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Safeguarding a Human-centric Patent System: The Case of the Inventive Step Test

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Abstract

In recent years, the impact of artificial intelligence (AI) on patentability criteria has garnered significant attention in both academic and legal spheres, sparking proposals ranging from upgrades to patent criteria to major posthumanist reforms. However, a crucial gap remains in understanding how AI tools specifically affect the inventive step test and the disclosure requirements when viewed through the lens of the patent bargain theory in both modern and postmodern contexts. This gap largely stems from the prevalence of economic narratives surrounding the patent system and the perceived efficiency of AI tools. This paper addresses this oversight by adopting a normative doctrinal approach that aligns the technical analysis of AI's impact with a human-centric strategy for patent policy. Focusing on the disclosure requirement and the inventive step test, the paper highlights the need to reassess the patent system's structure and policy directions in light of the increasingly sophisticated AI tools used in the inventive process. The analysis reveals that AI tools influence definitions of prior art, the concept of a skilled person, and her general knowledge, highlighting the need to revisit the disclosure requirement. The paper argues that posthumanist solutions are neither proportionate nor appropriate, proposing a revised definition of 'progress instead' to reshape broader patent policy.

Keywords: patents, AI, inventive step, obviousness, disclosure, human-centric

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1. Introduction

Patents operate under an 'incentive-centred paradigm' to incentivise innovation in a *quid pro quo* system,[1] drawing on a modernist view of incremental progress and the notion of scientific supremacy. Indeed, the patent system is designed to protect inventions that are commonly the product of incremental research and development (R&D) activities. Consequently, innovation was often associated with science and linear progress.[2] However, the nature of innovation has evolved significantly over the past half-century as patent law has adapted to the rapid expansion of technological advancements across multiple domains, particularly following postmodernism's shift towards technological supremacy in the 1980s.[3] The patent law structure is designed to fulfil an equitable *quid pro quo*, which ensures that it meets public-good considerations while providing an incentive for follow-on innovation. This includes not only offering rewards to inventors, but also ensuring that society benefits from technological and product improvements.[4]

The patent system inherently suffers from structural inefficiencies. As an intellectual property right (IPR), a patent is a protected monopoly, meaning competition law has no role in the *ex ante* structure. This places significant emphasis on ensuring that the system functions effectively as a self-regulatory framework capable of addressing potential abuses of patent monopolies. In other words, it is crucial for the system to be efficient and strike a balance between competing interest groups through its design and enforcement mechanisms. Additionally, the system is burdened with patent thickets and patent trolling practices that exploit legal loopholes across different intellectual property offices. These practices, enabled by flaws in the patentability criteria thresholds, can stifle competition and unduly extend the monopolies and revenue streams of right-holders.[5] Such abusive practices, enabled by law through the system's design, can block competition and expand the right holder's monopoly and revenue streams.[6] Despite these issues, courts and lawmakers

[1] David Vaver, 'Intellectual Property: Still a "Bargain"?' (2012) 34 *EIPR* 579; contains an inventory of sources for the view that patents are a *quid pro quo*.
[2] Paul Forman, 'The Primacy of Science in Modernity, of Technology in Postmodernity, and of Ideology in the History of Technology' (2007) 23(1), *History and Technology* 1, 13–16.
[3] Ibid.
[4] Matthias Lamping and others, 'Revisiting the Framework for Compulsory Licensing of Patents in the European Union', *Max Planck Institute for Innovation & Competition Research Paper* No 23-07.
[5] This is a reported issue, particularly in the field of pharmaceuticals; see, for example, IMAK, *Overpatented, Overpriced Curbing patent abuse: Tackling the root of the drug pricing crisis* (2022) <www.i-mak.org/wp-content/uploads/2023/01/Overpatented-Overpriced-2023-01-24.pdf> accessed 6 September 2024.
[6] Ibid.

frequently default to incremental reforms rather than addressing the underlying structural problems that perpetuate inefficiencies in the system.[7]

Beyond these inherent inefficiencies, the rise of AI further complicates the traditional framework, challenging not only the procedural aspects of patent law but also its philosophical foundations, which extend beyond the question of AI inventorship. I will not address here the broader issues of patent eligibility for AI-assisted inventions or AI inventorship. Instead, it focuses on the impact of AI-assisted innovation on patentability criteria, particularly the disclosure requirements and the inventive step test, including the definition of the person skilled in the art (PSITA). This investigation proves significant when considering that the patent system is based on a human-centric view of the inventive process. This assumption is now being rigorously questioned in light of the increasing role of AI in R&D. The broader narrative of technological and AI advancement heavily influenced the contemporary academic discourse, serving as a lens to examine the implications of collaborative AI–human partnerships in the inventive processes,[8] within the context of the Fourth Industrial Revolution (4IR).[9] This reflects a broader transformation in how technology is conceptualised as a synonym for progress, which is assumed to be the subject of reward as implemented in the inventive step test.

As machine learning (ML) systems become more sophisticated, their role in the inventive process raises questions about the relevance of existing patent criteria and the human-centric nature of it. For example, some commentators assert that granting patents to AI-assisted inventions, even in cases where AI is named as the inventor, may incentivise innovation more efficiently.[10] Other proposals included upgrading the PSITA doctrine, suggesting that AI could replace this hypothetical skilled person, and proposing a machine skilled in the art (MSITA) as a more suitable standard.[11] The MSITA concept proposes using AI as the benchmark for assessing inventive step and obviousness, replacing the human-centred PSITA standard, which can be classified as a posthumanist reform.[12] While the traditional 'lone inventor' concept is rightfully

[7] Simone A Rose, 'The Supreme Court and Patents: Moving Toward a Postmodern Vision of "Progress"' (2013) 23(4) *Fordham Intellectual Property, Media and Entertainment Law Journal* 1204.

[8] George Fragiadakis and others, 'Evaluating Human-AI Collaboration: A Review and Methodological Framework' (arXiv.org, 2024) <www.arxiv.org/abs/2407.19098> accessed 24 August 2024.

[9] Mario Benassi and others, 'Patenting in 4IR Technologies and Firm Performance' (2021) 31 *Industrial and Corporate Change* 112; Iqbal H Sarker and others, 'Cybersecurity Data Science: An Overview from a Machine Learning Perspective' (2020) 7(1) *Journal of Big Data* 1.

[10] Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57(3) *Boston Collage Law Review* 1079.

[11] Ryan Abbott, 'The Machine Having Ordinary Skill in the Art' in Anselm Kamperman Sanders and Anke Moerland (eds), *Intellectual Property as a Complex Adaptive System* (Edward Elgar Publishing 2021); Daniele Fabris, 'From the PHOSITA to the MOSITA: Will "Secondary Considerations" Save Pharmaceutical Patents from AI?' (2020) 51 *IIC* 685.

[12] Ibid.

being reevaluated,[13] I argue that preserving a human-centred perspective remains a cornerstone of patent law, as it underpins the social contract inherent in the patent system's *quid pro quo*. This is not to deny that ML possesses distinct capabilities that enhance inventive processes. In fact, ML has demonstrated remarkable proficiency in identifying patterns within vast datasets, facilitating breakthroughs in multiple fields.[14] However, as AI-driven innovation overlaps with the human-centric patent framework, it is crucial to assess critically whether existing patent doctrines adequately address these complexities.

In response to these complexities, intellectual property offices in different jurisdictions initiated several consultations to address the challenges emerging from the integration of AI in inventive processes and patenting practices.[15] While these discussions primarily focus on procedural changes in patent examination guidelines, they overlook a significant underlying issue related to the philosophy that shapes the system's rationale. This creates a divergence from the contemporary postmodern era, which serves as a socioeconomic movement that challenges modernist narratives and fosters a contextual understanding of narratives and concepts, such as the current 4IR innovation influenced by automation and data-driven approaches.[16] Thus, a thorough reassessment of patentability criteria, as an implementation of such underlying socioeconomic context, is essential to promote and highlight a human-centric understanding of innovation and progress.

In this context, this paper investigates the impact of AI on the inventive step test and analyses the legal and philosophical implications of AI's involvement in the inventive process. Adopting a normative methodology, this study integrates doctrinal legal analysis with critical frameworks grounded in socioeconomic and legal theories of innovation, including postmodernism and posthumanism. These frameworks serve as central lenses, as the foundations of patent law have evolved throughout various historical and socioeconomic contexts, frequently reflecting prevailing narratives of innovation.[17] Indeed, the widely accepted economic justification for patents as a tool for promoting research investment and technological progress,[18] which is rooted in a

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[13] Mark Lemley, 'The Myth of the Sole Inventor' (2012) 110 *Michigan Law Review* 709.

[14] Maurice Schellekens, 'Artificial Intelligence and the Reimagination of Inventive Step' (2021) 13 *Journal of Intellectual Property, Information Technology and Electronic Commerce Law* <www.jipitec.eu/archive/issues/jipitec-13-2-2022/5537> accessed 21 March 2024.

[15] See, for example, Alia Kahwaji, 'Response to the USPTO 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', 29 July 2024 <https://www.regulations.gov/comment/PTO-P-2023-0044-0046>.

[16] Mario Benassi and others, 'Patenting in 4IR Technologies and Firm Performance' (2021) 31 *Industrial and Corporate Change* 112.

[17] Uma Suthersanen, 'Towards a More Human, Equitable, and Inclusive IP World Order?' (2024) 73(120) *GRUR International.*

[18] See generally Catherine Rhodes*, Patent Politics: Life Forms, Markets, and the Public Interest in the US and Europe* (2018) 37(4) New Genetics and Society 437; Jason Rantanen, 'Peripheral Disclosure' (2012) 74(1) *University of Pittsburgh Law Review* 16; Fritz Machlup, 'An Economic Review of the Patent System' (US Senate Judiciary Committee Report, 1958).

modernist paradigm, equates innovation with scientific and industrial advancement, albeit overlooking broader socioeconomic dimensions. [19] To counter this, postmodernism challenges assumptions of linear progress and conventional efficiency, offering a critical perspective on how the inventive step test aligns with evolving R&D trends. While primarily a sociological framework, postmodernity can provide valuable insights for patent law and AI policy considerations. [20] This interdisciplinary approach enables a deeper critique of patent law and policy, extending beyond simple textual analysis of patent examination guidelines to expose potential inconsistencies in the system's theoretical framework.

To address these issues, the paper first defines AI and the human-centric approach within the context of patent law, then proceeds to examine the interconnected and significantly affected patentability criteria, specifically the inventive step test and the disclosure requirement, which are significantly impacted by the use of AI in the inventive process. In doing so, the paper critically addresses the challenges that AI can present to the components of the inventive step test, including the definition of prior art, common general knowledge (CGK) of the PSITA legal fiction, and the concept of the obviousness gap that constitutes the subject of the patent reward. The paper concludes with a set of policy recommendations. Given the lack of a unified international patent framework, I focus here on the patent systems of the UK, EU, and US. These jurisdictions have taken distinct yet influential approaches to AI-assisted patent challenges, offering a comparative lens to assess potential doctrinal reforms. References to national laws are made through a comparative microanalysis of national patent laws, case law and patent office examination guidelines in the jurisdictions under scrutiny.

2. Definitions and Foundational Concepts

2.1. Defining a Human-centric Approach to Patent Law and AI Innovation

A self-conducted analysis of a Google Scholar dataset from 2015 to 2023 reveals a dramatic increase in the usage of terms related to human-centric approaches. Specifically, the term 'human-centric' in scholarly literature has grown by an impressive 447% during this period, while the related term 'human-centered' has seen a 169% increase.[21] This trend reflects a growing recognition of the importance

[19] See on postmodernity and patent focus on progress Simon A Rose, 'The Supreme Court and Patents: Moving Toward a Postmodern Vision of "Progress"' (2013) 23(4) *Fordham Intellectual Property, Media and Entertainment Law Journal* 1204.

[20] Different fields, including law and technology, can use postmodernity as a moderator. See applying postmodernity on the web and social impact at Pierre Berthon, 'Post-Modernism and the Web: Societal Effects' (Opentextbc.ca, 2024) <https://opentextbc.ca/electroniccommerce/chapter/post-modernism-and-the-web-societal-effects> accessed 25 March 2024.

[21] As per a self-conducted analysis of 'human-centered' and 'human-centric' keywords, Google Scholar dataset (2015–2023), analysed on 8 September 2024. The date selection follows trends of organisational announcements around AI development, such as those from OpenAI.

of prioritising human needs, experiences, and values at the forefront of technological advancements and policymaking, in parallel with the increasing discourse around AI development and trends. The patent system, as one of the cornerstones of innovation policy, is not immune to this shift. Traditionally focused on protecting inventions and stimulating innovation through exclusive rights, the patent system now faces calls for reform to better align with human-centric values, particularly when there are increased calls for post humanist policy changes.[22] This section explores the concept of a human-centric patent system that not only encourages technological progress but also explicitly considers its impact on human well-being, ethical considerations, and societal needs. The concept of human-centric patent law emerges as a critical framework for revisiting the system's structure in light of AI's impact on the patentability criteria.[23] This framework goes beyond simply recognising humans as the only inventors and prioritises human well-being and societal benefit in light of revised patent bargain parameters. While acknowledging the power of AI as a tool for inventors,[24] this approach emphasises the irreplaceable human intellectual autonomy and its crucial involvement in leading innovation. Although recent literature has addressed difficult questions, including enquiries to redefine the borders of this human intellectual autonomy in an industry where humans and algorithms work together increasingly, [25] it remains an untested area which requires further investigation.

Transitioning from an industrial age to an intelligent one revolutionises industries, enhancing productivity and fostering innovation. However, this transition necessitates the development of new skills, regulatory frameworks, and ethical considerations to ensure that technology benefits all.[26] Indeed, the so-called 4IR has a techno-economic vision; [27] it links economic development with technological advancement. As a result, the interests and dynamics of stakeholders and interest groups are evolving, necessitating continuous reassessment, which can be a complex interdisciplinary task. Thus, it is essential to compare different perspectives and definitions from legal, economic, technological, and social literature despite potential ideological disparities. Considering the traditional goals of patent law and the relevant economic literature, I posit that consumer welfare is not inherently tied to the unchecked growth of patents, which is accelerated by the use of AI in research and

[22] For example, Ryan Abbott, Everything Is Obvious (2019) 66 *UCLA Law Review* 2; Fabris (n 11).
[23] Keisha Ingram, 'Power and Culture in Human-centric Innovation Ecosystems' (2020) 6 *Journal of Management and Training for Industries* 1.
[24] See Miles Brundage and others, 'Toward Trustworthy AI Development: Mechanisms for Supporting Verifiable Claims' (*arXiv.org,* 2020) <www.arxiv.org/abs/2004.07213> accessed 24 March 2024.
[25] Neil Heffernan, 'Artificial Intelligence, Human Intellectual Autonomy and the Future of Work' (The Aspen Institute, 29 August 2024) <www.aspeninstitute.org/blog-posts/artificial-intelligence-human-intellectual-autonomy-and-the-future-of-work> accessed 9 September 2024.
[26] Klaus Schwab, World Economic Forum annual report 2024 <www.weforum.org/docs/WEF_Annual_Report_2023_2024.pdf> accessed 9 September 2024.
[27] See Joel Alves and others, 'Is Industry 5.0 a Human-Centred Approach? A Systematic Review' (2023) 11(1) *Processes* 193.

development. Instead, it suggests that welfare might be better served by imposing a stringent patentability standard, which protects the public from loss by permitting only significant inventions to be patented while encouraging innovation, knowledge sharing, and disclosures. This stance reflects and adjusts to the new dynamics between AI and human creativity. Consequently, a human-centric approach emphasises that innovation stems from human effort and needs rather than being solely driven by technology or data, focusing on addressing human needs through a directed problem-solving policy approach.

To uphold a fair, human-centred patent system, it is essential to examine the stories around innovation trends in the 4IR. This examination must occur within a well-defined set of parameters that embrace a broad viewpoint, considering the complicated and substantial nature of human progress and knowledge. Such concepts extend beyond a simplistic modernist utilitarian view of fundamental ideas like 'reward' and 'incentive'.[28] I assert in this article that a human-centric patent framework should encompass a system that strikes a balance between protecting intellectual property rights and ensuring transparent knowledge sharing. Finally, human-centric patent law challenges the simplistic equation of 'technology' equals 'progress'.[29] This framework, fuelled by a postmodern transformation approach, advocates for a more nuanced understanding that considers the impact of AI advancements on human well-being, innovation democratisation, and justice.[30] In this context, this approach emphasises innovation as a socially embedded phenomenon that is both stimulated by and fulfils societal needs.

2.2. Defining Artificial Intelligence Tools for the Purpose of the Inventive Step Test

Defining and categorising how AI interacts with patent law can be a complex exercise.[31] Scholars in legal and computational fields have made numerous attempts to categorise AI in this context to provide some universal clarity to lead policy analysis on patent law. A review of existing literature reveals four key factors influencing the development of patent law categories in the context of AI: AI capabilities, the stage of AI involvement (input or output), the legal classification of AI (as an invention or inventor), and the analytical perspective (patentability or inventorship).

For instance, when considering AI capabilities, different AI systems vary in autonomy and adaptiveness after deployment.[32] The revised Organisation for Economic Co-

[28] Suthersanen (n 17).
[29] See Alexander Trauth-Goik, 'Repudiating the Fourth Industrial Revolution Discourse: A New Episteme of Technological Progress' (2020) 77 *World Futures* 55; Daron Acemoglu and Simon Johnson, *Power and Progress* (PublicAffairs, 2023).
[30] Andrew Feenberg, 'Transforming Technology: A Critical Theory Revised' (Oxford University Press, 2002).
[31] Martin Müller, 'Issues in Patenting "Artificial Intelligence" from an EPO Perspective' (2024) 19(3) *Journal of Intellectual Property Law and Practice* 201.
[32] OECD, 'Explanatory Memorandum on the Updated OECD Definition of an AI System' (2024) <www.oecd-ilibrary.org/science-and-technology/explanatory-memorandum-on-the-updated-oecd-definition-of-an-ai-system_623da898-en> accessed 12 March 2024.

operation and Development (OECD) definition of AI[33] implies that the functions of AI often utilised in the inventive process are limited to correlation rather than causation. Notably, these cannot operate without human involvement in the inventive process. To this end, a common distinction exists between narrow AI (AI focused on specific tasks) and strong AI, also known as artificial general intelligence (AGI).[34] Patent law rewards both technical solutions and human creativity. This emphasis aligns with the practical uses of narrow AI within the inventive process, which this paper embraces.

Central to the research focus of this article is a key understanding of AI as a comprehensive problem-solving tool, where models like generative AI directly influence the parameters that define the inventive step in patent law. The paper does not differentiate between the AI technologies in use, whether they involve large language models (LLMs), artificial neural networks, or other variants; however, it does distinguish between openly available AI tools and proprietary systems that remain undisclosed. The awareness and availability of these AI tools are recognised as vital to assessing the skill level of the PSITA. This foundational perspective shapes the analysis of AI's influence on patent law and the inventive process that follows. Additionally, the paper will examine how generative AI affects the parameters of the inventive step test. When an AI produces an output recognised as an invention, it is termed an 'AI-assisted invention'. I will not explore here cases where AI is claimed to act as an autonomous inventor.

It is noted that several misconceptions about ML's role in the inventive process can skew discussions on AI inventions and patentability towards AGI or strong AI. These include overstating ML's capabilities, downplaying the human role in the inventive process, and focusing on algorithms at the expense of human ingenuity,[35] despite reports illustrating that limitations in ML capabilities prevent AI from creating inventions autonomously.[36] I emphasise that recognising these limitations helps curb misconceptions and highlights the critical role of human ingenuity. Instead of promoting posthumanist ideas of algorithm driven creativity, I propose maintaining the human nature of the patent system as manifested in the patentability criteria whilst acknowledging that the system should account for the growing use of ML as a

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[33] The OECD revised definition of AI is: 'An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment.' OECD, 'Explanatory Memorandum on the Updated OECD Definition of an AI System' (2024) <www.oecd-ilibrary.org/science-and-technology/explanatory-memorandum-on-the-updated-oecd-definition-of-an-ai-system_623da898-en> accessed 12 March 2024.

[34] Bin Liu, '"Weak AI" is Likely to Never Become "Strong AI", So What is its Greatest Value for Us?' (arXiv, 2021) <arXiv:2103.15294>; Michael Guihot, Anne F Matthew and Nicolas P Suzor, 'Nudging Robots: Innovative Solutions to Regulate Artificial Intelligence' (2017) 20 *Vanderbilt Journal of Entertainment and Technology Law* 385, 393.

[35] Ibid.

[36] See generally Daria Kim and others, 'Ten Assumptions About Artificial Intelligence That Can Mislead Patent Law Analysis' (2021) *Max Planck Institute for Innovation & Competition Research Paper* No 21-18, accessed 6 March 2024; see also, Müller (n 31).

problem-solving tool. The paper echoes scholars' arguments, stating that strong AI assumptions and AGI scenarios are not a direct concern of patent law as long as they are human-centred by design, like all other legal instruments. [37]

3. Re-evaluating the Disclosure Requirement for AI-assisted Inventions

The 'patent bargain' combines utilitarian theories that reward inventors and incentivise innovation with the information theory that values public knowledge disclosure.[38] Society grants exclusive rights to inventors in exchange for the disclosure of their inventions, incurring a higher cost for those that are particularly valuable.[39] This disclosure facilitates the dissemination of technical knowledge and expands the societal knowledge base, encouraging the sharing of technology and preventing research duplication.[40] Without enabling disclosure, valuable knowledge would be withheld, potentially slowing innovation and progress. The wording of the relevant provisions in the national laws of the jurisdictions under scrutiny is largely similar, requiring applicants for patents to disclose the invention in a clear, complete, and sufficient manner that the PSITA can implement.

The disclosure section of a patent application serves three crucial functions. First, it unveils what the invention itself is. Second, it clarifies the invention's technical field in relation to existing inventions (prior art). Third, it provides sufficient detail for a skilled person in that field to understand and implement the invention. [41] Consequently, enabling disclosure is a central tool of the patent system for encouraging further innovation. In essence, this disclosure functions as a 'technical teaching', defining the scope of protection by limiting it to the claimed invention and offering clear instructions on how to solve a specific technical problem using specific technical means. [42] The enablement requirement for disclosure is a fundamental principle as it ensures that the patent specification provides sufficient information to enable a PSITA to make and use the invention without undue experimentation.[43]

Practically, patent granting requires demonstrating that an invention solves a technical problem and achieves a tangible technical effect. Currently, patent applications do not require inventors to disclose how an invention was conceived and

[37] Ibid.
[38] Alan Devlin, 'The Misunderstood Function of Disclosure in Patent Law' (2010) 23(2) *Harvard Journal of Law & Technology* 407.
[39] See generally Michele Boldrin and David Levine, *Against Intellectual Monopoly* (Cambridge University Press, 2008).
[40] Dominique Guellec, 'Patents as an Incentive to Innovate' in Dominique Guellec and Bruno van Pottelsberghe de la Potterie (eds), *The Economics of the European Patent System: IP Policy for Innovation and Competition* (Oxford University Press, 2007).
[41] Standing Committee on the Law of Patents, 'Report' (SCP/35/5) World Intellectual Property Organization (WIPO), 28 September 2023.
[42] Case G 0001/19 (Pedestrian simulation) of EPO Board of Appeal 2021, R 24, and R 42(1)(c) EPC.
[43] 35 USC § 112(a) and Article 83 of the European Patent Convention.

the tools used. The only requirement is to explain to the PSITA how to make and use the invention. These two issues are distinctly different; explaining how to create the invention differs from detailing how the invention was developed. This principle poses challenges in the realm of AI-assisted innovation, as the inner workings of these inventions often remain unclear.[44] This lack of transparency regarding AI parameters and processes complicates the possibility of replicating the inventive process in the future. Moreover, AI's inherent opaqueness and replicability raise significant concerns about meeting the disclosure requirements of patent law.[45] Given the complexity and obscurity of AI algorithms, patent examiners may find it more challenging to evaluate the internal mechanisms of AI that inform its decisions.

More critically, a traceability problem occurs. The US and UK do not differentiate between AI-assisted inventions and traditional inventions, meaning that the same traditional patentability rules apply to AI-assisted inventions, including disclosure requirements. Additional guidelines apply for AI-related inventions, particularly when the patent application concerns an AI output. It is worth exploring these guidelines to revisit the assessment of AI-assisted inventions, including those not directly related to AI yet whose creation was assisted by it. For AI-related inventions, the European Patent Office (EPO) requires a detailed disclosure of mathematical methods and characteristics of training data when technical effects depend on them for 'AI-related' inventions.[46] This disclosure should enable a skilled person to reproduce the technical effect of the invention across the entire scope of the patent claims. Case law suggests that details such as neural network structures and learning mechanisms may require disclosure.[47] However, the problem lies in the lack of a mandate to disclose the use of AI tools in the inventive process beyond AI-related inventions, at least under the EPO doctrine, where the aforementioned rules do not apply.[48] Without knowledge of AI tool usage, patent examiners, as PSITAs, may overestimate the inventiveness of a solution. Indeed, an invention that appears highly innovative may be a routine output of an AI model, potentially leading to an overvaluation of the inventive step. This lack of clarity can challenge the accuracy of the inventive step test and the legal framework's ability to fulfil its objectives, potentially leading to a lower benchmark

[44] Rebeca Ferrero Guillén and Altair Breckwoldt Jurado, 'Vagueness in Artificial Intelligence: The "Fuzzy Logic" of AI-Related Patent Claims' (2023) 2 *Digital Society* <www.link-springer-com.uea.idm.oclc.org/article/10.1007/s44206-022-00032-0> accessed 27 March 2024.
[45] Sabine Jacques and others, 'CCP Response to Consultation on Artificial Intelligence and Intellectual Property' (Centre for Competition Policy, 7 January 2022); Sean B Seymore, 'Patenting the Unexplained' (2019) 96(4) *Washington University Law Review* 707.
[46] European Patent Office, Guidelines for Examination 2024, G-II-3.3.1, for further commentary on the updated guidelines see Rose Hughes, 'Highlights from the New EPO Guidelines for Examination 2024' (The IPKat, 13 February 2024) <www.ipkitten.blogspot.com/2024/02/highlights-from-new-epo-guidelines-for.html> accessed 26 March 2024.
[47] Case T 1191/19 (Neuronal plasticity/INSTITUTGUTTMANN), EPO Boards of Appeal, 2022.
[48] See for example Article 83 of the European Patent Convention; 35 USC 112(1); see also Daryl Lim, 'AI & IP: Innovation and Creativity in an Age of Accelerated Change' (2018) 2 *AKRON Law Review* 813, 861 (stating that patent applicants are not required to disclose the use of AI in developing an invention).

for inventive step assessment. Furthermore, suppose AI significantly contributed to an invention but was not disclosed. In that case, other PSITAs might struggle to reproduce the invention, thereby undermining the patent system's goal of disseminating knowledge and the underlying principle of enabling disclosure. This lack of disclosure regarding the use of AI as a tool may hinder follow-on innovation, as subsequent inventors may not fully understand the context of the original invention's development.

However, meeting an added disclosure requirement may be challenging for inventors and patent examiners. For example, AI tools are evolving rapidly, making it difficult to adapt to different variations of applied tools. Additionally, inventors may face the added burden of maintaining detailed records of AI usage, such as when and for what purpose the tool was employed. While traceability solutions, such as watermarking AI-assisted outputs or tracing the metadata of the outputs, could address some concerns, the risk of losing a competitive edge or facing patent rejection due to AI involvement remains. This legal area is still largely unexplored and uncertain, necessitating further legal investigation and intervention to clarify uncertainties and address the issues raised regarding disclosure requirements. Overall, AI-assisted inventions challenge traditional patent disclosure requirements, which necessitates enhanced transparency regarding AI tool usage in the inventive process. This may include details, capabilities, and contributions of specific AI systems. In this regard, the accessibility to the tools might also become a crucial part of the enablement.[49] Patent systems must also evolve to assess AI-assisted content as potential prior art.[50] Upgrading disclosure requirements is essential to maintaining a human-centric patent system. By mandating more comprehensive information about AI involvement and requiring access to AI tools, the patent system can better differentiate between human ingenuity and machine-generated outputs. This approach ensures that the patent system continues to reward and incentivise human creativity while adapting to the realities of AI-assisted innovation, thereby preserving the fundamental human-centred principles of patent law.

4. The Impact of AI on the Inventive Step Test

The inventive step test, also referred to as the 'non-obviousness requirement', is a fundamental criterion in patent law. It aims to ensure that patents are granted only for genuine inventive advancements rather than trivial improvements. Alongside novelty and utility, it is one of the core requirements for patentability. Though the inventive step test (alternatively known as the non-obviousness doctrine)[51] is the

[49] Jordana Rose Goodman Esq, 'Defining PHOSITA: Access to AI tools and patentability standards' (Frontiers Policy Labs, 13 May 2024) <www.policylabs.frontiersin.org/content/defining-phosita-access-to-ai-tools-and-patentability-standards#_ftn5> accessed 28 August 2024.
[50] See Kahwaji (n 15).
[51] The inventive step test is referred to as 'non-obviousness' in the US. In this paper, both terms are interchangeable. However, Ove Granstrand noted 'The difference between "inventive step" and "non-obviousness" is not necessarily negligible (as the former relates to the relation

most recently developed of the three requirements for obtaining a patent, it is now generally considered to be the defining feature of an invention. The inventive step test is widely understood as a fundamental function of the patent system, such that it has been described as the 'final gatekeeper of the patent system',[52] and 'the heart of the patent law'.[53] Patent law regulates access to and exclusivity of technical information,[54] relying heavily on empirical evidence and technological certainty while incorporating legal fiction. The concept of the PSITA, a crucial legal fiction, plays a key role in information management,[55] particularly in the inventive step test. Obviousness is judged against the PSITA's knowledge.[56] If the PSITA would have deemed the invention obvious at the time of application, it fails to qualify as patent-worthy. Unlike the reasonable person in tort law or the average consumer in trademark law,[57] the PSITA is loosely defined so as to adapt to different fields and technological advancements.[58]

In case law, the inventive step test has been interpreted as the distance or the gap between the current state of the art and the claimed invention. This can be found in *Windsurfing International Inc v Tabur Marine (Great Britain) Limited*, and is known as the *Windsurfing* test.[59] The UK Court of Appeal has established a four-step test to identify whether an invention satisfies the inventive step requirement: (1) identify what the patent claims;[60] (2) identify CGK in the art; (3) identify the difference between what is known and what is claimed; and (4) assess whether this difference would be obvious to the skilled person.[61]

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between the invention and prior art, while the latter refers to the mental process of the PSITA), but the underlying goal of the provision approximates the laws in spirit if not in drafting'; see Ove Granstrand, 'Are We on Our Way in the New Economy with Optimal Inventive Steps?' in Ove Granstrand (ed), *Economics, Law and Intellectual Property; Seeking Strategies for Research and Teaching in a Developing Field* (Springer, 2003) 223, 237.

[52] Robert P Merges and John F Duffy, *Patent Law and Policy* (Carolina Academic Press, 2021) 644.

[53] Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* (2003) Ch 4, at 2.

[54] Eben Moglen, 'Legal Fictions and Common Law Legal Theory: Some Historical Reflections' (1990) *10 Tel Aviv University Studies* 33.

[55] See Craig A Nard, 'Legal Fictions and the Role of Information in Patent Law' (2019) 69 *Vanderbilt Law Review* 1517 <www.scholarship.law.vanderbilt.edu/vlr/vol69/iss6/3> accessed 18 March 2024.

[56] 35 USC § 103.

[57] *Panduit Corp. v Dennison Mfg Co* 774 F 2d 1082 (Federal Circuit 1985).

[58] Manual of Patent Examining Procedure (MPEP), 3rd edn, section 2141.03 Examination Guidelines for Determining Obviousness under 35 USC 103' (Uspto gov, 2024) <https://www.uspto.gov/web/offices/pac/mpep/s2141.html> accessed 4 April 2025.

[59] *Windsurfing International Inc v Tabur Marine (GB) Ltd* [1985] RPC 59.

[60] I.e. the 'inventive concept'.

[61] [1985] RPC 59 at 74.

Jacob LJ later rephrased the *Windsurfing* test in *Pozzoli*,[62] but the test's essence remains the same. Similarly, the EPO has incorporated the *Windsurfing/Pozzoli* test in the so-called 'problem and solution' approach to the assessment of the inventive step, which involves: (1) determining the closest prior art; (2) establishing the 'objective technical problem'; and (3) considering whether the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person.[63] In the US**,** the inventive step test was interpreted in *Graham v John Deere*[64] as an obviousness test. Indeed, in *Securitypoint Holdings, Inc v United States*,[65] the obviousness test requires 'a comparison between what is claimed to have been invented in the patent and what was already known to a person of ordinary skill in the field of art pertaining to the invention'.[66]

Legal scholarship has acknowledged the inherent complexity of the non-obviousness doctrine, and has been described as 'mysterious, incomprehensible, and contradictory.[67] This stems from the multifaceted nature of the inventive step test. Several key elements are involved, and each can be highly case-specific.[68] To fulfil the obviousness test, it should be determined what the scope of the state of the art is, the skills and knowledge of the PSITA should be identified, and the gap between the claimed invention and the identified prior art from the lens of the PSITA measured.[69] Taking this a step further, examining AI-related inventions for the inventive step test can bring additional complexities as it affects the three elements of the inventive step test: (1) the size of the state of the art; (2) the identity or making of the PSITA and the means in her disposal; and (3) the distance or gap of the invention from the state of the art.[70] Evolving innovation processes and rules have a significant impact on the components of the inventive step test. This influence extends beyond AI-related

[62] *Pozzoli SPA v (1) BDMO SA and (2) Moulage Industriel de Perseigne SA1* [2007] FSR 37.
[63] Guidelines for Examination in the European Patent Office, Part G, Ch VII, para 5 (European Patent Office, 2024). The EPO problem solution approach combines the last two steps of the *Windsurfing* test. See *Palmer v Dunlop Perdriau Rubber Co Ltd* (1937) 59 CLR 30, 61.
[64] *Graham v John Deere Co*, 383 US 1 (1966), the *Graham* test was revisited in *KSR Int'l Co v Teleflex Inc*, 550 US 398 (2007) with regard to the predictability of use and results. See Christopher A Cotropia, 'Predictability and Nonobviousness in Patent Law after KSR' (2014) 20(2) *Michigan Telecommunications and Technology Law Review* (2014).
[65] *Securitypoint Holdings, Inc v United States*, 129 Fed Cl 25, 35 (2016).
[66] Ibid.
[67] Michael D Pendleton, 'An Objective Failure of Intelligence: Intellectual Property and Artificial Intelligence' in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar Publishing, 2022).
[68] For simplicity, certain complexities – such as the detailed examination of the scope of the claimed invention –are outside the scope of this paper.
[69] *Windsurf/Pozzoli* test and *Graham v John Deere* in the US*.* For simplicity, the paper identifies the broad key elements that the approaches to inventive step involve across different jurisdictions, as opposed to the order in which they are applied, as different tests in different jurisdictions have a different order.
[70] Noam Shemtov and Garry A Gabison, 'The Inventive Step Requirement and the Rise of the AI Machines' in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar Publishing, 2022).

inventions, impacting assessments of both AI-related and non-AI inventions, referred to as 'AI-assisted inventions'.

4.1 AI and the Expanding Boundaries of Prior Art

An inventor who applies for a patent must know and explain how the invention differs from or adds to the state of the art.[71] The state of the art may comprise everything available to the public before the date of the application.[72] Article 54(2) European Patent Convention, in a similar approach to the UK and the US, defines the state of the art as 'everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application'.[73] This includes published patents or patent applications (and in some cases, patent applications as of their filing date), scientific and technical publications, public demonstrations or uses of the invention, products that were available for sale or offered for sale, public talks (such as presentations at scientific meetings or trade shows), printed materials, and information posted online or on websites. However, the crux of the prior art definition lies in its accessibility and availability to the public, as established by case law.[74] The scope of prior art has already been broadened by the widespread use of digital resources and commodified AI tools, such as generative AI models, which accelerate the dissemination of public information, including YouTube tutorials and academic articles.[75]

However, relying solely on accessibility as a touchstone for prior art can be problematic in light of generative AI. The definition of prior art does not specify any condition regarding the source of the disclosure, which means that the strict interpretation of the law does not differentiate between human- and AI-generated text. AI-generated disclosures, as a new, under-explored area, can be problematic; in particular, the manner and quantity in which AI can generate disclosures could hinder the fundamental purpose of the prior art test, which was built on different human-centric assumptions regarding publishing and incremental knowledge progress. Furthermore, the volume of information generated or stored by AI compared to human cognitive capacity cannot be said to be compatible.[76] Generative AI can flood the public domain with generated content, which could be used strategically to

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[71] Ana Ramalho, 'Patentability of AI-Generated Inventions: Is a Reform of the Patent System Needed?' (2018) *SSRN Electronic Journal* <www.ssrn.com/abstract=3168703> accessed 16 March 2024.

[72] Article 54(2) EPC defines the state of the art as 'everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application'.

[73] A similar definition exists in 35 USA code 102 (a)(1) and 103, as well as section 3 of the UK Patents Act 1977.

[74] See, for example, *In re Hall*, 781 F 2d 897 in the US

[75] Shemtov and Gabison (n 70).

[76] Ben Dickson, There's a Huge Difference Between AI and Human Intelligence - So Let's Stop Comparing Them (TECHTALKS, 21 August 2018) <www.bdtechtalks.com/2018/08 /21/artificial-intelligence-vs-human-mind-brain> accessed 10 September 2024.

prevent patenting in certain areas.[77] This can also be in the form of routine work in the inventive process. For example, feeding the AI system with available information from the state of the art becomes part of the prior art, and it is in that sense that it should be regarded as an important common element of the process,[78] as this can also impact the definition of the PSITA and her CGK.

In the context of human-centric patent law, the concept of prior art requires reconsideration to reflect the connection between human creativity and human exposure to published works. It should further reconsider the changing nature of the traditional understanding of publication and accessibility. The extensive, AI-processed knowledge landscape constitutes a hyperreal environment against which human innovation occurs. This presents a challenge in distinguishing between AI-generated content and human-inspired breakthroughs, emphasising the necessity to identify and value the unique human contribution.

Significant issues exist regarding the traceability and differentiation of authorship between AI and human sources. The potential difficulty in distinguishing between human-authored and AI-generated content complicates the assessment of prior art. It further raises critical questions about the weight to be given to different sources of information in evaluating the inventive step. A starting point for actionable solutions can be found in other legal frameworks. For instance, the EU AI Act[79] tackles some transparency issues, although it does not directly address intellectual property rights (IPR). Article 50 focuses on user awareness and high-risk AI systems. Still, it introduces two key considerations relevant to IPR: the need for proper labelling; and thorough documentation for AI-generated content and general-purpose AI models.[80] These could be extended to the patentability requirements generally and the determination of prior art, which would help to ensure transparency in the patent system framework. Such regulatory measurements can mitigate the competition disadvantages that can occur with watermarking or labelling AI outputs by requiring a unified standard for all. Consequently, having such traceability of human/AI output can help better account for prior art for the inventive step test and the other parameters, such as the CGK of PSITA.

4.2. AI's Impact on the PSITA and her CGK

To provide the state of the art with a context relevant to the skilled person, patent examiners and tribunals must determine which aspects of the identified state of the art constitute CGK to the skilled person.[81] The main difference is that prior art includes

[77] See, for example, allpriorart.com <http://www.areben.com/project/all-prior-art>, accessed 26 July 2024, although there is no empirical evidence that it was cited as prior art in any patent application or decision.

[78] Dennis Crouch, *Legal Fictions and the Corporation as an Inventive Artificial Intelligence* (Edward Elgar Publishing, 2022) <www.elgaronline.com/view/book/9781800881907/book-part-9781800881907-7.xml> accessed 14 September 2023.

[79] EU Artificial Intelligence Act 2024.

[80] EU Artificial Intelligence Act 2024, Ch VI, Art 50.

[81] Case T 0766/91 (Decorative laminates/Boeing), EPO Boards of Appeal 1993, para 8.2.

anything available to the public before the priority date, whereas the CGK is limited to the knowledge possessed by a skilled person active in the relevant field of art.[82] The relevant field of the art is defined according to the technical problem to be solved, including neighbouring fields or a broader general technical field.[83] The essence of the inventive step test is whether the gap between the prior art and the invention is obvious to the PSITA as per her CGK. In other words, the CGK provides an insight into the level of skills and knowledge the PSITA is assumed to have in relation to the relevant prior art of the invention. The level of knowledge of the PSITA is not clearly defined but can vary across different fields. It is influenced by the level of knowledge development, the significance of the problems to be solved and the educational levels typically held by inventors in that field.[84]

Across different legal jurisdictions, including the EPO, assessing the inventive step for inventions follows a similar approach. The characteristics of the skilled person, as outlined in case law, demonstrate a development of the concept over the years. For example, in the UK, Jacob LJ in *Rockwater Ltd v Technip France SA*[85] described the addressee as a 'nerd' who, if real, would be 'very boring', but 'not a complete android'.[86] Similarly, in the US, in *Gillette Safety Razor v Anglo-American Trading*, it was suggested that the PSITA is 'halfway between a mechanical idiot and a mechanical genius'.[87] It is presumed to be a person who does not possess a spark of inventiveness but is sufficiently interested in their field to improve on prior art as per *Technograph v Mills & Rockley*.[88] The PSITA is presumed to have access to all publicly available technical knowledge.[89]

One of the PSITA's functions, among others, is to ensure that patent application disclosures provide sufficient information for the PSITAs to utilise and reproduce the invention under examination. In defining the PSITA, courts and tribunals consider factors such as educational background and field experience. While these attributes

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[82] See Derk Visser, *The Annotated European Patent Convention (2000)*, 25th edn (Kluwer Law International, 2017), explaining that if the technical field of the solution differs from the technical field of the problem, the latter prevails.

[83] Case T-176/84 (Pencil Sharpener), EPO Boards of Appeal 1985. This is because there is a widespread debate about technical problem common to both fields or because the materials used are similar or related, which arguably here can be a concept applied to the assessment of AI inventions.

[84] Kathy Wasström, 'Person Skilled in the Art' (Laine IP News, 2020) <www.laineip.fi/en/person-skilled-in-the-art> accessed 21 March 2024.

[85] *Rockwater Ltd v Technip France SA (formerly Coflexip SA)* [2004] RPC 919, CA at 6–15.

[86] Ibid.

[87] *Gillette Safety Razor v Anglo-American Trading* (1913) 30 RPC 465 at 481 per Lord Moulton.

[88] *Technograph v Mills & Rockley* [1972] RPC 346 at 355.

[89] The level of creativity of the PSITA differs between the United States Patent and Trademark Office approach and the EPO and UK Intellectual Property Office approaches. This can have an impact on the definition of CGK possessed by the PSITA when it comes to disclosed use of AI in the inventive process. The US assumes a higher threshold, where the PSITA possesses ordinary creativity (person having ordinary skill in the art). If using AI falls under this 'ordinariness', it could raise the bar for inventive step when AI is involved in inventions made using AI.

are vital for evaluating patentability and enablement criteria, integrating AI tools in the inventive process introduces a new, often neglected element that should influence how the PSITA's skills and routine work are determined. Traditional modernist patent law and systems were designed with the understanding of a human inventor who follows an inventing process that involves building on hypotheses, synthesising existing knowledge, and demonstrating ingenuity in relation to human cognitive capabilities.[90] As the concept of the 'inventor' evolves, particularly in a postmodern context of science, technology, and R&D practices, it can be argued that the current understanding of an inventor's routine work should be expanded to include the use of broad problem-solving tools, such as AI.

Furthermore, for effective invention creation and use, a PSITA requires access to the necessary AI tools involved in creating inventions across different fields, as successful implementation and utilisation of an invention demand both access to and familiarity with the relevant tools.[91] A PSITA cannot recreate a described invention without at least a fundamental understanding of such essential tools, their application in the field, and their accessibility. This understanding may sometimes require direct access to the tools themselves. The availability of these tools is a distinct consideration from a PSITA's education or general field experience and should be incorporated into the definition of a PSITA. However, given the issues in the disclosure requirement, a lack of transparency regarding the tools used in R&D can impede subsequent innovations. For example, an inventor using advanced AI tools and models gains an advantage in making discoveries that may not be reflected in the knowledge and skills of the PSITA in the field. Furthermore, follow-on inventions might be hindered due to a lack of awareness and access to such tools. The varying complexity of AI tools and the methods employed in the inventive process can create disparities and inequalities in patenting practices.

Further, suppose the use of AI in the invention process is considered the normal means and capacity for routine work and experimentation. In that case, the thresholds for the inventive step test need to be adjusted.[92] Once these AI-related skills become part of the CGK, patent examiners and courts must select an adequate level of AI-related skills and tools. In such a scenario, in addition to the difficulty in

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[90] Ben Dickson, 'There's a Huge Difference Between AI and Human Intelligence - So Let's Stop Comparing Them', TECHTALKS (21 August 2018) <www.bdtechtalks.com/2018/08 /21/artificial-intelligence-vs-human-mind-brain>; see also: Matthew Bultman, 'Patents and Artificial Intelligence: An "Obvious" Slippery Slope' Bloomberg Law (October 2021) <www.news.bloomberglaw.com/ip-law/patents-and-artificial-intelligence-an-obvious-slippery-slope> accessed 28 July 2024.

[91] Goodman (n 49).

[92] See WIPO's Standing Committee on the Law of Patents (SCP), Request to Submit Information on the Requirements of Inventive Step and Sufficiency of Disclosure (October 2023); Schellekens brings an interesting perspective on whether publicly available training data sets can be considered as part of the state of the art or the means of experimentation; see Martin Schellekens, 'Artificial Intelligence and the Reimagination of Inventive Step' (Jipitec, 2022) <www.jipitec.eu/archive/issues/jipitec-13-2-2022/5537> accessed 21 March 2024.

determining the standard form of AI used routinely in research and experiments across different fields, the PSITA and the inventive step test will be set at a higher bar because the access to AI skills might make more inventions obvious to the PSITA, which can mean fewer inventions passing the inventive step test.[93] For example, if it is presumed that access to generative AI models like generative pre-trained transformer (GPT) constitutes a normal means of experimentation for the PSITA, it fundamentally alters how the PSITA engages with CGK. The very nature of 'publications' resulting from GPT models, characterised by a level of randomisation, raises multiple questions about the PSITA's interaction with such content as part of their CGK. Moreover, the ease of accessing vast amounts of AI-generated content blurs the lines between readily accessible knowledge and deeply understood expertise, prompting the question of whether mere interaction with AI-generated content is sufficient to consider it part of the PSITA's knowledge base and whether the information would be similar enough upon using the same prompt.

Consequently, the skills attributed to a PSITA should be updated to encompass not only publicly available AI tools but also sophisticated, exclusive tools. In terms of the disclosure that is considered part of a PSITA's CGK, the EPO guidelines emphasise that a single source, such as a patent document or journal article, typically does not qualify as CGK.[94] This implies that, beyond patent disclosures, information and knowledge regarding AI-related inventions must be well documented and widely disseminated to be considered part of the CGK.[95] Following the CGK principle in the EPO, it can be asserted that a single patent claim disclosing the application or potential uses of AI algorithms does not significantly raise the bar in terms of skills and knowledge for a PSITA, as it would not be considered part of the CGK. Accordingly, information on the use of AI in the relevant field cannot become part of the CGK without first becoming sufficiently prevalent in that field. This means that the level of skill and knowledge possessed by the PSITA may not match the realities of the innovative process, assuming it is common for an AI to be involved in the development of inventions. Furthermore, current patent applications are a valuable yet underutilised source of scientific and technological knowledge. This is because they are not considered part of the PSITA's CGK. Turning to AI, if an AI algorithm can read patent applications, analyse the patterns and gaps and draft a patent claim, this suggests that patent publications would be expected to be part of the CGK even if it is not widespread.[96]

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[93] Shemtov and Gabison (n 70). This also raises the possibility of feeding an AI tool, for example, with available information from the state of the art that facilitates, to a great degree, framing the gap, which arguably can make it easier to draft a successful patent claim. See Ana Ramalho, *Intellectual Property Protection for AI-Generated Creations: Europe, the United States, Australia and Japan* (Routledge, 2021) 127.

[94] See T 475/88 EPO Boards of Appeal, 1989.

[95] Shemtov and Gabison (n 70). However, in T 595/90 EPO Boards of Appeal decision, exceptions exist where technical journal articles can be considered common knowledge.

[96] For example, see Kathleen Walch, 'The increasing use of AI in the pharmaceutical industry', (Forbes, 26 December 2020) <www.forbes.com/sites/cognitiveworld/ 2020/ 12/ 26/ the -

As established earlier, the legal fiction of the PSITA, which is often referred to as the gatekeeper of the patent system, operates within a set of parameters. Compromised parameters could lead to the granting of patents for frivolous inventions, further burdening a system that already faces other serious issues, such as patent thickets. [97] In this context, a higher inventive step threshold might be regarded as a positive change despite arguments claiming this might stifle innovation.[98]

4.2.1. The PSITA v MSITA Debate

In patent law, the PSITA concept has sparked significant debate among scholars and legal professionals due to the rise of AI capabilities. Some scholars propose that computers might replace this hypothetical skilled person with a machine skilled in the art (MSITA). [99] The idea of extending legal fiction to accommodate technological advancements is not unprecedented. [100] In other areas of law, such as tort law, scholars have explored concepts like the 'reasonable robot' in relation to AI-generated actions.[101] Some researchers predict a phased transition towards artificial superintelligence (ASI), suggesting inventive machines may become the norm in certain industries.[102] However, these arguments often rest on two assumptions: first, that AI has reached or will soon reach the level of AGI or ASI; and second, that this level of autonomy necessitates legal recognition. There is insufficient evidence to support either of these assumptions in the near term.

Legal principles have historically demonstrated adaptability to new technologies without necessitating paradigm replacement. For instance, the 'presumed consent' concept evolved to accommodate e-commerce without compromising its core principles. [103] Similarly, digitalising the PSITA concept need not mean replacing it entirely with an MSITA. In trademark law, the 'average consumer' doctrine could be updated to reflect the influence of AI algorithms on consumer behaviour rather than

increasing -use -of-ai -in -the -pharmaceutical -industry> accessed 10 September 2024; it should be noted here that this might not be the case for other fields.

[97] Marco D'Ostuni, 'Patent Quantity Concerns under Competition Law' in Anselm Kamperman Sanders and Anke Moerland (eds), *Intellectual Property as a Complex Adaptive System* (Edward Elgar Publishing, 2021).

[98] David Encaoua, Dominique Guellec and Catalina Martinez, 'Patent systems for encouraging innovation: Lessons from economic analysis' (2006) 35(9) *Research Policy* 1423.

[99] Ryan Abbott, 'I think, therefore I invent: creative computers and the future of patent law' (2016) 57(4) *Boston College Law Review* 1079.

[100] In *University of Utah v Max-Planck-Gesellschaft zur Förderung der Wissenschaften EV*, 734 F 3d 1315, 1323 (Fed Cir2013) the court also rejected the idea that corporations or sovereigns could be inventors.

[101] Ryan Abbott, The *Reasonable Robot: Artificial Intelligence and the Law* (Cambridge University Press, 2020).

[102] Abbott (n 2021); see also Fabris (n 11).

[103] Georgia Jenkins, 'An Extended Doctrine of Implied Consent – a Digital Mediator?' (2021) 52 *International Review of Intellectual Property and Competition Law* 706 <www.link-springer-com.uea.idm.oclc.org/article/10.1007/s40319-021-01024-2> accessed 22 March 2024.

being replaced by an AI system.[104] Overextending legal fiction risks undermining the core purpose of patent law, which balances the incentives for inventors with the dissemination of knowledge. Shifting the focus too far towards AI-centric approaches could potentially marginalise the human role in invention and R&D activities, potentially misdirecting policy recommendations.

The widely discussed case of DABUS,[105] involving an 'inventive machine'[106] named as an inventor in a patent application, brought this issue to the forefront. Despite facing legal setbacks due to the prevailing definition of inventors as natural persons,[107] this case highlighted the growing tension between the capabilities of AI and existing legal frameworks. While courts and patent offices have largely upheld human-centric principles,[108] denying inventorship rights to AI, these decisions may inadvertently discourage transparency regarding AI's role in the invention as it stands. Balancing human-centric patents with technological advancements is crucial for maintaining the objectives of the patent bargain. Thus, implementing more transparent disclosure about AI/ML involvement in inventions could help achieve this balance, reflecting AI's evolving role while preserving the relevance of the PSITA concept. If paired with clearer disclosure policies, recent court decisions could better align with global efforts to promote transparency and access to technology.

4.3. AI, the 'Obviousness Gap', and Redefining Progress

The inventive step test in patent law embodies a cost−benefit analysis that reflects the dual objectives of the patent bargain: protection and dissemination.[109] This is evident in the structure of tests like the *Windsurfing/Pozzoli* test, which balances these goals through its four steps. The test begins by identifying the state of the art and PSITA's CGK, essentially asking, 'Where would technology be without this invention?' to establish a baseline. Examining the scope of the claim determines 'where society stands with the invention'. The gap between these two points represents the societal benefits derived from the invention's non-obviousness. The legal fiction of the PSITA is used to assess this gap and determine if it surpasses the PSITA's CGK, justifying a patent grant.[110] The increasing use of ML in innovative activities suggests that a more knowledgeable PSITA could potentially narrow the

[104] On trademarks see Carolina Tobar, 'Do Androids Dream of Trademarks? Revising the "Average Consumer" Notion in the Artificial Intelligence Context' (International Training Centre of the International Labour Organization, February 2019).
[105] *Thaler v Comptroller-General of Patents, Designs and Trademarks* [2023] UKSC 49 (20 December 2023); see the Artificial Inventor Project <www.artificialinventor.com>.
[106] Ibid.
[107] Albeit not uniformly or statutorily. See Noam Shemtov, 'A Study on Inventorship in Inventions Involving AI Activity' (European Patent Office, 2019) 37.
[108] The patent applications were filed in China, India, Canada, the Republic of Korea, Israel, Taiwan, the US, the UK, Patent Cooperation Treaty, EPO, Germany, Japan, South Africa, and Australia.
[109] Shemtov and Gabison (n 70).
[110] Ibid. Similar objects and logic can be said to apply to other tests, such as the problem-solution approach in the EPO.

inventive gap. This could result in fewer inventions passing the obviousness test, as the PSITA would be more likely to perceive inventions as obvious due to their expanded knowledge base. Such a decrease in patentable inventions could benefit society by reducing patent thickets and encouraging more R&D spending.

The concept of progress is central to the patent bargain, serving as the subject of reward and incentive.[111] This raises questions about the nature and purpose of the progress being incentivised and rewarded in the patent system. Given the shift towards technoscience and technology as a measure of progress, revisiting the concept through a postmodern lens can offer insights into the dynamics of the patent system's powers and its relationship to progress.[112] If postmodernism has altered the nature of science, steering it towards technology and technoscience, it is appropriate to consider these shifts within the broader context of postmodernism and its effects on other aspects, particularly those concerning power and progress. Indeed, when applied to patent law analysis, postmodernity challenges traditional legal and economic frameworks by questioning grand narratives and absolute concepts.

The current patent system is deeply intertwined with the core principles of modernism.[113] It reflects the belief in linear progress that is evidenced in scientific discoveries and technological innovation, where innovation builds incrementally upon existing knowledge.[114] However, with the rise of collaborative innovation,[115] the influence of social context on innovation and the increasing role of AI, the patent system faces challenges in upholding these modernist ideals. In light of these changes, it becomes crucial to consider how the patent system can preserve human agency in innovation, address human needs and societal challenges, and ensure transparency in AI innovation. These considerations align with a more human-centric approach to progress and innovation. Although postmodernism does not offer a direct or clear solution for reforming the inventive step test or the patent system, it does, however, challenge the grand narratives underpinning the policy and law of patents. This includes deconstructing the progress narrative and the resulting reward and incentive in return for disclosure trade-offs. In their book, *Power and Progress*, Acemoglu and Johnson argue that the traditional definition of progress, which focuses solely on technological advancement, overlooks social contexts and consequences.[116] The

[111] *Graham* (n 64) at 6.
[112] The paper follows this approach following Professor Margaret Chon's seminal piece, 'Postmodern "Progress": Reconsidering the Copyright and Patent Power' (1993) 43 *DePaul Law Review* 97.
[113] Adam Lucas, 'Manufacturing Modernity: Innovations in Early Modern Europe—An Introduction' (2020) 61 *Technology and Culture* 995.
[114] Delphine Gallaud, 'Collaborative Innovation and Open Innovation' in EG Carayannis (ed), *Encyclopedia of Creativity, Invention, Innovation and Entrepreneurship* (Springer, 2013) 236.
[115] Marcel Bogers, 'Knowledge Sharing in Open Innovation: An Overview of Theoretical Perspectives on Collaborative Innovation' in C de Pablos Heredero and D López (eds), *Open Innovation at Firms and Public Administrations: Technologies for Value Creation* (IGI Global, 2011).
[116] Acemoglu and Johnson (n 29) 13–16.

authors highlight the need for a 'postmodern' definition of progress that prioritises shared prosperity alongside technological development.[117]

This redefinition of 'progress' aligns with a human-centric framework by emphasising not just technological advancement but also human values, environmental sustainability, democratisation of innovation, and social justice. It necessitates a reconsideration of how the law and the structure of the patent system balance protection with knowledge-sharing and how we can promote reasonable innovation that supports broader socioeconomic goals by design.[118] At a policy level, Acemoglu and Johnson argue that the technology-equals-progress narrative has to be challenged.[119] If this narrative is to be deconstructed, such that progress would not equal technology, then changing the law to fit a more nuanced narrative is an inadequate response.

I advocate for a more balanced approach to patent law that considers the broader concept of progress, including its measurement and reward, as well as factors such as access to knowledge, humanism, morality, environmental concerns, sustainability and the relationship with science and technology.[120] It further suggests moving away from a blind, incentive-centred narrative of promoting progress towards a more comprehensive and inclusive understanding of progress, which will impact the design and implementation of the patent system, most likely beyond the inventive step test. The impact of AI, in light of the narrative of technology and progress, is a showcase of a wider issue that needs to be addressed throughout various parts of the patent system design and, more broadly, in innovation policies and legislative reviews.

While the inventive step test is not the sole consideration, the industrial applicability test and other patentability criteria should also reflect this direction.[121] However, the inventive step test is a crucial starting point. Such legislative review should consequently aim to adapt the system to the new paradigm of inventive activities and scientific and technological advancement, where available information and open access play a crucial role in fostering responsible and democratic innovation. This suggests incorporating elements that promote a transparent and widened scope and function of the disclosure requirement.

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[117] Ibid chs 5–9.
[118] Suthersanen (n 17).
[119] Acemoglu and Johnson (n 29).
[120] Simon A Rose, 'The Supreme Court and Patents: Moving Toward a Postmodern Vision "Progress"?' (2013) 23(4) *Fordham Intellectual Property, Media and Entertainment Law Journal*,.
[121] See Alia Kahwaji, 'Revisiting Industrial Applicability and Utility Criteria: AI's Role in the Inventive Process and Postmodern Human-Centric IP Development' (4iP Council, 2025) <www.4ipcouncil.com/research/revisiting-industrial-applicability-and-utility-criteria-ais-role-inventive-process-and-postmodern-human-centric-ip-development> accessed 29 March 2025.

5. Conclusion

The patent system operates on a *quid pro quo* basis, ensuring that both society and inventors benefit from innovation. Key patentability requirements, such as the disclosure requirement and the inventive step test, are central to maintaining this balance. This paper has demonstrated that AI-assisted innovation challenges these established criteria, necessitating legal and policy interventions to preserve the system's human-centric foundation. However, rather than a reactive shift towards machine agency and posthumanist solutions, a more constructive approach is to reinforce the role of human ingenuity in the inventive process while adapting legal frameworks to account for AI tools' growing influence.

A core finding of this analysis is that AI's role in inventive processes disrupts the application of the inventive step test, particularly by expanding the scope of prior art and altering the conventional understanding of publication. If AI-generated insights and tools remain undisclosed in the patent application process, the standard applied to the hypothetical PSITA may no longer accurately reflect the actual technological capabilities required for assessment, thereby distorting the test's effectiveness. In other words, this means that the PSITA standard will be maintained at a lower threshold, allowing more inventions, regardless of their level of inventiveness, to be patented. Addressing this issue requires greater transparency in patent disclosures, ensuring that the use of AI tools, as well as access to them, is adequately documented and accessible to the PSITA. The increasing integration of AI in research and development does not justify an indiscriminate expansion of patent rights. While AI can enhance the efficiency and scope of inventive processes, allowing patents on AI-assisted inventions without sufficient scrutiny risks weakening the quality of innovation and limiting public access to knowledge. Instead, maintaining a rigorous inventive step threshold is crucial to ensuring that only genuinely novel and non-obvious contributions are rewarded with patent protection. This approach balances the need to encourage technological advancements with the broader public interest in preventing excessive monopolisation over minor or routine developments.

I argue that a human-centric patent framework is essential not only for preserving the foundational principles of patent law, but also for creating a system that effectively balances patent protection with the need for transparent knowledge sharing. A human-centred approach to patentability criteria ensures that innovation remains driven by human problem-solving rather than merely reflecting technological or data-driven outputs. Furthermore, this framework challenges the simplistic equation of 'technology equals progress'. Informed by postmodernist critiques, I advocate for a more nuanced understanding of progress that considers the broader impact of AI advancement on human well-being, social innovation justice, and access to knowledge. A human-centred approach to patent law is not merely a theoretical preference but a necessary framework for maintaining a system that both incentivises innovation and safeguards the integrity of knowledge-sharing. Rather than positioning AI as a driving force of creativity, this perspective emphasises the need to evaluate technological progress in terms of its broader societal impact. The

assumption that increased technological output automatically equates to meaningful progress is a narrow view. Instead, patent law should incorporate a more holistic understanding of innovation that takes into account ethical considerations, equitable access to knowledge, and long-term sustainability.

This paper also challenges the notion that AI-assisted innovation should necessarily undermine and overlook the crucial need for human agency in patent law. While AI is increasingly being used as a tool in problem-solving and research, this does not warrant a fundamental shift away from human-centric legal frameworks. Instead, patent law must evolve to acknowledge AI's growing role while ensuring that its use remains a tool to enhance human innovation rather than replace it. Concerns over the potential for AGI to challenge existing patent structures remain largely speculative. As long as the patent system remains structured around human agency, such concerns do not necessitate immediate reform. Ultimately, I advocate for a reform of patent law that moves beyond a singular focus on incentivisation and towards a broader, postmodern, and more nuanced vision of progress on both technical and policy levels. This requires rethinking how innovation is measured and rewarded, incorporating considerations such as public access to knowledge, ethical implications, and sustainable technological development. AI's impact on the inventive step test serves as a case study of much larger issues related to the question of how legal and policy frameworks should adapt to rapid technological change without compromising the core principles of intellectual property rights, innovation, and human centrality. Moving forward, it is essential to emphasise that the challenge lies not in replacing human-centric legal doctrines but in ensuring that patent law remains fit for purpose in an era of AI-assisted invention, striking a careful balance between promoting innovation and maintaining transparency, fairness, and public benefit.