involving AI encounter challenges or are chosen as the only means of protection. The certification does not foresee the protection of the same creation under various industrial property regimes. In this regard, the certification is proposed as the most efficient to be united with the regime implemented in the AI Act and Directive 2004/48/EC and forwarded as a proposal by the European Commission.

25. The proposed certification system foresees shorter protection terms than under the patent or utility model protection, considering the rapidly changing field of creations and addressing more incremental intellectual leaps. The proposed regime involves registration and issuing a document acknowledging the certification, similar to a utility certificate, to render a creation publicly available. The proposal also includes the differentiation of obtainable rights depending on the protection sought and the contribution of AI to the creation. The regime is proposed to involve evaluation criteria similar to those under the EPC but with a

differentiated level of stringency depending on the incremental nature of the creation. The proposal also involves the possibility of licensing.

26. The suggestion foresees the involvement of an inspective sandbox and expert opinions on sufficient disclosure. The respective mechanisms could engage the existing AI centres in the EU and experts in the field, including also from the universities. The approach would allow for collaboration, exchange of knowledge, and the development of proficient experts more rapidly. As a result, the involvement of existing experts and the use of creations involving AI and generated in the EU would benefit the EU internal economy and provide a competitive advantage globally. Consequently, the respective system would diminish the necessity to import foreign creations and could also attract investors to accelerate the further development of creations involving AI in the EU. Thus, the respective direction would facilitate building a centralized, harmonized, robust AI ecosystem in the EU.

27. Utility model protection also demonstrates a considerable economic, national, and international impact. Additionally, recognition of the role of AI in creation is stated to motivate developers along with patent protection. A s*ui generis certification* regime could provide a sustainable solution to address future developments of AI.

28. The legal and economic incentive supports that the patent social contract regarding patent protection possibilities under the EPC for creations involving AI must be reconceptualized and incorporated with a *sui generis* mechanism. The hypothesis of the thesis is therefore confirmed.

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ACKNOWLEDGEMENTS

Initially, I would like to express gratitude to my supervisors prof. Aleksei Kelli and prof. Martin Ebers for their invaluable expertise, support, encouragement, advice and patience throughout my PhD studies. Their comments regarding publications and the thesis provided a different perspective that has aided in improving the quality of the respective works. They also did not spare guidance regarding the steps to be taken and terms to follow, which has significantly helped me to manoeuvre through this journey.

Additionally, I am grateful not only to my supervisors but also to the academic personnel at the University of Tartu, who believed in me, allowed me to pursue my PhD studies as an international student, and provided their feedback on my research. I would like to express my profound sympathies to asoc. prof. Merike Ristikivi, prof. Irene Kull and prof. Marju Luts-Sootak for their continuous encouragement and support during my studies and for providing opportunities to present my research to a broader audience.

Furthermore, I would like to thank my family and friends for their continuous belief, patience, advice, and encouragement. Their unwavering support has been one of the cornerstones that has driven me since the beginning of my PhD studies. Their unique viewpoints have provided a different perspective on various research aspects and have had a meaningful impact on my dissertation.

Finally, I am grateful to the personnel of the Library of the Patent Office of the Republic of Latvia, the National Library of Latvia, the European Patent Office, and the Journal of the World Intellectual Property Review for helping me to find necessary research sources.

SUMMARY IN ESTONIAN

Tehisintellekti kaasav looming ja Euroopa patendikonventsioon: õiguslikud tagajärjed ja võimalikud lahendused

1. Ülevaade uurimisvaldkonna hetkeolukorrast ja uurimisprobleemi kohast selles

Õiguslik ülevaade

Euroopa patentide väljaandmise konventsioonis ehk Euroopa patendikonventsioonis (edaspidi "EPC") sätestatakse mitmesugused patentsuse nõuded, et looming kvalifitseeruks leiutiseks: a) olemas peab olema "leiutis" või "tehniline" looming, mis on patentne ja kuulub tehnika valdkonda; b) leiutis peab olema "tööstuslikult kasutatav"; c) leiutis peab olema "uudne"; d) leiutis peab hõlmama „leiutustaset" või see ei ole vastava ala asjatundja jaoks endastmõistetav võrreldes valdkonnas olemasolevate teadmistega; e) "leiutis" peab olema piisavalt kirjeldatud, et asjatundja saaks seda teostada ilma liigse katsetamiseta.

Lisaks sellele on Euroopa Komisjon seadnud Euroopa Liidu (edaspidi "EL") eesmärgiks jõuda tehisintellektil põhinevate uuenduste valdkonnas esirinda ning on seadnud prioriteediks piirkonnas tehisintellekti ökosüsteemi loomise. Selle eesmärgi saavutamise oluline verstapost oli Euroopa Parlamendi ja nõukogu 13. juuni 2024. aasta määruse (EL) 2024/1689 (millega nähakse ette tehisintellekti käsitlevad ühtlustatud õigusnormid ning muudetakse määruseid (EÜ) nr 300/2008, (EL) nr 167/2013, (EL) nr 168/2013, (EL) 2018/858, (EL) 2018/1139 ja (EL) 2019/2144 ning direktiive 2014/90/EL, (EL) 2016/797 ja (EL) 2020/1828 (tehisintellekti käsitlev määrus)) vastuvõtmine.

Euroopa Nõukogu järgis seda algatust ja võttis vastu tehisintellekti raamkonventsiooni. Konventsiooni eesmärk on tehnoloogia arengut rahvusvaheliselt kiirendada, tagades samal ajal põhiõiguste kaitse.

Pealegi on Euroopa Parlament sätestanud, et patendikaitse on oluline stiimul tehisintellekti hõlmavate uuenduste tegemiseks. Selle mõiste loomisel võeti arvesse tehisintellekti potentsiaali inimese heaolu suurendamisel ja tehisintellekti rakendusvõimalusi paljudes valdkondades. Tehisintellekti tähtsust on rõhutatud ka muudel foorumitel ja õigusruumides riiklikul, piirkondlikul ja ülemaailmsel tasandil.

Siiski on Maailma Intellektuaalse Omandi Organisatsioon, sarnaselt teiste kirjanduses esitatud algatustega, osutanud raskustele, mis tehisintellektipõhiste tulemuste puhul patentsusega seoses tekivad. Need reservatsioonid on seotud tehisintellekti spetsiifikaga, tavaliselt selle masinõppe (edaspidi "MÕ") alamvaldkonnas, mis keskendub arvutite iseõppimise võimaldamisele, kus arvutid tunnevad ära andmemustreid, loovad ja seletavad mudeleid ning teevad prognoose ilma eelnevalt programmeeritud mudelite ja reegliteta.

Tehisintellekti ja masinõppe eripära

On olemas mitmesuguseid masinõppemeetodeid – juhendatud, juhendamata, pooljuhendatud masinõpe, stiimulõpe ja aktiivne õpe. Iga vastav õpikäsitus hõlmab teatud määral inimese kohalolekut ja erinevaid õpiprotsesse. Lisaks sellele on olemas mitmeid masinõppemudeleid alates lihtsatest mudelitest, mis suudavad täita triviaalseid ülesandeid, nagu klasterdamine ja klassifitseerimine, kuni täiustatud vormideni, mis põhinevad mitmekihilisel arhitektuuril või neurovõrkudel. Konstruktsiooni sügavus võimaldab ennustada, et arvukad klassid õpivad tuvastama abstraktseid mõisteid, lõppkokkuvõttes mõisteid, mille täpsus väheneb minimaalselt ja mis hõlmavad põhiteavet. Lisaks võimaldavad neurovõrgud töödelda eri suurusega ja tüüpi andmekogumeid, ka heterogeenset laadi andmekogumeid, näiteks geneetilisi andmeid.

Masinõpe on traditsioonilisest programmeerimisest täiesti erinev. Tavapärase programmeerimise puhul kombineeritakse väljundi saamiseks andmed ja programm (algoritm). Masinõppe puhul aga itereerib alusalgoritm (matemaatiliselt või arvutiprogrammina) sisendandmeid ja moodustab koos väljundiga programmi või selle, mida tavaliselt nimetatakse tehisintellektisüsteemiks või tehisintellektimudeliks.

EPC koostati ajal, kui olemas oli tavapärane programmeerimine. Selles mõttes tuleb seda tõlgendada tehnoloogilise arengu, sealhulgas tehisintellekti, masinõppe ja tänapäeval ka suurte keelemudelite valguses. Aga siiski põhjustavad tehisintellekti eripärad probleeme EPC raamistiku tõlgendamisel mitte vaakumis, vaid praegust teaduse arengut arvestades.

Patentsuse raskused

Nimelt on nii, et 1) masinõppemudeleid, mis põhinevad täiustatud arhitektuuril või paljudel sisseehitatud kihtidel, mis väljundi loomiseks itereerivad sisendandmeid, võib olla raskesti mõista ja selgitada (nn musta kasti paradigma). Seega võib tehisintellekti kasutava loomingu puhul olla keeruline täita EPC artikli 83 kohast "olemuse piisava avamise" nõuet; 2) tehisintellekti üha suurem kasutamine loomingu tegemisel tekitab küsimuse tehisintellekti rolli tunnustamisest patenditaotlustes, et tagada tehnoloogiline stabiilsus. Euroopa Patendiameti apellatsioonikoda (edaspidi EPO BA) ja mitmed teised maailma jurisdiktsioonid on sätestanud, et vastava patendiraamistiku kohaselt saab leiutajaks olla ainult inimene; 3) Euroopa patendikonventsiooni artikliga 52 piiratakse patentseid leiutisi, jättes välja ka matemaatilised meetodid ja arvutiprogrammid. See väljajätmine ei ole seotud "tehniliste" arvutis rakendatavate leiutistega, mis väljenduvad "tehnilises" valdkonnas ja millel on "edasine tehniline mõju". Tehisintellekti kaasava loomingu puhul on tekitab raskusi asjaolu, et arvutis käitamisel põhineb see algoritmidel ehk arvutiprogrammidel. Seega võidakse tehisintellekti kaasavat loomingut pidada mittepatentseks, kui see ei ole tehnilist laadi; 4) tehisintellekti üha suurem kasutamine loomingu tegemisel võib lisaks nn musta kasti efektile tuua kaasa ka raskusi leiutustaseme saavutamisel ja hindamisel vastavalt EPC artiklile 56. Kõnealused reservatsioonid kujutavad endast ka kontseptuaalsemaid

probleeme üldiste poliitiliste küsimuste osas või selles osas, kas EPC aluseks olev praegune patendialane ühiskondlik leping on nende takistuste lahendamiseks piisav. Euroopa Patendiamet kasutab sõnastust "ühiskondlik patendialane leping", et kirjeldada patendikaitse aluseks olevat kokkulepet või loogikat – leiutise avalikustamine, mis rikastab üldisi teadmisi vastutasuks lõpetatud ainuõiguste eest.

Doktoritöö põhineb artiklitel ning tugineb viiele originaalväljaandele, milles käsitletakse tehisintellekti kaasava loomingu patentsusega seotud probleeme.

Mõisted

Võttes arvesse eri mõisteid, mida kirjanduses rakendatakse tehisintellekti (edaspidi „TI") kasutamise kirjeldamiseks väljundi loomisel, järgitakse käesolevas doktoritöös Euroopa Patendiameti (European Patent Office, edaspidi „EPO") kasutatavat kirjeldust. Nimelt on valitud termin "tehisintellekti kaasav looming", mis põhineb sõnastusel "tehisintellekti kaasavad leiutised", mida Euroopa Patendiamet kasutab arvutis rakendatavate leiutiste kirjeldamiseks.

Doktoritöös kasutatakse tehisintellekti rakendamise või tehisintellekti abil soovitud tulemuse loomise kirjeldamiseks mõistet "tehisintellekti kaasav looming". Tehisintellekti "kaasamist" olemasolevas tehnoloogilises arengus mõistetakse kui vahendit, mida inimesed rakendavad. Tulevikus võib seda mõistet aga tõlgendada ka nii, et see hõlmab tehisintellekti poolt iseseisvalt loodud loomingut, mis piisava arengutaseme saavutamisel on tohutu potentsiaaliga.

Lisaks hõlmab sõna "looming" tehisintellekti rakendamise või hõlmamise abil saadud väljundit. See mõiste on valitud eesmärgiga eristada seda teistes raamistikes kasutatavatest mõistetest, eriti seoses hästi tuntud mõistetega, nagu "teos" autoriõiguse raamistikus ja "leiutis" patentide raamistikus. Eraldi mõiste kasutamine ei ole lihtsalt eelistuste küsimus, vaid vajadus, sest sellega tagatakse selge ja ühemõtteline suhtlus valdkonnas, kus täpsus on ülimalt tähtis.

Veelgi enam, erinev mõiste võimaldab teha ettepaneku esialgse *sui generis* sertifitseerimismehhanismi kohta, ilma et seda ajataks segamini teistes õigusraamistikes kasutatavate mõistetega. Lisaks võimaldab ühtne mõiste tõlgendada raamistikku tulevase tehnoloogilise arengu valguses, eriti kui jõutakse üldtehisintellekti tasemele. Samas võib teisi kirjanduses kasutatud mõisteid, nagu *mutatis mutandis*, käsitada sünonüümidena. Näiteks "tehisintellektipõhine", "tehisintellektitoega", "tehisintellekti genereeritud" (nii iseseisvalt kui ka abiga) ja "tehisintellektiga seotud". Loomingu konkreetsete aspektide täpsustamiseks võiks analoogidena käsitada mõisteid "tehisintellekti abiga" (inimese osalusel), "tehisintellekti loodud" (inimese osaluseta), "tehisintellekti abil loodud väljundid" ja "tehisintellekti loodud väljundid".

Võttes arvesse, et "tehisintellekti" kohta puudub ühtne määratlus, tuginetakse doktoritöös Euroopa Patendiameti tõlgendusele, milles kirjeldatakse tehisintellekti kui arvutite ja masinate võimet täita inimestega seostatavaid vaimseid ülesandeid, nagu õppimine, mõtlemine ja probleemide lahendamine. See kirjeldus on kooskõlas ELis kohaldatava tõlgendusega "tehisintellektisüsteemide" kohta (masinpõhine süsteem, mis on projekteeritud töötama autonoomsuse eri

tasemetel ning mis võib pärast juurutamist olla kohanemisvõimeline ja mis saadud sisendist otseste või kaudsete eesmärkide saavutamiseks järeldab, kuidas genereerida väljundeid, näiteks prognoose, sisu, soovitusi või otsuseid, mis võivad mõjutada füüsilist või virtuaalset keskkonda).

2. Uurimisprobleem, teadustöö eesmärk, uurimisküsimused

Väitekirja uurimisprobleem on see, kas olemasolevat EPC raamistikku saab tõlgendada nii, et see võimaldaks lahendada tehisintellekti kaasava loomingu patentsuse probleeme. **Teadustöö eesmärk on** selgitada need takistused välja ja pakkuda neile võimalikke lahendusi, hõlbustades sel viisil EPC-st tulenevate patentsusnõuete täitmist.

Uurimisprobleemi vaatlemine on oluline, et määrata kindlaks EPC kohaselt tehisintellekti kaasava loomingu patentsuse õiguslik tegelikkus, tagada tehniline stabiilsus, hõlbustada ühtlustatud ja tsentraliseeritud patendisüsteemi loomist ning kiirendada kogu ELi katva tehisintellekti ökosüsteemi loomist. Uurimisprobleemiga tegelemata ei oleks võimalik saada selgust ka üldistes poliitilistes küsimustes, mis puudutavad olemasoleva EPC kohaldamisala piisavust tehisintellekti kaasava loomingu kaitsmisel. Uurimisprobleemi arvesse võttes on võimalik selgitada välja kõige tõhusam lähenemisviis, kuidas ületada EPC kohaselt tehisintellekti kaasava loominguga seotud takistused.

Iga kirjeldatud reservatsiooniga kaasneb uurimisprobleemi ja -eesmärgi käsitlemine. Sellele vaatamata ei põhjusta kõik nimetatud probleemid analoogseid pingeid EPC-le vastavuse asjus. Näiteks tekib EPC artiklist 83 tuleneva "olemuse piisava avamise" kriteeriumi täitmisel võrreldes muude patentsuse aspektide täitmisega kõige vähem raskusi. Ülejäänud takistused on võrdsed.

Pealegi võivad teatud aspektid praegu tunduda vähemtähtsad. Kuid tehisintellekti kiire arengutempo sunnib meid kaaluma edaspidi tekkida võivaid takistusi. See nimetatud aspekt puudutab leiutustaseme hindamist. Lisaks võivad muud reservatsioonid muutuda pakilisemaks, kui üldistamisvõime osas saavutatakse üldtehisintellektile lähedasem tase. Teisisõnu võivad tehisintellekti rolli tunnustamine, loomingu olemuse piisava avamise võimalus ja EPC kohaselt patentse leiutisega seotud "tehniliste valdkondade" määratluse loogika pingeid isegi suurendada.

Seega illustreerib kirjeldatud küsimuste kogum Euroopa patendiõiguse tõlgendamise ja tehisintellekti kaasava loomingu kaitse tagamise teostatavust. Nimelt, arvestades, et patentsusnõuded on kumulatiivsed ehk need kõik peavad olema täidetud, ei võimaldaks mõne nõude eiramine kaitset saada. Lisaks tuleb EPC-d tõlgendada süsteemselt. Järelikult on patentsuse aspektide tõlgendamine omavahel seotud. Seega nõutakse jätkusuutliku, tervikliku ja sisemiselt ühtlustatud patendiraamistikuga, mida saab tõlgendada tulevaste tehnoloogiliste arengute valguses, et kõiki kirjeldatud küsimusi käsitletaks vaakumis ja tervikuna. Kumulatiivse lähenemisviisiga saavutatakse uurimiseesmärk – tuvastada kõige teostatavam lähenemine, et ületada kirjeldatud raskused seoses tehisintellekti kaasava loomingu vastavusega EPC-le.

Seega on uurimisprobleemi vaatlemine seotud erinevate selliste uurimisküsimuste käsitlemisega, mis võimaldavad meil saavutada teadustöö eesmärki ja leida sobivaim lähenemisviis. Arvestades, et "olemuse piisava avamise" aspekt on kõige vähem ebaselge, tuleb esialgu vaadelda esitatud kriteeriume. Järgmised aspektid seoses "leiutaja" ja "patentsuse" nõuetega on praegu sarnase prioriteediga. Viimane kriteerium on "leiutustase", mis hõlmab enamaid eelseisvaid takistusi. Seega saab nimetatud aspekti pidada esmatähtsaks.

Kuid pidades silmas tulevast teaduslikku arengut ja EPC tõlgendamise teostatavust, oleksid kõik muud nõuded peale "olemuse piisava avamise" nõude sarnase tähtsusega. Kuid ilma poliitilise toetuseta "leiutaja" ja "patentsuse" takistuste lahendamisel muutub kõige olulisemaks aspektiks 'leiutustaseme" kriteeriumide saavutamine ja hindamine.

Selle tulemusena oleks õigusliku ja tehnoloogilise stabiilsuse saavutamine ning tehisintellekti kaasava loomingu tegemise innovatsiooni ja laiendamise edendamine teostatavam, kui kõiki nimetatud küsimusi käsitletaks võrdselt. Osakaupa käsitlemine võib suurendada õiguslikku läbipaistmatust ja põhjustada tehnoloogilist seisakut. Nii võib see teine suund suurendada seadusandjate ja loojate halduskoormust, kui EPC kohast patentsuse aspektide tõlgendamist korduvalt läbi vaadatakse.

Uurimisküsimused on rühmitatud valdkondade kaupa ning vastavalt praegusele tasemele ja probleemi ebaselgusele. Sellegipoolest peavad EPC alusel patendi andmiseks olema täidetud kõik patentsuse aspektid. Seega pakutakse välja, et vastavatel uurimisküsimustel on sarnane tähtsus järeldamisel, kas EPC tõlgendamise abil saaks ületada allpool loetletud probleeme, mis tehisintellekti kaasava loomingu puhul tekivad EPC-st tulenevate nõuete täitmisel ja teadustöö eesmärgi saavutamisel.

1) Kas tehisintellekti kaasav looming saab täita EPC artikli 83 kohast "olemuse piisava avamise" nõuet? Kõnealune uurimisküsimus võimaldaks teha järeldusi selle kohta, kas EPC praeguse artikli 83 nõudeid saaks tõlgendada viisil, millega tagatakse tehisintellekti kaasava loomingu puhul selgus nõuetele vastavuse ja kaitse piiride suhtes. Peale selle võimaldab EPC kohaldamisala vaatlemine määrata kindlaks võimalikud lähenemisviisid, kuidas lahendada nõuetele vastavuse probleeme ja saavutada teadustöö eesmärk. See tähendab, et seonduvad nišid, mida tuleb selgitada, hõlmavad vastamist, kas: a) leiutise kohta on võimalik esitada teavet, eriti süvaõppe puhul koos neurovõrkudega või nn musta kasti efekti tõttu?; b) kas algoritmi, treenimisandmete või mõlema deponeerimise nõude rakendamine „olemuse piisava avamise" kriteeriumide täitmiseks on tõhus?; c) kas avamise kriteeriumid on läbipaistvuse ja selgitatavuse poolest tõhusad mitte ainult seoses leiutise struktuuri, vaid ka funktsionaalsusega?

2) Kas matemaatilised meetodid ja arvutusalgoritmid on EPC alusel alaliselt patendikaitsest välja jäetud?

Selle uurimisküsimusega selgitatakse väljajätmise piire ja seost EPC kohase tehisintellekti kaasava loominguga. Uurimisküsimusega tegelemine võimaldab määrata kindlaks ka EPC piirid ja tõenäolised lahendused kirjeldatud takistuste ületamiseks, mis võimaldavad saavutada ka teadustöö eesmärki. Siinjuures tuleb

analüüsida omavahel seotud aspekte, mis sisaldavad vastust küsimusele, kas: a) masinõppemudeleid tuleb käsitleda kui "arvutit" või "masinat" ja kas need vastavad EPC-s sätestatud "tehnilisuse" nõudele?; b) kaalud ja kallutatus moodustavad "arvutiprogrammi" ja kujutavad endast masinõppemudelit?; c) siis, kui masinõppemudel on õppinud ilma inimese osaluseta, on tegemist "arvutiprogrammi" või "matemaatilise meetodi" välistamisega?; d) EPC pakub tehisintellekti kaasavale loomingule "tehniliste valdkondade" ja "tehnilisuse" nõuete puhul piisavat kaitset?; e) EPC nõuete mittetäitmisel võivad teised olemasolevad tööstusomandi kaitse korrad pakkuda tehisintellekti kaasavale loomingule tõhusat kaitset?

3) Kas olemasolevad "inimtekkelise" leiutise kriteeriumid on võimalik omistada kõigile tehisintellekti kaasavatele loometöödele?

Otsustes J 0008/20 *(Designation of inventor/DABUS*) ja J 0009/20 (*Designation of inventor/DABUS II*) otsustas EPO BA, et praeguse EPC kohaselt saab leiutajaks olla ainult inimene. Vastav tõlgendus võimaldab vaadelda, kas tehisintellekti rolli tunnustamine loomingu tegemisel oleks kooskõlas EPC loogikaga. Uurimisküsimusele vastamine võimaldab vaadelda EPC tõlgendamise piire ja teostatavaid lahendusi, et ületada tehisintellekti kaasava loomingu puhul takistused ja saavutada teadustöö eesmärk. Sellega seonduv nišš, mida tuleb käsitleda, hõlmab analüüsimist, kas on võimalik teha vahet inimese ja tehisintellekti leiutisel ning isegi koosleiutamisel inimese ja tehisintellekti vastastikuste seoste tulemusena, mis võimaldaks tunnustada mitte ainult inimese, vaid ka tehisintellekti rolli loomingus ja omandiõigustes?

4) Kas olemasolev leiutustaseme hindamise meetod on piisav, et uurida tehisintellekti hõlmavate eksponentsiaalselt keerukate loometööde endastmõistetavust?

Uurimisküsimus võimaldab selgitada välja, kas EPC tõlgendamisega saab lahendada eelseisvaid probleeme, mis tehisintellekti kaasava loomingu puhul võivad EPC kohase leiutustaseme nõude saavutamise ja hindamisega seoses tekkida. Samuti võimaldab uurimisküsimus selgitada välja takistuse ületamiseks vajalikud tõlgendusekohandused ja muud võimalikud lahendused, mis samal ajal aitab saavutada teadustöö eesmärki. Sellega seoses tuleb analüüsida, milliseid täiendavaid suuniseid tuleks tehisintellekti kaasava loomingu patentsuse käsitlemiseks välja anda või kas selleks tuleks kriteeriume muuta.

5) Kas on vaja "sõlmida" uus ühiskondlik patendialane leping tehisintellekti kaasava loomingu patendikaitse kohta?

Nagu eespool kirjeldatud, tuleb neid kriteeriume vaadelda mitte ainult vaakumis, vaid ka selleks, et kirjeldada EPC võimaliku tõlgendusruumi terviklikku õiguslikku tegelikkust, et konventsioonile vastaks ka tehisintellekti kaasav looming. Seega saab uurimisküsimusele vastata ainult kõiki takistusi analüüsides. Teisisõnu võimaldab uurimisküsimus kindlaks teha, kas EPC-d saab tõlgendada nende raskuste valguses, mis kaasnevad tehisintellekti kaasava loominguga. Lisaks sellele võimaldab EPC piirangute kindlaksmääramine iga nimetatud uurimisküsimuse puhul hinnata ka võimalikke lähenemisviise väljaselgitatud takistuste ületamiseks. Võimalike lahenduste hulgas on ka hinnang selle kohta, kas:

a) muud olemasolevad tööstusomandi kaitse korrad saaksid pakkuda piisavat kaitset tehisintellekti kaasavale loomingule?; b) muud kui tööstusomandi kaitse valdkonna mehhanismid saavad pakkuda piisavat kaitset? Tulemusena võimaldab hindamine saavutada teadustöö eesmärgi ja käsitleda väitekirja hüpoteesi.

3. Väitekirja hüpotees

Väitekirja hüpotees on, et ühiskondlik patendialane leping, mis käsitleb EPC kohaseid patendikaitse võimalusi tehisintellekti kaasava loomingu puhul, tuleb ümber mõtestada ja lisada sellesse *sui generis* mehhanism.

Väitekirja hüpotees põhineb järgmistel eeldustel: 1) EPC kehtiv kohaldamisala on selle tõlgendamisel puudulik, arvestades praeguseid takistusi tehisintellekti kaasavate leiutiste patentsusnõuete täitmisel; 2) tehisintellekti kaasava loomingu eripära arvestamine kaitse saamiseks nõuaks EPC põhjalikku muutmist, mida ei pruugita toetada; 3) muud tööstusomandi raamistikus ja väljaspool seda olemasolevad vahendid ei pruugi kõikidel juhtudel terviklikku kaitset pakkuda; 4) *sui generis* mehhanism pakuks ühtlustatud, eelistatavalt ELi patendi sarnast kaitset, mis eksisteeriks paralleelselt teiste tööstusomandi kaitse kordadega, oleks ulatuse, hindamiskriteeriumide ja -perioodi ning kaitse kestuse poolest tehisintellekti kaasavale loomingule spetsiifiline, tekitamata täiendavat halduskoormust loojatele ja hindajatele, oleks tulevaste tehnoloogiliste arengute suhtes paindlik, ei kattuks teiste tööstusomandi kaitse kordadega, kuid võimaldaks neid kasutada koos algse loogika ja muude aspektidega; 5) *sui generis* mehhanism, eelistatavalt ELis tsentraliseeritud ja ühtlustatud, sõltub rahvusvahelisest tunnustamisest, mille puhul võib ette tulla õigusloomeprotsessi juhtivate huvide pingeid.

4. Metoodika ja allikad

Väitekirjas käsitletakse uurimuse põhiväidete põhjendamiseks traditsioonilisi õiguslikke meetodeid, sealhulgas analüütilist, võrdlevat, ajaloolist ja mudelipõhist meetodit. Analüüsis vaadeldakse esmaseid ja teiseseid õigusallikaid, et hinnata seaduse õiguslikku tähendust, kohaldatavust ja selle aluseks olevaid põhimõtteid. Esmased allikad hõlmavad nii riikide kirjalikke seadusi kui ka rahvusvaheliste konventsioonide tekste, suuniseid ja soovitusi, mille on vastu võtnud intellektuaalomandi organisatsioonid, ametid ja väitekirja teemaga seotud institutsioonid. Väitekiri sisaldab EPC, seda ettevalmistavate dokumentide ja Euroopa Patendiameti (EPO) selgitavate suuniste analüüsi, milles tõlgendatakse patentsuse eri aspekte, eelkõige seoses tehisintellekti kaasava loominguga, nagu näiteks tehisintellekti ja masinõppe suunised ning muud sarnased.

Allikate valimisel peeti silmas tehisintellekti kaasava loomingu puhul kirjeldatud patentsuse probleemide kohta tehtud analüüsi. Läbi vaadati kirjandus, peamiselt monograafiad, milles analüüsitakse EPC patentsuse kriteeriume, samuti ettevalmistavad dokumendid, et saada ülevaade iga patentsuse aspekti sisust, mille täitmisel on tehisintellekti kaasava loomingu puhul takistusi. Lisaks analüüsiti EPO ja EPO BA peamist kohtupraktikat, millega määratakse kindlaks

Euroopa patendikonventsiooni vastavate patentsuse aspektide tõlgendamine, eelkõige arvutiga teostatud leiutiste valdkonnas.

Lisaks analüüsiti vastavate ettepanekute mõistmiseks allikaid, milles kesken-dutakse tehisintellekti kaasava loomingu puhul *sui generis* mehhanismile. Neile tuginedes pakutakse väitekirjas välja esialgne sertifitseerimismehhanism.

Võttes arvesse EPC ja ELi omavahelist seotust, analüüsitakse ka nende intel-lektuaalomandi ja tehisintellekti käsitlevaid õigusraamistikke, sealhulgas näiteks tehisintellekti käsitlevat määrust ja muid õigusakte. Võrreldakse ka teistes juris-diktsioonides, näiteks Saksamaal, Ühendkuningriigis, USAs, Lõuna-Aafrikas, Uus-Meremaal, Ukrainas ja Austraalias rakendatavat lähenemisviisi.

Ühendkuningriigi õigusraamistikku analüüsiti põhjusel, et see on EPC-st erinev. Lisaks sellele on Ühendkuningriigi hiljutises vastuolulises kohtupraktikas välja toodud ainulaadne arusaam tehisintellektist, tehisintellekti kaasavast loo-mingust ja patentse objekti tõlgendamisest. Lisaks analüüsiti ja võrreldi Ühend-kuningriigi õigusraamistikus ka patendiraamistikku ja autoriõiguse kaitset, kuna neis esineb ebajärjepidevus tehisintellekti rolli tunnustamisel loomingu tege-misel. Sarnane paradigma on vastavates valdkondades olemas ka USAs, Uus-Meremaal ja Ukrainas.

Analüüs ja võrdlus USAga tehti samuti seetõttu, et USA patendisüsteem erineb EPC-st. Lisaks sellele on Ameerika Ühendriikide Patendi- ja Kauba-märgiamet välja andnud juhised, milles tutvustatakse uudset üldist vaatenurka selle kohta, kui suur peab olema inimese panus, et teda saaks pidada leiutajaks. Seega analüüsitakse USA arusaama vaakumis ja koos EPC kohase tõlgendusega, et teha järeldus, kas see suund võiks lahendada takistusi, millega tehisintellekti kaasav looming patentsuse valdkonnas kokku puutub.

Saksamaa, Austraalia ja Lõuna-Aafrika õigusraamistikke analüüsiti ja võr-reldi EPC-ga, sest neist igal riigil on ainulaadne lähenemine tehisintellekti rolli tunnustamisele loomingu tegemisel.

5. Väitekirja ülesehitus

Väitekiri põhineb järgmistel publikatsioonidel, milles käsitletakse tehisintellekti kaasava loomingu patentsuse takistusi:

1) Selgitatavus – Rudzite, L. Algorithmic explainability and the sufficient dis-closure requirement under the European Patent Convention. *Juridica Inter-national*, nr 31, 2022. – https://doi.org/10.12697/JI.2022.31.09, lk 125–135;

Rudzite, L., Kelli, A. The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives. *New Legal Reality: Challenges and Perspectives.* II. The 8th International Scientific Conference of the Faculty of Law of the University of Latvia 21–22 October 2021. Riga: University of Latvia Press, 2022. Collection of Research Papers, 2021. – https://doi.org/10.22364/iscflul.8.2.27, lk 400–408. Prof A. Kelli abistas töö kavandi läbivaatamisel;

2) Leiutise autorsus – Rudzite, L. Certification as a Remedy for Recognition of the Role of AI in the Inventive Process. *International Comparative Jurisprudence*, kd 8 nr 1, 2022. – http://dx.doi.org/10.13165/j.icj.2022.06.009, lk 112–128;

3) leiutustase – Rudzite, L. Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence. *International Comparative Jurisprudence*, kd 9 nr 1, 2023. – http://dx.doi.org/10.13165/j.icj.2023.06.010, lk 139–154;

4) Patentne leiutis – Rudzite-Celmina, L. Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence. *Masaryk University Journal of Law and Technology*, kd 17 nr 2, 2023. – https://doi.org/10.5817/MUJLT2023-2-4, lk 249–279.

Igas publikatsioonis käsitletakse ka osa üldisi poliitilisi probleeme. Selles mõttes on need kõik võrdselt olulised. Sissejuhatavas peatükis tuginetakse nimetatud artiklitele ning analüüsitakse nendes vaadeldud teemasid nii eraldi kui ka tervikuna. Sissejuhatavas peatükis arutatakse eri jurisdiktsioonide lähenemisi tehisintellekti loomingu patentsuse aspektidest. Lisaks tugineb sissejuhatav peatükk ka nimetatud artiklites esitatud analüüsile, milles käsitletakse alternatiivsete kaitsemeetodite tõhusust. Sissejuhatavas peatükis toetutakse artiklites soovitatud esialgsele sertifitseerimismehhanismile ja arendatakse seda edasi.

6. Väitekirja ulatus ja edasised uurimisvaldkonnad

Väitekirja käsitlusala hõlmab Euroopa patendikonventsiooni. Arvestades et kõik ELi liikmesriigid on EPC osalised, saab doktoritöö käsitlusalaks pidada ka kõiki ELi liikmesriike. Siiski võib uurimistööd *mutatis mutandis* kasutada arutelude lähtepunktina ka teistes jurisdiktsioonides.

Uurimistöös keskendutakse patendiküsimustele, kuid puudutatakse ka muid teemasid, nagu autoriõigus, ärisaladused, lepinguline kaitse, andmekaitse ja konkurentsiaspektid. Neid perspektiive võiks edasi uurida. Lisaks võiks edasine uurimistöö keskenduda eri andmetüüpidele ja patentsusele, näiteks geneetilistele andmetele ja biotehnoloogiale.

Lisaks sellele käsitletakse töös mõningaid intellektuaalomandiõiguse valdkonnas üha olulisemaks muutuva tehisintellekti käsitleva määruse aspekte. Siiski on potentsiaali edasiseks analüüsiks, eelkõige litsentsimise ja standardimise valdkonnas, mis on eriti asjakohased standardi rakendamiseks oluliste patentidega seotud juhtudel.

Lisaks sellele on üldtehisintellekti arengu võimalik mõju patentsusele teema, mis vajab edasist uurimist. Vastavad aspektid, sealhulgas leiutaja roll, leiutustase, patentne leiutis, piisav avalikustamine, litsentsimine ja rikkumist takistavad asjaolud võivad kõik olla oluliselt mõjutatud. *Sui generis* sertifitseerimismehhanismi sobivus nende võimalike takistuste kõrvaldamiseks on samuti teema, mida võiks olla kasulik täiendavalt analüüsida.

7. Järeldused

Väitekiri on struktureeritud, käsitledes kõiki eespool kirjeldatud probleemseid aspekte Euroopa patendikonventsiooni kohase patentsuse puhul: 1) selgitatavus; 2) objekti patentsus; 3) leiutise autorsus; 4) leiutustase; 5) üldised poliitikaküsimused. Kõik aspektid, välja arvatud viimane, vastavad nende puhul viidatud väljaannetele. Nendes väljaannetes käsitletakse üldisi poliitikaküsimusi ja neid kajastatakse *sui generis* sertifitseerimismehhanismi analüüsis. Väitekirja sissejuhatuses vaadeldakse üldiste poliitikaküsimuste täiendavat perspektiivi.

Esimesed neli eelnevalt kirjeldatud aspekti sisaldavad sarnast hierarhiat, millele osutati uurimisprobleemi puhul. Iga patentsuse aspekti vaadeldakse enne nende koos analüüsimist eraldi, et mõista üldiste poliitikaküsimuste loogikat. Uurimistulemused on esitatud kronoloogiliselt, lähtudes vastava artikli avaldamise kuupäevast, et säilitada selge ja järkjärguline areng.

Selgitatavus

Artiklites "The interaction between algorithmic transparency and legality: Personal data protection and patent law perspectives" ja "Algorithmic explainability and the sufficient disclosure requirement under the European Patent Convention" vaadeldakse kõnealuseid aspekte. Tehakse järeldus, et pakutud algoritmi, treenimisandmete või mõlema deponeerimismehhanisme ei peeta piisavaks. Nimelt võib tehisintellekti kaasaval loomingul olla raskusi selgitatavusega. Pealegi võib tekkida raskusi avalikustatava teabe hulga kindlaksmääramisel, et täita EPC kohaseid „olemuse piisava avamise" kriteeriume.

Vastavate kriteeriumide täitmise võiks saavutada masinõppemudeli struktuuri, selle elementide, sisemise korrelatsiooni, õppe tüübi, sisendandmete ja allika kirjeldamisega. Alusalgoritmi ja kõiki masinõppemudelisse sisestatud andmeid ei ole vaja sõnaselgelt avalikustada. Teine võimalus on tõendada masinõppemudeli väljundi korratavust statistiliselt sagedase vastavusemäära ja ekspertide arvamuste esitamise abil.

Selles kontekstis on oluline märkida, et algoritmi või treenimisandmete või mõlema deponeerimismehhanism ei asenda kirjalikku avalikustamisnõuet. Seega võidakse kõnealusel deponeerimisel hoopis avalikustada mittekohustuslikku teavet ja anda konkurentidele ebaproportsionaalne eelis.

Leiutise autorsus

Artiklis "Certification as a Remedy for Recognition of the Role of AI in the Inventive Process" käsitletakse seda, kui õiguspärane on pidada kõigil juhtudel leiutajaks inimest. Järeldatakse, et tehisintellekti rolli tunnustamine on oluline, saamaks selgust inimvõimekuse ja teaduse arengu osas ning õigustamaks Euroopa EPC aluseks olevat ühiskondlikku patendialast lepingut. Nimelt peetakse selle all silmas ainuõiguse andmist avalikustatud töötulemuse eest. Kui tehisintellekti rolli väljundi loomisel patendialases õigusraamistikus ei tähtsustata, tekitab see läbipaistmatust ka autoriõiguse valdkonnas, kus mitmes juris-

diktsioonis tunnustatakse arvutiga loodud teoseid. Lisaks sellele võib tehisintellekti rolli mittetunnustamine takistada stiimulit innovatsiooniks või sundida valima muid kaitsevõimalusi, mis omakorda võib teaduse arengut negatiivselt mõjutada.

Ükski järgnevalt pakutud lahendustest, kuidas saaks tehisintellekti rolli tunnustamise lisada EPC-sse, ei ole teostatav, sest see nõuaks EPC muutmist, mida tõenäoliselt ei toetata: a) tehisintellekti käsitamine eraldi digitaalse või elektroonilise isikuna; b) inimese poolt esindatava tehisintellekti (arvuti) osaluse märkimine patenditaotluse jaotises "leiutaja"; c) ainult juriidilise isiku nimetamine omanikuna, ilma et patenditaotluses oleks esitatud teavet leiutaja kohta; d) juriidilise isiku nimetamine loomingu omanikuks; e) tehisintellektile juriidilise isiku staatuse andmine nagu elutute esemete puhul, et tunnustada tehisintellekti osalust loomingu loomisel ilma moraalsete õigusteta; f) tehisintellektile juriidilise isiku staatuse andmine sarnaselt näiteks Läti Vabariigi pärimisseaduse kontseptsiooniga; g) tehisintellekti rolli tunnustamine patenditaotluses tulemuse loomisel "panustajana" või "kaaspanustajana". Lisaks sellele ei võimaldaks USA alternatiivne lähenemisviis, millega nõutakse inimese märkimisväärset panust, et teda saaks pidada leiutajaks, ikkagi tunnustada tehisintellekti väljundi loomisel.

Leiutustase

Artiklis "Implications for the Inventive Step Under the European Patent Convention Related to the Increasing Application of Artificial Intelligence and Certification as a Sui Generis Protection Mechanism for Creations Involving Artificial Intelligence" käsitletakse EPC kohaste praeguste leiutustaseme hindamiskriteeriumide tõhusust tehisintellekti kaasava loomingu eripärasid arvestades. Järeldatakse, et tehnika taseme, ala asjatundja ja hindamismetoodika määratlemine võib nõuda EPC kohandamist. Nimelt oleks vaja rakendada järgmist: a) masinõppemudelite ja nende võimete avalikustamise kohustus; b) avalikult saadaolev infosüsteem, mis hõlmab kõiki masinõppemudeleid, andmekogumeid ja tehnika taset; c) ala asjatundja standard seoses võimetega, mis masinõppemudelil peavad olema, et hinnata patendinõudlusi ja määrata kindlaks tehnika tase. Pealegi võivad vastavad kohandused sisaldada subjektiivsuseriski.

Teise võimalusena tuleks kõik andmed teha avalikult kättesaadavaks, mis võimaldaks masinõppemudelitel muutuda võrdselt võimekaks. Ettepanek "endastmõistetav, et järele proovida" (kindlaksmääramine, kas looming tunduks endastmõistetav inimesele, kes on selle proovimiseks asjatundlik) eeldab siiski, et see asjatundja peab teostama hindamise ja selgitama välja muud aspektid. Pealegi võib standard "endastmõistetav, et järele proovida" olla EPC-s juba olemas kui lähenemisviis "probleem-lahendus" või "võiks-saaks". Lisaks sellele võib masinõppe kaasamine leiutustaseme kindlaksmääramisse tekitada olulisi takistusi arendajatele, kes ei valiks masinõppe rakendust, ning põhjustada masinõppe arendajatele riski, et nad ei suuda prognoosida tulevasi aspekte ega edasist arengut. Neid probleeme tuleks patendiõigusesse tehisintellekti lisamisel hoolikalt kaaluda ja käsitleda.

Lisaks sellele võib olla vaja sõlmida EPC alusel kokkulepe masinõppe väljundi (toorandmed või -teave) väärtuse ja selle hindamisprotsessi kohta. Veel võib olla vaja ühtset arusaamist ja konsensust, kas leiutustaseme hindamine põhineb masinõppemudelisse juba sisestatud andmetel või selle tulevikupotentsiaalil, mis eeldab samuti konsensust väljundi väärtuse asjus – ainult toorandmed või -teave. Peale selle võib olla vaja *konsensust* masinõppemudeli poolt teostatavate lubatud tegevuste (ainult teabe otsimine või allikatevaheliste seoste kindlaksmääramine) ja nende tajumise suhtes (ainult kui toorandmed või kui masinõppemudel on end otsingu tulemusena ajakohastanud). Selline ühine arusaam ja konsensus on tehisintellekti ajastu patendiõiguse tuleviku kujundamisel oluline.

Patentne objekt

Artiklis "Patent-Eligible Invention Requirement Under the European Patent Convention and its Implications on Creations Involving Artificial Intelligence" käsitletakse "tehnilisuse" nõude, "arvutiprogrammi" ja "matemaatilise" meetodi välistamise aspekte ning mõju tehisintellekti kaasavale loomingule. Järeldatakse, et tehisintellekti kaasav looming ei pruugi Euroopa patendiõiguse ja autoriõiguse alusel olla kaitstud, kui see ei ole vastavalt kas piisavalt tehniline või on liiga tehniline. Pealegi võivad tehisintellekti kaasavad teosed olla muidu "tehnilised", kuid neid kohaldatakse "mittetehnoloogilises" valdkonnas, mis võib need EPC alusel mittepatenditavaks muuta. Ja kuna EPC nõuab leiutise olemuse piisavat avamist, annab see märkimisväärse eelise konkurentidele, kes soovivad analoogset funktsiooni kasutada näiteks "mittetehnilistes" valdkondades. Sellisel juhul ei paku EPC praegune patendikord väidetava leiutise kõrval piisavat kaitset arvutiprogrammide või algoritmide käitumisele (struktuuri loogikale) ega funktsionaalsele väärtusele. Kõnealust kaitset ei pruugita saada ka autoriõiguse raames.

Seega ei kaitse olemasolev tööstusomandi kaitse kord masinõppemudeli, programmi ega algoritmi funktsionaalse väärtuse kloonimise eest ning seda kohaldatakse intellektuaalomandi õiguste kaitse alla mittekuuluvates valdkondades kõigil juhtudel. Tänapäeva tarkvara ei ole enam seotud konkreetse riistvaraga; seega tähendab see abstraktsiooni ja hõlbustab rakendamist eri valdkondades. Selle tulemusena ei pruugi patent pakkuda arendajatele asjakohast tasu ja stiimulit võrreldes sellesse panustatud jõupingutustega, mistõttu on nad sunnitud valima muid kaitsevõimalusi. EPC asjaolud võivad aga muutuda pärast seda, kui tehisintellekti kaasav looming saavutab teatava üldistusastme ja muutub *per se* "tehniliseks".

Lisaks järeldatakse, et ühe riigi kohtute ja kohtunike vahel puudub *üksmeel* mõistete „arvutiprogramm", "matemaatiline meetod" ning nende seoste kohta masinõppe ja inimese osalusega. Konsensuse puudumine võib avaldada negatiivset mõju tehnoloogilisele stabiilsusele, mistõttu on lahenduse leidmine eriti pakiline. Lisaks sellele tuleb iga muudatust ühe patentsusekriteeriumi tõlgendamises analüüsida ka teiste kriteeriumide valguses, et vältida õiguslikku läbi-

paistmatust. Pealegi võib see paradigma avaldada negatiivset mõju tehnoloogilisele stabiilsusele ja sundida valima alternatiivseid kaitsevõimalusi.

Masinõppemudelid põhinevad "algoritmidel" või "arvutiprogrammidel", kui neid täidetakse arvutis, sõltumata mudeli loomisel rakendatud õppimistehnikast ja masinõppemudeli tüübist. Võib väita, et kaalud ja kallutatused kujutavad endast eraldi "arvutiprogrammi" või "matemaatilist meetodit" (algoritmi), kui need on ette nähtud kasutamiseks väljaspool "arvutit". Samal ajal moodustavad masinõppemudeli osa kaalud ja kallutatused.

Lisaks on EPO peale "funktsionaalsuse" (rakendusvaldkond) ja "tehnilise panuse" (probleemilahendus) lähenemisviisidele välja töötanud kolmanda lähenemisviisi loomingu ja selle tunnuste tehnilisuse hindamiseks – "matemaatilise võrrandi" meetodi. See rõhutab vajadust terviklikuma lähenemisviisi järele tehnilisuse hindamisel, tuues esile selle küsimuse tähtsuse. Seega võib mittetehnilisus käia koos tehnilisusega, mille tulemuseks on tehniline leiutis. Sellegipoolest võimaldab praegune seis tulemusel muuta aluseks olevat algtoodet, mis on iseenesest vastuoluline. Nimelt puudub *kokkulepe* loomingu tegemise loogika kohta. Sama looming võib olla tehtud eri põhjustel, nii kunstilistel kui ka tehnilistel. Seega ei avalda ainult loomingu väljendus iseenesest selle tekkimise loogikat. Siinjuures võivad arvutiga teostatud leiutised hõlmata tehnilisi kaalutlusi, ka koodina. Kuna tarkvara ei ole enam lahutamatult seotud riistvaraga ja muutub üldisemaks, ei peaks "tehnilisuse" kindlakstegemine olema seotud loomingu kujutamisega.

Üldised poliitikaküsimused ja sui generis *sertifitseerimismehhanism*

Nende raskuste analüüs, millega tehisintellekti kaasav looming EPC kohase patentsuse puhul kokku puutub, kinnitab väitekirja hüpoteesi, et ühiskondlik patendialane leping on vaja ümber mõtestada, et selles käsitletaks tehisintellekti kaasava loomingu patendikaitse võimalusi EPC alusel, ja kehtestada *sui generis* mehhanism. Lisaks sellele kajastub kõnealune vajadus mitte ainult õiguslikes, vaid ka majanduslikes kaalutlustes.

Teised viisid, nagu ärisaladused ja lepinguline kaitse, pakuvad piiratud raamistikku, mille tingimuseks on konfidentsiaalsuse säilitamise vajadus. Vastavad tingimused võivad märkimisväärselt mõjutada oluliste partnerluste teostatavust – eriti sellistes valdkondades nagu masinõpe ja tehisintellekt –, mis peavad tagama ühilduvuse teiste toodetega. Seega ei pruugi vastavad vahendid kõigil juhtudel pakkuda piisavat kaitset ja hõlbustada tehnoloogilist arengut.

Tehisintellekti rolli tunnustamine loomingu tegemisel, patendikaitse andmine vastavatele uuendustele "mittetehnilistes" valdkondades ning tegelemine takistustega, mida tehisintellekti kasvav keerukus võib leiutustaseme hindamisel tekitada, võib nõuda EPC kontseptuaalset muutmist. Seega on lisaks EPC põhimõttelistele kohandustele, mida EPO ei pruugi toetada, vaja üle vaadata ka olemasolev ühiskondlik patendialane leping. Teisisõnu on vaja ümber mõtestada tasakaal, mis valitseb leiutajale ainuõiguse andmisel leiutise avalikustamise eest. Tuleb arvestada, et on vaja tunnustada tehisintellekti rolli loomingu loomises, mis

nimetatud tehingut mõjutab. Nimelt osaleb selles vähem tööjõudu; seega peaks ka ainuõiguse andmine olema lühem. Lisaks tuleks kohandada ka muid kaitseaspekte.

Seetõttu tehakse ettepanek vabatahtliku *sui generis* sertifitseerimismehhanismi loomiseks, et aidata kaasa eespool kirjeldatud raskuste lahendamisele. Mõiste "sertifikaat" on valitud kavandatava korra sõnaselgeks kirjeldamiseks. Sertifitseerimine tugineb olemasolevatele ettepanekutele eraldi õigusliku raamistiku loomiseks tehisintellekti kaasava loomingu kaitseks, sertifitseerimise ja sertifikaatide praegusele tunnustamisele erinevates valdkondades, sealhulgas intellektuaalomandi valdkonnas (näiteks kasulikkuse tunnistused, täiendava kaitse tunnistused, patendi andmise tunnistus), samuti muudele *sui generis* süsteemidele (pooljuhtide, kasulike mudelite kaitse). Edasiste arutelude lähtepunktina pakutakse välja kõnealuse sertifitseerimissüsteemi esialgne raamistik.

Ettepanek puudutab EPC liikmesriikide kui ELi osaliste kohaldamisala. Sertifitseerimisega ei nähta ette ühe ja sama loometöö kaitset mitme tööstusomandi kaitse korra alusel. Seega tehakse ettepanek sertifitseerimise kui kogu ELi hõlmava mehhanismi kohta, mille saaks potentsiaalselt ja kõige tõhusamalt koondada tehisintellekti käsitleva määruses ja direktiivis 2004/48/EÜ sätestatud lähenemisviisiga ning mille kohta on Euroopa Komisjon esitanud ettepaneku. Sertifitseerimine on kavandatud täiendava või eraldiseisva mehhanismina paralleelselt olemasolevate tööstusomandi kaitse kordadega, et pakkuda kasuliku mudeli sarnast patendilaadset kaitset tehisintellekti kaasavale loomingule. See lähenemisviis ei nõuaks EPC muutmist ega sunniks arendajaid valima alternatiivseid kaitseviise, mis seetõttu võiksid takistada teaduse arengut. Selle asemel teavitaks sertifitseerimine ühiskonda tehisintellekti ja inimeste tegelikest võimetest ning tunnustaks tehisintellekti rolli.

Kavandatava süsteemiga nähakse ette lühemad kaitsetähtajad kui patendi või kasuliku mudeli kaitse puhul, võttes arvesse kiiresti muutuvat loomingu-valdkonda ja progressiivseid intellektuaalseid hüppeid. Soovitatud kord hõlmab registreerimist ja sertifitseerimist kinnitava dokumendi väljastamist, mis sarnaneb kasuliku mudeli tunnistusega, et muuta looming avalikult kättesaadavaks. Lisaks hõlmab ettepanek omandatavate õiguste diferentseerimist, sõltuvalt taotletavast kaitsest ja tehisintellekti panusest loomingu tegemisel. Soovitatavalt peaks see kord hõlmama sarnaseid hindamiskriteeriume, nagu EPC-s on sätestatud, kuid teistsuguse rangusastmega, mis oleneks loomingu progressiivsest laadist. Selgitatavusega seotud reservatsioonide ületamiseks soovitatakse sertifitseerimisel kasutada nn katsetuskeskkonna vahendit ja eksperte, kes võiksid konfidentsiaalselt teha vajaliku kontrolli loomingu kohta avalikustatava teabe hulga kohta. Ettepanekuga nähakse ette ka litsentsimise võimalus. Soovitatud lähenemisviisi saaks kohandada ka tulevaste tehnoloogiliste arengute suhtes, sealhulgas juhul, kui saavutatakse üldtehisintellekti tase.

PUBLICATIONS

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CERCS RESEARCH FIELD: S124 Patents, copyrights, trademarks

ETIS RESEARCH FIELD: 2. Culture and Society; 2.7. Law;
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ETIS RESEARCH FIELD: 2. Culture and Society; 2.7. Law;
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ETIS RESEARCH FIELD: 2. Culture and Society; 2.7. Law;
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Academic degrees

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DISSERTATIONES IURIDICAE UNIVERSITATIS TARTUENSIS

1. **Херберт Линдмяэ**. Управление проведением судебных экспертиз и его эффективность в уголовном судопроизводстве. Тарту, 1991.
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45. **Kai Kullerkupp**. Vallasomandi üleandmine. Õigusdogmaatiline raamistik ja kujundusvõimalused. Tartu, 2013, 398 lk.

46. **Iko Nõmm**. Käibekohustuse rikkumisel põhinev deliktiõiguslik vastutus. Tartu, 2013, 212 lk.
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50. **Elise Vasamäe**. Autoriõiguste ja autoriõigusega kaasnevate õiguste jätkusuutlik kollektiivne teostamine. Tartu, 2014, 308 lk.
51. **Marko Kairjak**. Keerukuse redutseerimine Eesti õiguses karistusseadustiku § 217^2 objektiivse koosseisu relatiivsete õigusmõistete sisustamise näitel. Tartu, 2015, 179 lk.
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56. **Mait Laaring**. Eesti korrakaitseõigus ohuennetusõigusena. Tartu, 2015, 267 lk.
57. **Priit Kama**. Valduse ja kohtuliku registri kande publitsiteet Eesti eraõiguses. Tartu, 2016, 194 lk.
58. **Kristel Degener**. Abikaasade vara juurdekasvu tasaarvestuse varasuhe. Tartu, 2016, 242 lk.
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