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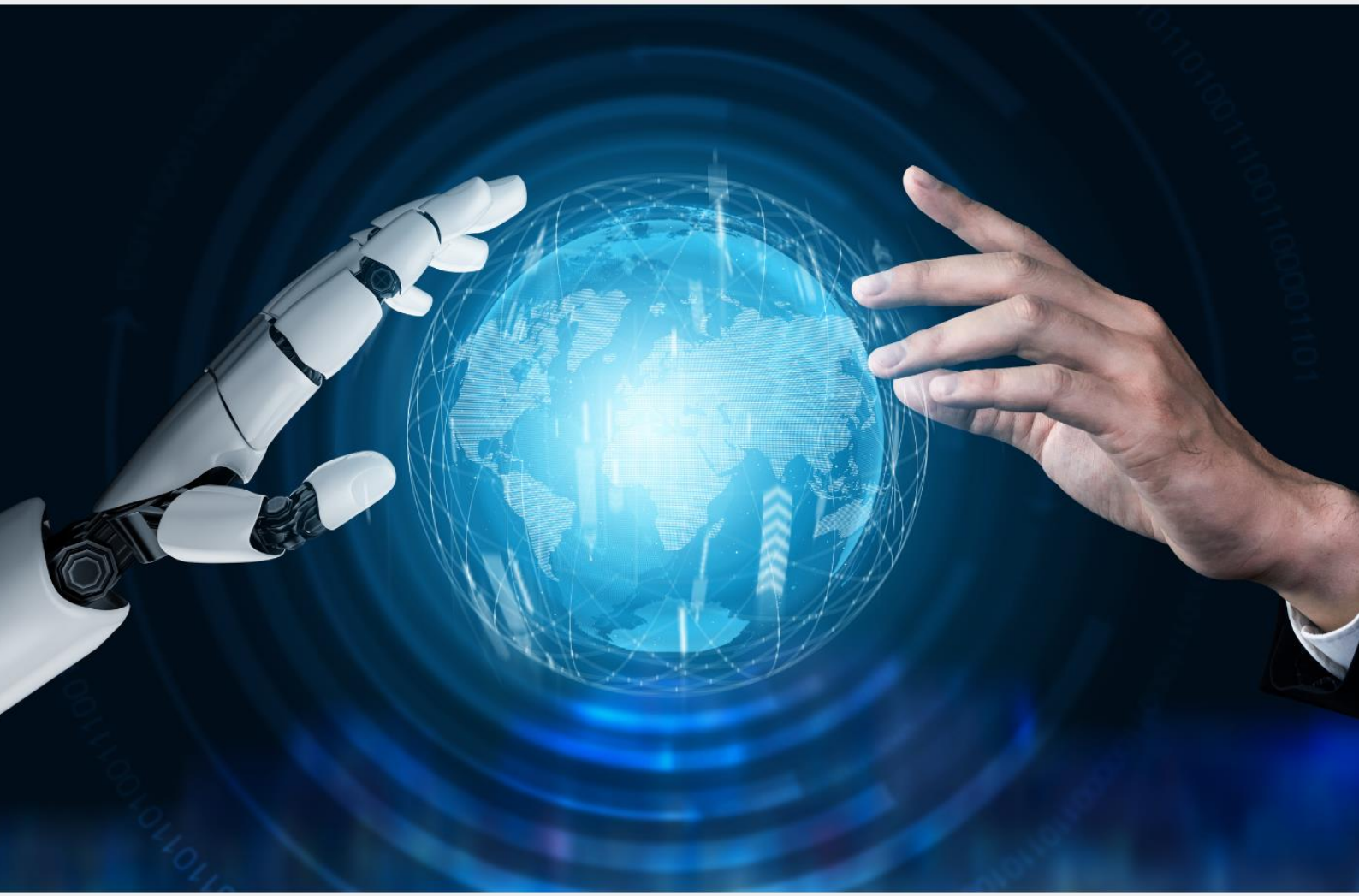
AI and Data Governance

When Code Creates: A Landscape Report on Issues at the Intersection of Artificial Intelligence and Intellectual Property Law



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Foreword

Rapid advancement in artificial intelligence (AI), and the mass uptake of generative AI in the past year, are raising a number of issues at the interface with intellectual property (IP) law—including some that go to the heart of the conceptual framework underlying IP, which matured in the early modern period in a very different technological context. This Landscape Report (Report) offers a comparative study of the global landscape, surveying recent developments and presenting an illustrative view of the evolving approach of the major legal systems on key issues such as the recognition of AI systems in inventorship and authorship, the impact of AI-generated creations on traditional IP categories, and the evolving nature of IP infringement in the age of AI.

The Introduction to the Report calls for communication and collaboration between the stakeholders in the public and private spheres to define and quantify the issues at the AI/IP interface. This Report, which is a product of a collaboration between the Intellectual Property Office of Singapore (IPOS) and the SMU Centre for AI & Data Governance (CAIDG), provides a basis for more dialogue between government, the relevant industries (including technology companies and content creators) and civil society (including but extending beyond academia). Our goal in embarking on this collaboration was to create and explore a common corridor for discussion, in recognition of the social and economic importance of the questions at its heart.

Our preliminary research and drafting revealed that it was not always straightforward how to approach the topic and how to individuate the various issues. Problems and questions raised under any given head of IP law (e.g., patent, copyright, etc.) mirror each other in their broad outline, and this correspondence is evident in the structure of each chapter and section. However, many of the issues arise from a common set of conceptions (and assumptions) around authorship, effort, and creativity, and accordingly bleed into each other. (For example, the requirement for a human author and the attribution of IP rights to one or more parties involved in the creation of a work or invention.)

While the issues treated in this Report include some philosophical "chestnuts"—such as the presupposition of human authorship in the conceptual scheme of IP law—we do not delve into broader issues such as the questions of political economy in the role that IP rights is assumed to play in the incentivisation of creativity and effort. While

important, such questions would take the Report beyond its natural (and manageable) scope; they warrant independent investigation. Instead, this Report explores IP law on its own terms and within its traditional frame of reference.

The Report is designed to serve as a resource for policymakers, lawmakers, technology developers and deployers, IP creators/rights owners, and civil society—in Singapore and beyond. Without advocating specific policy recommendations, it aims to provide the background necessary for informed dialogue and decision-making. By offering a clear, comparative perspective on the major issues, we hope to contribute to a deeper understanding of the complex interrelations between AI and IP, facilitating a rational approach to the creation and recognition of IP rights in an era where non-human agents play an increasingly active role in creative and inventive processes.

Singapore, with its forward-thinking, facilitative approach to emerging technology and strong IP framework, aims to place itself at the leading edge of responsible AI adoption, balancing commercial opportunity with the demands of technology governance. The AI/IP interface is a dynamic frontier, and Singapore's ongoing journey in this landscape is both a reflection of its commitment to innovation and a testament to the importance of robust, adaptable legal frameworks. Thus, beyond the domestic audience, we hope that this exploration of the issues across jurisdictions provides a useful point of comparison for a broader, international audience.

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Introduction

Intellectual Property (IP) laws traditionally assume that inventors, designers, authors and creators are human beings. The rapid advancement of Artificial intelligence (AI),[1] especially in respect of large language models and other generative AI models, is fundamentally impacting on business and society.

While forecasts are by their nature only estimates, the projections on AI provide an indication of its game-changing nature. One report by PwC suggests that AI could contribute up to US$15.7 trillion to the global economy in 2030—more than the current combined output of the People's Republic of China (China) and India.[2] Recognising the potential impact of AI, governments have started formulating plans and policies to harness the technology's benefits, while hemming in the risks. For example, Singapore's second National AI Strategy (NAIS 2.0) sees AI as a "potent force for good, to uplift human potential".[3]

Indeed, not only can AI help write code, it can also design new drugs, develop products, redesign processes and create graphic designs and artworks, among other creations and innovations.

However, it is precisely these abilities of AI that have given rise to a range of legal questions, including in the IP sphere. For instance, is there copyright protection over a piece of visual art generated by an AI model? Can there be patent protection over an invention devised by an AI system? Who owns the output generated by an AI model and conversely, who is liable if the output infringes another's IP rights? There are other conundrums.

As a response, jurisdictions around the world are keenly studying the interaction between AI and the IP regime. The implications for IP laws are multifaceted, and businesses and industries are calling for clear, adaptable and forward-thinking legal frameworks or guidelines.

[1] The OECD AI Policy Observatory defines an AI system as "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". See: 'OECD AI Principles Overview' (OECD.AI).
[2] Anand S Rao and Gerard Verweij, 'What's the Real Value of AI for Your Business and How Can You Capitalise?' (PwC).
[3] 'NAIS 2.0: Singapore National AI Strategy' (Government of the Republic of Singapore, 2023).

At the time this Landscape Report (the Report) was being conceptualised, there was a flurry of calls for comments from various IP Offices, with an increasing number of jurisdictions holding their own studies and consultations. The issues laid out in these calls, as well as current discussions, do not relate merely to the IP regime but intersect with technical, societal, cultural and economic perspectives, and require a background understanding of AI and of the IP regime. Many parallel conversations and studies are taking place on myriad AI/IP subject matter and issues. The World Intellectual Property Organization (WIPO), via its Conversation on Intellectual Property and Frontier Technologies,[4] has gone a considerable distance to organise the discussions and corral the relevant information.

These discussions have helped to crystallise the distinct (but interrelated) issues that lie at the intersection of AI and IP. So far, these issues are largely in a state of flux, with differing and often conflicting viewpoints across the range of stakeholders and no discernible consistency in the approaches by governments towards solutions to these issues. On the question of AI authorship for copyright works and AI inventorship for patents, there is generally alignment by the IP offices and courts of major jurisdictions that under the existing copyright and patents regimes, only human beings can be authors or inventors respectively. Even then, discussions continue as to whether the status quo should remain.

This is where the Report comes in. The Report is a collation of the treatments across various jurisdictions of selected key IP issues. It may be used as a primer to quickly locate an issue and the general understanding around it, and therefore allow the reader to obtain sufficient background prior to navigating the issues that surround AI and IP. By locating the treatment of these issues in the various jurisdictions in the same place, we hope to aid the reader in uncovering patterns relating to different schools of thought, different assumptions due to existing laws, cultural and social influences, and the divergences and convergences of thought that is present in relation to the current thinking in the field of AI and IP.

In discussing AI and IP issues, one needs to make a distinction between AI-*generated* inventions and works, and AI-*assisted* inventions and works. There is a scale with, at one end, AI being used as a tool to help develop new works and inventions, resulting in what is generally called AI-assisted works and inventions. Where AI has been part of the inventive or creative process, this is arguably no different from using any other

[4] This series was originally named *Conversation on IP and AI* but later renamed after the 3rd session in recognition that AI is part of rapidly evolving advanced technologies that have large-scale impact on how we communicate, provide and consume goods and services, and create and do business.

tool. The issues being thrown up by the rapid advancement of AI, and which are discussed in this Report, relate more to where AI has "cognitive" abilities and generates the invention or work with no human intervention, i.e., AI-*generated*. In addition, two points must be borne in mind when thinking about these issues. It is important to understand the complexity of AI as it involves multiple players (including the owner, the programmers and the users), all of whom play a part in the "creation" of eventual AI-generated output. At the same time, the policy considerations should continue to be clear whilst delving into the (often-complex) technical and legal details of AI.

As it stands, issues on patent and copyright law dominate the conversations. Apart from a key question of whether AI-generated output may be protected by IP laws, there has been, due to the boom in generative AI in the past year, much attention on issues of infringement in the training of AI systems and who should be held liable should the output infringe third parties' IP rights. But much remains speculative as the world awaits the results of pending lawsuits and governmental consultations and studies.

Discussions regarding designs, trademarks, and IP issues concerning digital replicas of persons, while existent, are nascent by comparison. However, we would be remiss in not (at least) touching on these other issues in this Report. Further, a comprehensive analysis of the multifaceted impact of AI on our society and economy is beyond the scope of the Report, as is any systematic exploration of law reform issues. And although of significant importance, the Report does not explore the issues of deep fakes and online harm, and maintains a focus on the intersection of AI and IP law.

Depending on the reader's purpose, different themes and takeaways may be gleaned from the Report. However, there are certain key ideas that emerge from the various discussions. One is that AI, being non-human, does not respond to the same incentives that motivate human beings—the conferment of a time-limited monopoly to exploit one's creations and inventions. However, there is significant debate on whether IP protection is nevertheless required for AI-generated output, in order to stimulate continued investment in AI development and the commercialisation of AI output, which are crucial for economic and technological advancement.

In this regard, one overarching question is whether, and if so, how IP laws should be adapted to accommodate AI and its output. In several areas, the role of AI is already testing the limits of IP laws—for example, whether AI can be an author or inventor.

Based on the extant discussions around such and similar questions, the answers do not come from hewing to either extreme of a binary approach, but from a more nuanced appreciation of where the balance ought to be struck. As alluded to above, one complicating factor is the existence of a multiplicity of stakeholders in the AI/IP ecosystem, with the attendant need to navigate the various tensions among them, including who should be liable for AI-generated output that is infringing.

Another takeaway is that while, at a high level, there are common issues that concern the different IP, one cannot assume a one-size-fits-all solution. This is because the different types of IP are governed by different IP regimes, which will therefore need to be separately understood in the search for solutions (e.g., novelty in patent law and originality in copyright law are different concepts).

Lastly, further consultations, and even collaboration, between the stakeholders in the public and private spheres, will be desirable, if not necessary, in refining the problem statements and the possible solutions.

The world in which AI operates continues to develop at an extraordinary pace, as do AI systems themselves. Even as we prepare the Report for publication, we are certain that more advancements will be made, more studies and proposals will be produced, and more issues debated. We still see value however, in producing the Report, not only as a snapshot in time, but as a resource for the ongoing and critical dialogue on whether existing IP legal frameworks are equipped to effectively address the complexities brought about by AI.

Chapter 1. AI and Patents

Patent protection is often seen as a bedrock of innovation. The inventor is granted a time-limited monopoly to exclude others from using the invention, in return for disclosing the secret behind the invention to the public, which can then tap the knowledge to further innovate. This *quid pro quo* creates a virtuous cycle that promotes the advancement of society. Over the years, this justification has breathed life to a system of patent laws, the key aspects of which have largely remained intact since the Venetian patent statute in the 15th century.[5] While there are differences in patent systems around the world, a common thread runs through their design: patent protection is intended to incentivise *human* ingenuity.

The rise of *artificial* intelligence has raised questions on the role, if any, of patent laws in protecting the innovative output of AI (AI-generated inventions). The focus of this Chapter is on the protection of AI-generated inventions, as opposed to the protection of AI systems themselves and AI-*assisted* inventions, both of which involve humans.[6] Where there are humans involved, there is arguably less controversy on the possibility of protection under existing patent law. But AI involvement exists on a spectrum; as the discussion shifts from AI that automates to AI that invents autonomously (or appears to), the picture becomes far less clear.

There is of course the threshold question of whether AI is even capable of autonomous invention. Increasingly, this question appears to be moving closer to being answered in the affirmative. Besides the food container and flashing beacon that are claimed to have been invented by the AI system DABUS,[7] other examples are said to include an AI-designed plane cabin and AI-designed race-car chassis.[8] Accordingly, AI-generated inventions by "invention machines" are said to be "around the corner".[9] This makes the questions surrounding their patent protection even more pressing.

Ahead of dissecting the key issues, it is necessary to flag the broader, normative question of whether AI-generated inventions should receive patent protection in the

[5] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 103, 105.
[6] Ichiro Nakayama, 'Patentability and PHOSITA in the AI Era—A Japanese Perspective', in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 100.
[7] 'The Artificial Inventor Project' (*artificialinventor.com*).
[8] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 105.
[9] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 102.

first place. On one view, AI systems are not motivated by "the incentives that are at the heart of the patent system", i.e., exclusive rights and potential profits.[10] On the other hand, it has been argued that, as AI systems are created by humans through resource-intensive efforts, these humans may require incentives to develop AI systems in the first place.[11] For example, patent protection can promote commercial opportunities for AI-generated inventions.[12] To withhold patent protection would drive these inventions to be protected as trade secrets, which is less robust,[13] affects transparency obligations in areas such as the life sciences industry,[14] and is detrimental to the implicit rationale of providing protection in return for disclosure to the public, thereby spurring further innovation.[15] It has even been argued that the incentives for patent protection of AI-generated inventions are so great that some applicants will end up lying that AI had generated the invention, affecting the legitimacy of the patents obtained, and bringing the patent system itself into disrepute.[16]

There have been various strands of policy discussions on patent protection for AI-generated inventions in various IP offices, including WIPO, United States Patent and Trademark Office (USPTO) and the UK's Intellectual Property Office (UKIPO). Academic commentators have also weighed in, and we will make reference to arguments from the academic commentaries in this Chapter and throughout this Report.

In practical terms, the question of patent protection for AI-generated inventions can be broken into three distinct but closely related issues:

1. Can an AI system be named as inventor?
2. Can an AI-generated invention fulfil the patentability requirements?
3. Who is the owner of an AI-generated invention?

[10] See, for example Robert Plotkin, 'AI-Generated Inventions Need Human Ingenuity and Patents' (*Bloomberg Law*, 8 August 2023).
[11] See, for example Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 72, 78.
[12] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 108.
[13] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 84.
[14] Peter Georg Picht, Valerie Brunner and Rena Schmid, 'Artificial Intelligence and Intellectual Property Law: From Diagnosis to Action' [2022] Max Planck Institute for Innovation and Competition Research Paper No. 22-08, 9.
[15] Peter Georg Picht, Valerie Brunner and Rena Schmid, 'Artificial Intelligence and Intellectual Property Law: From Diagnosis to Action' [2022] Max Planck Institute for Innovation and Competition Research Paper No. 22-08, 8.
[16] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 86.

1.1 Can an AI system be named as inventor?

From 2018, under the auspices of the Artificial Inventor Project, a series of test cases (the DABUS litigation) were filed in many IP offices worldwide, seeking patent protection for the inventions autonomously generated by DABUS,[17] an AI system created by computer scientist Stephen Thaler. More than five years on, the emerging consensus from these cases—some of which have been heard by the highest courts—is that AI *cannot* be named as an inventor of an AI-generated invention within the existing framework of the patents regime.

In patent law, the question of inventorship is a matter of no small importance. The inventor has the indubitable right to be mentioned in the patent.[18] Demonstrating the connectedness of our three questions, existing laws in most jurisdictions link the *ownership* of a patent to either the (human) inventor or a legal entity that has acquired the ownership right from the inventor (e.g., where an employer becomes entitled to its employee's invention under the employment contract).[19] For these reasons, patent applications require the naming of the inventor. Where this requirement is not satisfied, no patent can be issued, with the application "[cut] off at the knees".[20] So long as an invention must have a human inventor, AI-generated inventions cannot be patentable.[21]

[17] DABUS stands for "Device for the Autonomous Bootstrapping of Unified Sentience".

[18] Under the Paris Convention for the Protection of Industrial Property, Article 4ter states: "The inventor shall have the right to be mentioned as such in the patent."

[19] Aaron Hayward and others, 'The IP in AI: Does Copyright Protect AI-Generated Works?' (*Herbert Smith Freehills*, 3 October 2023).

[20] Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 380.

[21] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 73.
This is not to say that the invention will be unable to meet patentability requirements, which is assessed objectively, rather than by reference to the mental process of the inventor: see Aaron Hayward and others, 'The IP in AI: Does Copyright Protect AI-Generated Works?' (*Herbert Smith Freehills*, 3 October 2023).

1.1.1 The DABUS applications

The key assertions in the DABUS patent applications are essentially: (a) that the AI system DABUS should be deemed an inventor—but (b) that as DABUS, being a machine, is unable to own property such as patents, the patent rights should accrue to DABUS' owner.[22]

In the vast majority of jurisdictions, including Australia, the European Union (EU), Japan, South Korea, the United Kingdom (UK) and the United States (US), it has been held that AI cannot be the inventor of an AI-generated patent.[23] The *Leitmotif* in the reported decisions is that existing patent legislation does not provide for non-human inventors, and that law reform would be necessary for this position to change.

In several jurisdictions, appeals or judicial review proceedings have been pursued following the initial rejection of the patent applications by the IP offices (see Table 1 of this Chapter for more details of the DABUS litigation). So far, the scorecard has not changed. For example, the highest courts in Australia and the US had declined to hear further arguments on the case, putting an end to the DABUS litigation in those jurisdictions.[24] Most recently, the outcome of a highly anticipated appeal to the UK Supreme Court affirmed the status quo—that an inventor must be a natural person and that therefore, DABUS is not and never was an "inventor" under the relevant UK patent legislation.[25]

Against this tide of adverse decisions, the DABUS application was successful in South Africa. South Africa does not conduct substantive examination before patent grants, although the application would presumably have cleared formalities and other requirements as part of its patent registration system. The reasons for the decision of South Africa's Patent Office are not known. However, some observers have criticised the decision as being erroneous—after all, the drafting of South Africa's Patents Act 57 of 1978 refers to the inventor with the singular pronoun "him" (rather than "it"—

[22] See, for example: Ichiro Nakayama, 'Patentability and PHOSITA in the AI Era—A Japanese Perspective', in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 101.
[23] For a fuller listing and details, see, for example, Kingsley Egbuonu, 'The Latest News on the DABUS Patent Case' *IP Stars* (20 December 2023), 'Patent' (*artificialinventor.com*) and DABUS, '1. WO2020079499 - Food Container and Devices and Methods for Attracting Enhanced Attention'.
[24] In Australia, a special leave to appeal to the High Court of Australia was rejected in November 2022. In the US, the Supreme Court of the United States denied a writ of *certiorari* in April 2023.
[25] *Thaler (Appellant) v Comptroller-General of Patents, Designs and Trademarks (Respondent)* [2023] (UK Supreme Court 49) [73].

even a non-gendered “they” would imply a human rather than some other entity in ordinary speech). In defence of the decision, it has been suggested that whether intentional or not, the decision was the right one based on a “purposive approach to statutory interpretation”.[26] Noting that South Africa’s IP policy sees IP as an important instrument to promote innovation, among other causes, some have described the decision as “progressive and pro-science” for the African country.[27]

Quite apart from the substantive outcome, the global concert of DABUS litigation has shone the spotlight on questions concerning the patent protection of AI-generated inventions. Given the preponderance of IP office and court decisions against naming AI as the inventor, and with several courts identifying the question as one for policymakers, the subject has come up for policy review in various fora.[28]

[26] Donrich Thaldar and Meshandren Naidoo, ‘AI Inventorship: The Right Decision?’ (2021) 117 South African Journal of Science, 2.

[27] Donrich Thaldar and Meshandren Naidoo, ‘AI Inventorship: The Right Decision?’ (2021) 117 South African Journal of Science, 3.
Saudi Arabia has also been claimed as a possibility, with the Saudi Authority for Intellectual Property reportedly conducting substantive examination after accepting the designation of DABUS as the inventor: see Ryan Abbott and Elizabeth Rothman, ‘IP Law in the Era of Generative AI’ (2023) 36 Amplify.

[28] Note that the reviews implicate other AI and patents issues, apart from the naming of AI as the inventor.

1.1.2 Policy discussions on AI inventorship[29]

At the international level, WIPO has raised the question of whether IP law should continue to require only human inventorship, whether it should allow AI to be named as the inventor, or whether there are alternative solutions. Noting that each of the possible approaches to AI inventorship "has potential implications across the complex IP legal framework", WIPO has stated that the options will need to be considered in the context of local innovation ecosystems.[30]

In the UK, the government consulted the public on the wider issues concerning patent protection for AI-devised inventions, and concluded (as of June 2022) that no legal change was needed as there was no evidence that UK patent law was inappropriate to protect inventions made using AI.[31] Most of the consultation responses stated that no legal change was the best option at the moment,[32] with many taking the view that any changes to rules on inventorship should be harmonised at the international level.[33] Among those respondents who supported some kind of legal change, the majority supported the approach of expanding the definition of "inventor" to allow humans responsible for an AI system to be named inventor. This was preferred over two other options: allowing an applicant to name an AI system as the inventor; and introducing a new patent-like right to protect inventions devised by AI.[34]

In the US, the USPTO had also sought wide-ranging stakeholder input on the current state of AI technology in the invention creation process and on how to address inventions created with significant AI contributions. The questions posed for public comment include: "Should AI systems be made eligible to be listed as an inventor? Does allowing AI systems to be listed as an inventor promote and incentivize innovation?"[35]

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[29] Beyond addressing the issue of whether AI should be named as an inventor, the policy discussions are also relevant to the other interrelated issues – including patentability requirements and ownership – that are discussed elsewhere in this Chapter.

[30] 'AI Inventions' (*WIPO*, 2023).

[31] 'Artificial Intelligence and Intellectual Property: Copyright and Patents: Government Response to Consultation' (*GOV.UK*, 28 June 2022) [65].

[32] 'Artificial Intelligence and Intellectual Property: Copyright and Patents: Government Response to Consultation' (*GOV.UK*, 28 June 2022) [69].

[33] 'Artificial Intelligence and Intellectual Property: Copyright and Patents: Government Response to Consultation' (*GOV.UK*, 28 June 2022) [79].

[34] 'Artificial Intelligence and Intellectual Property: Copyright and Patents: Government Response to Consultation' (*GOV.UK*, 28 June 2022) [71-77].

[35] United States Patent and Trademark Office, Department of Commerce, 'Request for Comments Regarding Artificial Intelligence and Inventorship', (*Federal Register*, 14 February 2024) Supplementary Information, Section IV, Question 9a.

Afternote: In February 2024, the USPTO issued guidance on inventorship and sought comments. Among other things, the guidance stated that while AI systems cannot be listed as inventors, the use of AI systems by a natural person does not preclude his or her qualifying as an inventor, if the natural person had significantly contributed to the claimed invention.[36]

In academic circles, options discussed have included: (a) retaining the status quo (i.e., that AI systems cannot be inventors); (b) listing the AI system and its human owner as joint inventors; or (c) recognising the AI system as the inventor with a human being as the owner of the invention.[37] None of these options are without issues open to debate. For example, on the recognition of AI inventorship, without clear criteria to assess whether an invention has indeed been AI-generated, "all attributions of rights to such a system would engender severe legal uncertainty".[38]

Another possibility again is to differentiate the patent applications for human inventions and AI-generated inventions, i.e., the introduction of a *sui generis* category for the latter group. On one variant of this concept, AI-generated inventions could qualify for patent protection, with the company deploying the AI to be named as the inventor and owner "under a work-made-for-hire-type model".[39] Here too, there would be creases to be ironed out, including applicants attempting to game the system by characterising their applications to fit into the category that provides for more desirable treatment.[40]

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[36] United States Patent and Trademark Office, Department of Commerce, 'Inventorship Guidance for AI-Assisted Inventions' (*Federal Register*, 13 February 2024) (accessed on 20 February 2024).

[37] Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 370.

[38] Peter Georg Picht, Valerie Brunner and Rena Schmid, 'Artificial Intelligence and Intellectual Property Law: From Diagnosis to Action' [2022] Max Planck Institute for Innovation and Competition Research Paper No. 22-08, 18.

[39] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 72.

[40] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 115.
Some commentators have suggested that to deal with the issues concerning human and AI inventions, which cannot be compared evenly, a new type of patents should be created for AI inventions, where the term of protection is shorter, e.g., 15 years: see Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 385–6. This is in contrast to patent protection whereby the period of protection must be no less than 20 years from the date of filing of the patent application.

Singapore

IPOS received a DABUS application in October 2022.[41] Thaler's inventorship statement reads: "DABUS, The invention was autonomously generated by an artificial intelligence".[42]

According to IPOS' database, the application has been treated as abandoned.[43]

Section 24(2) of the Patents Act (Mention of Inventor) requires a patent applicant to file a statement identifying the person whom the applicant believes to be the inventor; and where the applicant is not the inventor, to indicate the derivation of the applicant's right to be granted the patent, failing which the application is treated as having been abandoned. The existing law in Singapore would appear to require an applicant to identify a natural person in the inventorship statement under section 24(2).

Section 2(1) of the Patents Act defines "inventor" in relation to an invention as "the actual deviser of the invention". This has been interpreted by the Singapore courts to mean "the *natural person* who came up with the inventive concept".[44] In this regard, the Assistant Registrar of the Supreme Court noted that section 24(1) confers a "moral right" on the inventor to be named—even if he is not the proprietor.[45] Its nature is that of a personal right that cannot be assigned. The court held that the grant of a moral right to be named as the inventor means that the inventor must refer to a natural person. While the matter was decided on the basis that corporate entities cannot be named as inventors, the judgment makes clear that only natural persons can be regarded as inventors under the Patents Act.

This analysis is supported by academics, who have noted that section 19 of the Patents Act, which sets out who a patent may be granted to, is also predicated on the inventor being a natural person. As such, "an AI-generated invention cannot enjoy patent

[41] This application is the national phase entry of an international application under the Patents Cooperation Treaty (the PCT application), with the applicant having designated 18 jurisdictions, including Singapore. See Ryan Abbott and Elizabeth Rothman, 'IP Law in the Era of Generative AI' (2023) 36 Amplify.
[42] Under the Singapore Patents Act 1994, this statement is deemed to be the statement of the name of the inventor provided at the international phase under the PCT application, see s87(1)(c).
[43] 'IPOS Digital Hub' (*ipos.gov.sg*).
[44] *Energenics Pte Ltd v Musse Singapore Pte Ltd* [2013] SGHCR 21 [24].
[45] Section 24(1) of the Singapore Patents Act 1994 provides for the right of mention for the inventor or joint inventors in any patent granted for the invention.

protection in Singapore".[46] Notably, section 19 and 24 of the Patents Act share similar wording with section 7 and section 13 of the UK Patents Act 1977 (UK Patents Act).[47]

1.2 Can an AI-generated invention fulfil the patentability requirements?

Numerous requirements must be met for a patent to be granted. Some key conditions that an invention must commonly fulfil are:[48]

1. Novelty, i.e., the invention must have some new characteristic that is not known in "the body of existing knowledge in its technical field", which is known as the "prior art".
2. An "inventive step" or "non-obviousness", i.e., the invention would not have been obviously deduced by a person possessing ordinary skill in the relevant technical field.
3. Industrial application, i.e., the invention is useful or is capable of being utilised for a business or industrial purpose.
4. Subject matter that is accepted as "patentable" under the law.[49]
5. Sufficient disclosure, i.e., in a sufficiently clear and complete manner in the patent application, to enable replication by a person possessing ordinary skill in the relevant technical field.

(We note, in parentheses, that while these conditions have been harmonised over time, there would be differences among jurisdictions.)

This section focuses on the conditions of non-obviousness and sufficiency of disclosure, two requirements of some relevance to AI-generated inventions, and which have sparked significant discussion so far.

First, however, it is convenient to note the more general issue of patentable subject matter in the context of AI-related technologies. In many jurisdictions, "scientific theories, aesthetic creations, mathematical methods, plant or animal varieties,

[46] Wee Loon Ng-Loy, 'Chapter 16: Intellectual Property' in Simon Chesterman, Goh Yihan and Andrew Phang Boon Leong (eds), *Law and Technology in Singapore* (Singapore Academy of Law 2021) [16.022].
[47] Singapore derived much of its Patents Act 1994 from the UK.
[48] 'Frequently Asked Questions: Patents' (*WIPO*).
[49] Various jurisdictions stipulate exclusions from patentable subject matter. An invention that falls within such exclusions would be considered non-patentable subject matter.

discoveries of natural substances, commercial methods, methods for medical treatment (as opposed to medical products) or computer programs are generally not patentable".[50] The rapid development of AI has engendered discussion on whether AI-related technologies, such as AI systems, are patentable.[51]

Recently the High Court of England and Wales decided that an aspect of AI—an Artificial Neural Network—did *not* engage the exclusion from patent protection under the UK Patents Act 1977, which excludes from protection "a program for a computer … as such".[52] Further, the court found that as the claimed invention did make a "technical contribution", it would therefore be patentable in any case.[53] Following the case, the UKIPO suspended its guidelines on the examination of AI-related applications pending consideration of the judgment,[54] which has been seen as a positive development for the patentability of AI inventions.[55]

Insofar that a specific *AI-generated* invention in question is considered to constitute "software", or to concern abstract ideas or mathematical theories, it may or may not qualify as patentable subject matter under existing requirements, depending on the facts of the case.

1.2.1 Non-obviousness

In reviewing the literature, two main strands of discussions stand out in relation to the elements of the non-obviousness requirement: (a) the notional skilled person;[56] and (b) the prior art that the skilled person has reference to in discerning whether the invention is non-obvious.

In relation to the first point, an invention that is non-obvious is one that cannot be obviously deduced by a person with ordinary skill in the relevant technical field. Given the time-limited monopoly that comes with a patent, the interposition of this legal

[50] 'Frequently Asked Questions: Patents' (*WIPO*).
[51] An example of a patent for a generative AI system is for "Attention-based sequence transduction neural networks" filed in the US (US10452978B2) and elsewhere by Google LLC.
[52] See UK Patents Act 1977 s1(2)(c)–(d).
[53] *Emotional Perception AI Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2023] EWHC 2948 (Ch).
[54] 'Examining Patent Applications Relating to Artificial Intelligence (AI) Inventions' (*GOV.UK*, 22 September 2022).
[55] See example, Alex Burns, 'Emotional Perception AI v UKIPO: Is This the Dawning of a New Era for AI-Related Inventions at the UKIPO?' *Mewburn Ellis* (28 November 2023).
[56] We use "skilled person" as a catch-all term for the different manifestations of the notional person in the non-obviousness requirement across jurisdictions.

standard is an important "filter", since it "prevents a patent from being granted to an invention which would have been created anyway without the incentive of exclusive rights".[57] This requirement ensures that patents are granted only for inventions that provide "an appropriate level of improvement over the prior art and of contribution to technological development that benefits society."[58]

While there are jurisdictional nuances, the non-obviousness requirement invariably involves the patent examiner assuming the shoes of a fictional person to judge the invention on hand.[59] For example, the US law uses the "person having ordinary skill in the art" (PHOSITA), where the difference between the invention and the prior art must, as a whole, have been non-obvious to a PHOSITA before the filing date of the invention.[60] The UK conjures a slightly different fictional person, being a "person skilled in the art", who need not be a "Nobel prize winner" but rather "best seen as someone who is good at their job, a fully-competent worker".[61] Under the UK test, the question is whether the differences between the inventive concept and the prior art constitute steps that would have been obvious to the person skilled in the art, or whether they require any degree of invention.[62]

The requirement was clearly conceived in relation to human inventors. As vividly described by a judge in the US context, "the proper way to apply the… obviousness test… is to first picture the inventor as working in his shop with the prior art references—which he is presumed to know—hanging on the walls around him."[63] To date, the non-obviousness requirement has not been adapted for the examination of AI-generated inventions, although questions have already been raised. For example, the Full Court of the Federal Court of Australia in the DABUS litigation asked: "If an artificial intelligence is capable of being recognised as an inventor, should the standard

[57] Ichiro Nakayama, '5: Patentability and PHOSITA in the AI Era—A Japanese Perspective', *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 109.
[58] 'WIPO Patent Drafting Manual: Second Edition' (WIPO 2023), 19.
[59] The issue of the skilled person is also relevant as it is also the skilled person who determines the sufficiency of disclosure, and infringement (in some jurisdictions), see, for example, Yolanda Wang and Jennifer Che, 'How Smart Is a "Skilled Person in the Art"?' (*China Patent Strategy*, 11 April 2022).
[60] Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 372.
[61] See 'Manual of Patent Practice' (*GOV.UK*).
[62] See *Pozzoli SpA v BDMO SA* [2007] EWCA Civ 588, which elaborates on the UK's *Windsurfing* approach to obviousness in *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1984] EWCA Civ J0131-3 FSR 59.
As another example, the EPO adopts the "problem-solution approach" to assess inventive step, using a person skilled in the art, see 'Chapter VII – Inventive Step' in *Guidelines for Examination in the European Patent Office* (*European Patent Office*, 2023). For a compendium of the legal test in various jurisdictions, see: 'Certain Aspects of National/Regional Patent Laws' (status as of June 2023).
[63] *re Winslow* [1966] C.C.P.A. 365 F.2d 1017.

of inventive step be recalibrated such that it is no longer judged by reference to the knowledge and thought processes of the hypothetical uninventive skilled worker in the field? If so, how?"[64]

The crux of the issue is that what would be non-obvious to the human mind might well appear trivial to AI.[65] This point is brought home by the "Pyrimidine Derivative" case in Japan.[66] The case involved proceedings to invalidate a patent that was granted in relation to a pharmaceutical compound. Based on the facts, the compound was cited in the prior art, albeit in the form of a general formula. However, given that the specific configuration of the compound was one out of over 20 million alternatives, the court held that the invention of the compound was not easily conceived. While not directly linked to AI, commentators have noted that the judgment raised interesting questions.[67] One commentator observed in 2018: "More than 20 million alternatives might be an enormous number today, but might not be so in the future when using AI."[68]

It has been posited that where more inventors and companies use powerful AI to devise new inventions, the legal standard will need adjustment to take the developments into account.[69] Otherwise, the non-obviousness requirement will be "far too lenient", with the human who owns the AI system claiming the credit even though the majority of inventing is performed by the AI system.[70] At some point, patent examiners will therefore need to start assuming that the skilled person also "has access to AI, which will raise the bar for obviousness in the patent process".[71] This will make it harder for human inventors to push their inventions across the line, so to speak, as the adoption of the notion of an AI-assisted skilled person, or even its

[64] *Commissioner of Patents v Thaler* [2022] FCAFC 62 [119].
[65] Hubert Ning, 'Is It Fair? Is It Competitive? Is It Human?: Artificial Intelligence and the Extent to Which We Can Patent AI-Assisted Inventions' (2023) 49 J. Legis., 427.
[66] *Nippon Chemiphar Co, Ltd v Shionogi & Co, Ltd* [2018] IP High Court H28 (Gyo-Ke) 10182, 10184.
[67] Ichiro Nakayama, '5: Patentability and PHOSITA in the AI Era—A Japanese Perspective', *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 110–111.
[68] Hiroshi Kato (2018) 16 *Chizai Prism* (IP Prism) 190, 35 (note), cited in Ichiro Nakayama, '5: Patentability and PHOSITA in the AI Era—A Japanese Perspective', *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 111.
[69] See Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 112. While these comments are made in the context of humans using AI for inventions, the comments would likewise apply to AI-generated inventions – and arguably with more force.
[70] Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 378.
[71] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 112.

replacement by a skilled AI system,[72] would naturally deem human-created inventions obvious. Indeed, it has been argued that a skilled person using AI "can potentially create every invention"—rendering "everything obvious".[73]

There are also difficulties with defining the "skilled AI system", as it would be challenging to determine what an AI machine might consider a step that would be considered sufficiently inventive.[74] It may also be difficult to establish what sort of AI system should constitute the skilled AI system, a challenge that is compounded by the "black box" nature of such systems and the dependency of their output on the particular datasets that the system in question had been trained on.[75]

In relation to the second point (on prior art), at present, a skilled person is not expected to be familiar with the prior art in other fields, unless there is a nexus to the issue at hand.[76] However, a skilled AI system would have the computing ability to access far more prior art than a human skilled person would otherwise be able to survey, expanding the scope of prior art to an "almost an infinite collection", raising the non-obviousness bar even further.[77]

In the USPTO's 2020 report on public views on AI and IP policy,[78] most public respondents agreed that the "growing ubiquity" of AI would affect how the USPTO and the courts would assess the PHOSITA standard, being a standard "critical" to determining whether a patent should be granted. However, it has been pointed out that historically, the requirement has been adapted in step with developments, such as allowing the skilled person to be an interdisciplinary team to reflect new ways in which research and development is conducted.[79] Against this view, there are suggestions that despite its flexibility, the non-obviousness requirement must still be

[72] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 113.
[73] Ryan Abbott, 'Everything Is Obvious' [2019] UCLA L. Rev. 2 66, 4–10.
[74] Gaétan de Rassenfosse, Adam B Jaffe and Melissa F Wasserman, 'AI-Generated Inventions: Implications for the Patent System' (2023) Southern California Law Review, 113.
[75] Aaron Hayward and others, 'The IP in AI: Does Copyright Protect AI-Generated Works?' (*Herbert Smith Freehills*, 3 October 2023).
[76] For example, in the UK, the question to be answered is: "…given the problem to be solved by the invention, in what analogous arts would it be reasonable for the skilled man to seek the solution": see 'Manual of Patent Practice' (*GOV.UK*).
[77] Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 378.
It may also be pointed out that a proliferation of AI systems, which will be able to generate AI-generated inventions at a high rate, will also fuel the amount of prior art.
[78] 'Public Views on Artificial Intelligence and Intellectual Property Policy' (USPTO, 2020) [iii].
[79] Aaron Hayward and others, 'The IP in AI: Does Copyright Protect AI-Generated Works?' (*Herbert Smith Freehills*, 3 October 2023).

revised to accommodate inventions that use AI. One suggestion is for the courts to first determine the type of inventor—human or AI—and change the analysis as applicable, i.e., two different standards, in acknowledgment that humans and AI "cannot be compared evenly". It is posited that the allowance of "a more lenient standard to obtain a patent in exchange for a shortened term limit is likely more than enough to incentivize inventors to disclose AI technology for patent protection".[80]

Singapore

In Singapore, section 13(1)(b) of the Patents Act states that a patentable invention is one that involves an inventive step. The meaning of "inventive step" is set out in section 15: "An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art …"[81]

The Singapore Court of Appeal in *First Currency Choice Pte Ltd v Main-Line Corporate Holdings Ltd and another appeal*[82] adopted as a guide the UK test set out in *Windsurfing International Inc. v Tabur Marine (Great Britain) Ltd*[83] to determine if an invention involves an inventive step. The test comprises a number of steps:[84]

1. Identifying the inventive concept embodied in the patent in suit;
2. Assuming the mantle of the normally skilled but unimaginative addressee in the art at the priority date, imputing to him what was, at that date, common general knowledge in the art in question;
3. Identifying what, if any, differences exist between the matter cited as being 'known or used' and the alleged invention;
4. Asking whether, viewed without any knowledge of the alleged invention, those differences constitute steps which would have been obvious to the skilled man or whether they require any degree of invention.

[80] Lexi Heon, 'Artificially Obvious but Genuinely New: How Artificial Intelligence Alters the Patent Obviousness Analysis' (2022) 53 (1): 8 Seton Hall Law Review, 386.
[81] State of the art is defined in s14 of the Singapore Patents Act 1994.
[82] *First Currency Choice Pte Ltd v Main-Line Corporate Holdings Ltd and Another Appeal* [2007] SGCA 50 [41].
[83] *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59. See also *Rohm and Haas Electronic Materials CMP Holdings, Inc (formerly known as Rodel Holdings, Inc) v NexPlanar Corp and another* [2018] 5 SLR 180, and *IIa Technologies Pte Ltd v Element Six Technologies Ltd* [2023] 1 SLR 987.
[84] 'Examination Guidelines for Patent Applications at IPOS' (IPOS, 2023) [4.20].

While the Singapore courts have not formally adopted the modified "Windsurfing approach" in *Pozzoli SPA v BDMO*,[85] the differences are explained as being essentially in form rather than substance.[86]

1.2.2 Disclosure

In exchange for the exclusive rights that come with a patent, patent holders must provide sufficient disclosure of the information on their inventions to the public (the disclosure requirement). The disclosure requirement allows others to learn about the latest inventions without having to "reinvent the wheel", and to avoid any duplicative efforts and investments in research and development, among other objectives.[87] Accordingly, the disclosure requirements across jurisdictions tend to comprise:[88]

1. A support requirement (or, in the US, a written description requirement) requiring all claims to be supported by the disclosure;
2. An enablement requirement, namely that the invention be disclosed sufficiently for a person skilled in the art to make and use the claimed invention based on the disclosure; and
3. A clarity requirement for the claims.

AI development has sparked significant discussion on the disclosure requirement. The discussions so far have focussed on the patenting of "AI-related inventions", as defined in this sub-section to refer to inventions that (a) form the AI technologies (e.g., AI systems); and (b) involve the use of AI.[89] Not so much inventions autonomously developed by AI *per se*. While there has been relatively scant conversation on the disclosure requirement for *AI*-generated inventions *per se*, the discussions are nevertheless of some relevance as these inventions—if otherwise eligible for patent protection—will likewise be subject to disclosure requirements.[90]

[85] *Pozzoli SpA v BDMO SA* [2007] EWCA Civ 588.
[86] 'Examination Guidelines for Patent Applications at IPOS' (IPOS, 2023) [4.22].
[87] 'WIPO Patent Drafting Manual: Second Edition' (WIPO 2023), 23.
[88] 'WIPO Patent Drafting Manual: Second Edition' (WIPO 2023), 23.
[89] Summary of Document SCP/34/5: Further Study on the Sufficiency of Disclosure (Part I)' (WIPO, 2022) [2].
[90] However, it is important to note that not all patent applications premised on an AI-generated invention will necessarily involve claims of use of AI. Consider an example where an AI system is used to generate the chemical formulation for a new drug. The AI used to generate the drug is not part of the claimed invention. The patenting of the chemical formulation for the drug is distinguishable from the use of the AI to generate the chemical formulation, or the patenting of the AI model which can be used to invent drugs.

It is also important to distinguish between the disclosure requirement for patentability and other policy conversations on disclosure, for example, to disclose the role of AI in a patent application for transparency and other reasons.[91]

As mentioned above, the disclosure requirement entails the invention being disclosed sufficiently so that a skilled person can make the claimed invention. However, it has been noted that in emerging technologies, "the technical knowledge of a person skilled in the art can quickly evolve, which can, in turn, make it a particular challenge to determine the level and amount of information that should be disclosed in patent applications".[92]

Jurisdictions such as the UK and Japan have examined the impact of the disclosure requirement.[93] Generally, IP offices appear to view such inventions as computer-implemented inventions, i.e., inventions that involve the use of a computer.[94] Accordingly, various jurisdictions have applied the guidelines for assessing sufficiency of disclosure for computer-implemented inventions to AI-related inventions.[95] Pivotal to these assessments appears to be the assumed knowledge of the skilled person.[96]

For example, in a decision by the European Patent Office (EPO) Technical Board of Appeal, the Board found that since the patent application did not disclose which input data was suitable for training the artificial neural network, the training of that network could "therefore not be reworked by the person skilled in the art and the person skilled in the art therefore cannot carry out the invention".[97]

[91] It has been said that "people have claimed to have secured patents for AI-generated inventions since at least the 1980s, but no one has ever disclosed an AI's role in such a patent application": Ryan Abbott, 'The Artificial Inventor Project' (2019) 6 *WIPO Magazine.* However, disclosing the use of AI will pave the way for the implementation of suggestions such as applying different obviousness requirements depending on whether AI was involved in the invention to be assessed for patent protection.
[92] Summary of Document SCP/34/5: 'Further Study on the Sufficiency of Disclosure (Part I)' (WIPO, 2022) [8].
[93] See 'Examination Handbook for Patent and Utility Model in Japan' (*Japan Patent Office*, 2019), where case examples pertinent to AI-related technologies were added.
[94] Summary of Document SCP/34/5: 'Further Study on the Sufficiency of Disclosure (Part I)' (WIPO, 2022) [20].
[95] Summary of Document SCP/34/5: 'Further Study on the Sufficiency of Disclosure (Part I)' (WIPO, 2022) [22].
[96] Summary of Document SCP/34/5: 'Further Study on the Sufficiency of Disclosure (Part I)' (WIPO, 2022) [23].
[97] *Decision T 0161/18* [2020] EPO Technical Boards of Appeal.

Based on the examination guidelines and case law, the issues that commonly arise when assessing the sufficiency of disclosure for AI-related inventions include:[98]

1. The correlation between the input and output data;
2. The black box problem, i.e., the difficulty of understanding the AI decision-making process and predicting the AI's decisions and output; and
3. The disclosure of the training data sets, i.e., whether the data used to train the AI should be disclosed and the extent of such disclosure.

More recently, in its request for comments regarding AI and inventorship,[99] the USPTO asked for feedback on whether applicants should be required to provide an explanation of the contributions AI systems had made to inventions claimed in patent applications, and the mechanics and extent of such disclosure.

As mentioned above, it is likely that *AI-generated* inventions will likewise be subject to disclosure requirements. Some jurisdictions even have a "best mode" requirement that entails the patent application disclosing the best method of carrying out the invention.[100] This would mean that AI systems would need to be interrogatable on such aspects of disclosure in relation to their inventive output.

Singapore

In Singapore, the requirement of sufficiency of disclosure is found in sections 25(4) and 25(5)(c) of the Patents Act 1994. Section 25(4) requires that the specification of a patent application "disclose the invention in a manner which is *clear and complete* for the invention to be performed by a person skilled in the art" (Emphasis added). Section 25(5)(c) requires that the claim be "supported by the description".

[98] Summary of Document SCP/34/5: 'Further Study on the Sufficiency of Disclosure (Part I)' (WIPO, 2022) [24-29].
[99] United States Patent and Trademark Office, Department of Commerce, *Request for Comments Regarding Artificial Intelligence and Inventorship* [Question 6 of the Section "IV. Questions for Public Comment"].
[100] See, for example '35 U.S.C. 112 Specification' (USPTO.gov) [112(a)]: "The specification…shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention."
In India, the best mode requirement can be a ground for patent revocation, as The Patents Act 1970 s64(1)(h) states: "The complete specification…does not disclose the best method of performing it which was known to the applicant for the patent and for which he was entitled to claim protection."

1.3 Who is the owner of an AI-generated invention?

Assuming AI-generated inventions may be granted patents, the question is who should have ownership of the resulting patents. Ownership matters because it determines who can sue (and be sued) on a patent. Ownership confers the patent owner the right to decide who may or may not use the invention for the duration of protection.[101] The right is often termed a "negative right"—i.e., the right to stop others from making, using, distributing or importing the patented invention without consent.[102] Given that a patent can generally last for 20 years, the ownership rights to a commercially valuable patent can procure significant advantages. Conversely, where a patent is alleged to have infringed another patent, it becomes necessary to identify the owner of the infringing patent, for infringement proceedings to run their course.

1.3.1 AI non-personality and attribution of invention

AI systems, being machines without legal personality, capacity or rights, cannot be owners of patents under existing laws in any jurisdiction. Indeed, even the proponents of the Artificial Intelligence Project do not go as far as to suggest that DABUS should be the owner of the AI-generated inventions.[103] Quite the contrary—as Ryan Abbott states: "Computers are non-sentient, cannot own property, and are themselves owned as property".[104] Elsewhere, he explains that "AI systems lack both legal and moral rights and thus the ability to own property. Moreover, there would be significant costs and no obvious benefits to changing laws to allow AI ownership".[105]

It is thus necessary to consider other candidates for ownership, including the AI's owner, user or developer. The DABUS litigation has made clear that, under the existing patent legislation of key jurisdictions, the owner of an AI system is not, without more, entitled to be granted a patent for the invention generated by the AI system.

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[101] 'Frequently Asked Questions: Patents' (*WIPO*).

[102] Alan J Morrison, 'The Patent as a Negative Right and the Claim as Its Business End' in *Biotechnology Law: A Primer for Scientists* (Columbia University Press 2020), 13-23.

[103] For a discussion on granting personhood to AI machines, at least for limited purposes, see Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 93.

[104] Ryan Abbott, 'Artificial Intelligence, Big Data and Intellectual Property: Protecting Computer-Generated Works in the United Kingdom' in Tanya Aplin (ed), *Research Handbook on Intellectual Property and Digital Technologies* (Edward Elgar Publishing Ltd 2020), 335.

[105] Ryan Abbott, 'The Artificial Inventor Project' (2019) 6 *WIPO Magazine.*

In Australia, for example, the Federal Court of Australia reviewed section 15 of the Patents Act, which sets out an exhaustive list of who may be granted a patent.[106] In construing the section, the court held that only a natural person could be an inventor, and "[s]uch an inventor must be identified for any person to be entitled to a grant of a patent under ss 15(1)(b)–(d)".[107] Where a human inventor cannot be identified, an AI owner will not be able to claim any legal entitlement to a patent under the legislation.[108]

The position is similar in the UK. The UK Supreme Court, having found that DABUS was not an "inventor" for the purposes of section 7 or 13 of the Patents Act 1977, went on to examine the question of whether Thaler was nevertheless entitled to apply for, and obtain a patent in respect of DABUS' AI-generated inventions.[109] The apex court answered the question in the negative. Among other reasons, the court (at [79]) noted that section 7 of the Patents Act provided a "complete code" on who has the right to apply for and obtain a patent, and Thaler did not satisfy any part of "this carefully structured code".[110] The court (at [86]) found that Thaler had not identified "any basis in law" on which he acquired a right to apply for and secure patent grants for DABUS' inventions through his ownership of DABUS. (See Table 1 of this Chapter for more information on the DABUS litigation.)

Given these developments, there is recognition that the question of ownership is a matter for policy review, with some arguing that an adjustment of current ownership principles is required. If the inventor is a machine that cannot own property or make

[106] *Commissioner of Patents v Thaler* [2022], FCAFC 62 [113].
[107] Section 15(1) of the Australian Patents Act 1990 provides that a patent may only be granted to a person who: (a) is the inventor; (b) would, on the grant of a patent, be entitled to have the patent assigned to the person; (c) derives title to the invention from the inventor or a person mentioned in para (b); or (d) is the legal representative of a deceased person mentioned in para (a), (b) or (c).
[108] However, the court below in *Thaler v Commissioner of Patents* [2021] FCA 879 held that ownership could in fact reside with the owner of the AI system. Justice Beach held that ownership could be based on possession, without the need for any legal assignment ([188]–[193]). See also Donrich Thaldar and Meshandren Naidoo, 'AI Inventorship: The Right Decision?' (2021) 117 South African Journal of Science, 1, where the authors noted that Justice Beach used established principles of property law to hold that Thaler would "automatically be entitled to any invention by DABUS" due to his ownership and control of DABUS.
[109] The question of whether DABUS in fact generated the inventions has never been investigated, as noted in *Thaler (Appellant) v Comptroller-General of Patents, Designs and Trademarks (Respondent)* [2023] UK SC 49 [52].
[110] Section 7(2) of the UK Patents Act 1977 provides that a patent may be granted to: (a) primarily the inventor or joint inventors; (b) in preference to the foregoing, to any person or persons who, by virtue of any enactment or rule of law, or any foreign law or treaty or international convention, or by virtue of an enforceable term of any agreement entered into with the inventor before the making of the invention, was or were at the time of the making of the invention entitled to the whole of the property in it (other than equitable interests) in the UK; (c) in any event, to the successor-in-title to any person mentioned in para (a) or (b); "and to no other person".

assignments, no one can ever own the invention. "If no one owns these inventions, they will fall into the public domain",[111] which "reduces the incentive to invest in the growth of the industry".[112] Indeed, the Federal Court of Australia observed that the attribution of ownership to (one of): (a) the owner of the AI system; (b) the developer of its software; (c) the owner of copyright in its source code; (d) the inputter of data; or (e) some other person raised questions of policy.[113] The USPTO in October 2022 found that the vast majority of respondents took the view that no changes were necessary to the existing law in the US, such that "only a natural person or a company, via assignment, should be considered the owner of a patent or an invention".[114] A minority of responses stated that, while AI systems should neither be inventor nor owner, the extension of ownership rights to a natural person should be considered where that person: (a) trains an AI process; or (b) owns/controls an AI system. In February 2023, the USPTO sought further comments on ownership issues, suggesting that the issue will continue to evolve.[115]

The UKIPO had previously noted that most of its stakeholders were of the view that AI should not own patents. Instead, AI users, owners or developers could own any patent rights in the first instance. Among the possible options raised to update the UK patents regime, one possibility was to expand the definition of "inventor" to include humans responsible for the AI system.[116] Another option was to allow patent applications to identify AI as the inventor. In either case, the patent owners could be "persons responsible for making the arrangements necessary for AI to devise the invention".[117]

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[111] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 84.

[112] Daryl Lim, 'AI & IP Innovation & Creativity in an Age of Accelerated Change' (2018) Akron L. Rev 52, 841.

[113] *Commissioner of Patents v Thaler* [2022], FCAFC 62 [119].

[114] 'Public Views on Artificial Intelligence and Intellectual Property Policy' (USPTO, 2020).

[115] See United States Patent and Trademark Office, Department of Commerce, *Request for Comments Regarding Artificial Intelligence and Inventorship* at Question 4, which states: "4. Do inventions in which an AI system contributed at the same level as a joint inventor raise any significant ownership issues? For example:
a. Do ownership rights vest solely in the natural person(s) who invented or do those who create, train, maintain, or own the AI system have ownership rights as well? What about those whose information was used to train the AI system?
b. Are there situations in which AI-generated contributions are not owned by any entity and therefore part of the public domain?"

[116] For example, it is noted that the European Patent Office has accepted that the "owner of a device involved in an inventive activity" may designate himself or herself as the inventor under its regime: see Designation of inventor/DABUS [2021] ECLI EP BA J 0008/20 [4.6.6]. See also: Ryan N Phelan, 'European Patent Office (EPO) Suggests That the Owner of an Artificial Intelligence (AI) Machine Could Be Listed as the Inventor of an AI-Generated Invention' (*PatentNext*, 26 July 2022). For a discussion on allowing certain stakeholders (including programmers, trainers, operators or users) to be the inventor, see example: Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 84, 94.

[117] 'Consultation Outcome: Artificial Intelligence and Intellectual Property: Copyright and Patents' (*GOV.UK*, 28 June 2022).

This would be reminiscent of section 9(3) of the UK Copyright Designs and Patents Act 1988 (UK CDPA 1998), which provides for the authorship of computer-generated works by "the person by whom the arrangements necessary for the creation of the work are undertaken".[118]

In his academic research, Ryan Abbott has argued that the owner should be the default owner, a situation which would "motivate owners to share access to their software" and therefore incentivise innovation. In contrast, the owner would be motivated to restrict access in instances where the user was the default owner. Further, programmers would not need ownership rights as they would "capture the increased value of an inventive machine upon selling it".[119] Separately, it has also been argued that "efficiency is best attained by allocating Al property rights to parties that purchase or license Al software and utilise it for invention", i.e., AI users.[120] From the standpoint of economic efficiency, even if ownership defaults to the AI owner, the AI users will still "bargain for and eventually end up as owners of the inventions".[121]

[118] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 84, 91.
[119] Ryan Abbott, 'Artificial Intelligence, Big Data and Intellectual Property: Protecting Computer-Generated Works in the United Kingdom' in Tanya Aplin (ed), *Research Handbook on Intellectual Property and Digital Technologies* (Edward Elgar Publishing Ltd 2020), 336.
[120] Michael W Schuster, 'Artificial Intelligence and Patent Ownership' [2018] 75 Wash. & Lee L. Rev, 1950.
[121] Trevor F Ward, 'DABUS, An Artificial Intelligence Machine, Invented Something New and Useful, but the USPTO Is Not Buying It' (2023) 75 Maine Law Review, 84, 96.

Singapore

The current position in Singapore is set out in section 19 of the Patents Act 1994, which is exhaustive as to the categories of persons that may potentially gain ownership of a patent: (a) inventors; (b) persons entitled by virtue of an enactment or rule of law, foreign law or treaty or any agreement entered into with the inventor; or (c) successors in title—"… and to no other person". Section 19 is of similar wording to section 7 of the UK Patents Act, which was interpreted by the UK Supreme Court as being a "complete code" on who has the right to apply for and obtain a patent.[122]

Unlike the inventor, who must be a natural person, the owner of a patent is "the *entity* to whom the patent is granted and who therefore has the right to conduct activities that would otherwise be considered to have infringed the patent". Therefore, the owner may be a non-natural person with legal personality, such as a corporation, which accords with usual commercial practice of how inventors routinely assign their inventions to their employers that are companies. Further, ownership may be assigned, as it is not tied to the particular inventor.[123]

[122] *Thaler (Appellant) v Comptroller-General of Patents, Designs and Trademarks (Respondent)* [2023] UK SC 49 [77].
[123] *Energenics Pte Ltd v Musse Singapore Pte Ltd* [2013] SGHCR 21 [25].

Table 1: Overview of Selected DABUS Proceedings

The "DABUS" proceedings have generated significant buzz in the discussions concerning AI and inventorship. DABUS—the Device for the Autonomous Bootstrapping of Unified Sentience—is an AI system invented by Dr Stephen Thaler. DABUS had allegedly devised two inventions: a flashing light beacon to attract enhanced attention during emergencies, and a fractal food container.[124]

From 2018, Thaler filed patent applications for DABUS' inventions in multiple jurisdictions around the world.[125] The IP offices received the applications either by direct filing or via the Patent Cooperation Treaty's international application entering the national phases. The applications indicated that DABUS was the inventor; and asserted that Thaler was entitled to DABUS' inventions (since a machine could not own property such as patents).[126]

More than five years on, the applications have, by and large, met with little success. The table below offers a snapshot of the proceedings—in IP offices or the Courts—thus far in some parts of the world. Note that this table is illustrative and is not intended to be representative or complete.

Location	Outcome of DABUS proceedings
Australia	In Australia, there was an initial stir when the Federal Court of Australia[127] ruled against IP Australia, holding that an AI system could be an inventor under the Australian Patents Act 1990. This was said to be the first court judgment allowing an AI machine to be named as an inventor.[128] Justice Beach held that the concept of "inventor" should be seen as flexible, and that including AI systems in the meaning of "inventor"

[124] See 'Artificial Intelligence (AI) and Inventorship' (WIPO 2023) SCP/35/7.
[125] 'Artificial Intelligence (AI) and Inventorship' (WIPO 2023) SCP/35/7 [117].
[126] Ichiro Nakayama, 'Patentability and PHOSITA in the AI Era—A Japanese Perspective', in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 101.
[127] *Thaler v Commissioner of Patents* [2021] FCA 879.
[128] Kingsley Egbuonu, 'The Latest News on the DABUS Patent Case' *IP Stars* (20 December 2023).

	reflected the reality "in terms of many otherwise patentable inventions where it cannot sensibly be said that a human is the inventor".[129] However, he held that while AI systems could be inventors, they could not be owners of patentable inventions, as only humans or other legal persons were capable of ownership. However, the Full Federal Court of Australia in 2022 ruled that the inventor must be a natural person, thereby disagreeing with Justice Beach.[130] The High Court of Australia—the apex court in Australia—has denied further appeal, such that the decision of the Full Federal Court of Australia is final.[131]
Europe	In its decisions in 2021, the Legal Board of Appeal of the EPO rejected the notion that under the European Patent Convention, the designated inventor could be anyone other than a person with legal capacity. As an AI did not possess rights, it could not be designated as an inventor. Further, a transfer of a patent right from AI to natural persons was not possible because AI did not own any rights and had no legal personality. However, the Board of Appeal agreed that under Article 52(1) of the EPC, patentable inventions were not limited to inventions conceived by humans.[132] In its written reasons for one of its decisions, the Board of Appeal also suggested that: "The Board is not aware of any case law which would prevent the user or the owner of a device involved in an inventive activity to designate himself as inventor under European patent law".[133]

[129] *Thaler v Commissioner of Patents* [2021] FCA 879. [10].
[130] *Commissioner of Patents v Thaler* [2022] FCAFC 62 [108, 113].
[131] 'Artificial Intelligence (AI) and Inventorship' (WIPO 2023) SCP/35/7 [124].
[132] 'Artificial Intelligence (AI) and Inventorship' (WIPO 2023) SCP/35/7 [157].
[133] Designation of inventor/DABUS [2021] ECLI EP BA J 0008/20 [4.6.6].

	Commentators note that this "arguably opens the door" for those who use AI systems to list themselves—instead of the AI system—as inventor, even where the invention was completely generated by the AI system.[134] Apart from the original applications, Thaler also filed a divisional application in 2021, designating himself as inventor "by virtue of being the owner of the AI system (DABUS) that created the invention". The Examination Division stated that this did not meet the legal requirements as it did not clearly designate an inventor. The divisional application remained pending as of September 2023.[135] Separately, in Germany, the Federal Patent Court in 2021 had ruled that AI-generated inventions were patentable although a natural person must be named as the inventor, with the applicant able to state that an AI system was involved.[136]
South Korea	In South Korea, the Korean Intellectual Property Office had issued a decision of nullification in 2022, after Thaler listed DABUS as the inventor and himself as the applicant. Thaler's subsequent complaint against the nullification decision was dismissed by the Seoul Administrative Court in June 2023.[137] The court held, among other things, that the provisions of the Korean Patent Act required an inventor who was a natural person with a name and address, and that the status of an inventor fundamentally presupposed legal capacity. The court also opined that it was difficult to conclude that recognising AI as an inventor would ultimately advance technological and industrial development in

[134] Ryan N Phelan, 'European Patent Office (EPO) Suggests That the Owner of an Artificial Intelligence (AI) Machine Could Be Listed as the Inventor of an AI-Generated Invention' (*PatentNext*, 26 July 2022).
[135] 'Artificial Intelligence (AI) and Inventorship' (WIPO 2023) SCP/35/7 [154].
[136] Kingsley Egbuonu, 'The Latest News on the DABUS Patent Case' (*IP Stars,* 20 December 2023).
[137] Young-Bo Shim and Dong-Hwan Kim, 'South Korea: IP Office's DABUS Nullification Highlights Stance Towards AI Inventors' (*IAM,* 8 December 2023).

	society.[138] A further appeal to the Seoul High Court is reportedly pending.
UK	The UK Supreme Court has dismissed Thaler's appeal, putting an end to DABUS litigation in the UK. In its judgment released in December 2023,[139] the five-judge apex court, having undertaken an exercise in statutory interpretation of the relevant provisions of the UK Patents Act, held that DABUS is not and never was an "inventor" for the purposes of section 7 or 13 of that statute. Further, Thaler never had any right to secure the grant to himself of patents under the statute in respect of the inventions that were said to have been generated by DABUS. In the Court of Appeal decision in 2021,[140] the three-judge court had similarly found that the UK Patents Act required a human inventor. However, of note is the dissenting judgment by Birss LJ. While he agreed with the majority that the term "inventor" in the legislation meant a natural person and could not include AI, he took the view that the UKIPO should have allowed the patent application—including the statement of inventorship—to proceed to examination, and if valid, for a patent to be granted, subject to any challenges by third parties.[141] However, the UK Supreme Court disagreed with Birss LJ, holding that the UKIPO was entitled to treat the DABUS applications as withdrawn, as Thaler had failed to file a statement that complied with section 13 of the UK Patents Act.
US	The courts have confirmed the decision of the USPTO to reject the DABUS application.

[138] 'Recent IP Developments in Korea' (*Lee & Ko Intellectual Property*, August 2023).
[139] *Thaler (Appellant) v Comptroller-General of Patents, Designs and Trademarks (Respondent)* [2023] UK SC 49.
[140] *Stephen Thaler v Comptroller General of Patents, Trade Marks and Designs* [2021] EWCA Civ 1374.
[141] Rachel Montagnon, 'Can an AI Be an Inventor of a Patent? DABUS/Thaler Appeal Comes before the UK Supreme Court' (*Herbert Smith Freehills*, 2 March 2023).

	In 2022, the US Court of Appeals for the Federal Circuit held that an inventor must be a human being under the Patent Act; this was supported by cases that the plain meaning of "inventor" was limited to natural persons.[142] However, the court left open the question of whether "inventions made by human beings with the assistance of AI are eligible for patent protection", observing that the answer may depend on the amount and quality of the AI's assistance.[143] A subsequent writ of *certiorari* was denied by the Supreme Court of the United States in April 2023, ending the litigation in the US.
South Africa	In 2021, the South African Companies and Intellectual Property Commission (CIPC) published the acceptance of the DABUS patent in its patent journal, with the patent listing DABUS as the inventor, and Thaler as the patentee. In doing so, South Africa became the first country—and only so far—to grant a patent naming AI as the inventor. South Africa does not provide formal examination and requires applicants to merely complete a filing for their invention.[144] There has been commentary suggesting that the DABUS patent should not have been accepted as the requirements of the South African Patents Act and Regulations had not been complied with.[145] On the other hand, other commentators have opined that the decision was the correct one and cohered with South Africa's public policy on AI.[146]

[142] *Thaler v Vidal*, 43 F.4th 1207 (Fed. Cir. 2022).
[143] *Thaler v Vidal*, 43 F.4th 1207 (Fed. Cir. 2022) [1213].
[144] Ed Conlon, 'DABUS: South Africa Issues First-Ever Patent with AI Inventor' (*Managing IP*, 29 July 2021).
[145] See, for example Christopher Mhangwane and David Cochrane, 'DABUS, the Rise of Inventive Machines' (*Spoor Fisher*, 19 January 2023).
[146] Donrich Thaldar and Meshandren Naidoo, "AI Inventorship: The Right Decision?" (2021) 117(11-12) S. Afr. J. Sci.

Chapter 2. AI and Copyright

The notion of copyright—the protection of ideas embodied in a medium such as printed text—is also traditionally grounded in protecting and incentivising products of *human* creativity and intelligence. For this reason, suggestions for the protection of AI-generated works [147] are generally met with hesitation.

Nevertheless, rapid technological developments have challenged traditional copyright tenets, particularly generative AI models with built-in algorithms that enable learning from data input and neural networks that generate new works with minimal human intervention. In the past year, given the unprecedented take-up of generative AI tools such as ChatGPT, Midjourney and Stable Diffusion, issues have arisen in various aspects of copyright law that pose three closely-related questions:

1. Can AI be named as an author?
2. Is there copyright protection for works generated by AI?
3. Who is the owner of an AI-generated work?

These questions need to be examined holistically, but they are easily (and often) conflated. The primary purpose of this Chapter is to break them down systematically, through a comparative perspective, while making clear the conceptual connections and dependencies between them.

Separately, there is also much debate on issues of copyright infringement arising at the different stages of the operation of an AI system, on both the input (e.g., the use of copyright material in training datasets) and output ends. This Chapter will focus on the questions set out above, leaving the issues of infringement (on both the input and output sides) to be dealt with in Chapter 4 on AI and Infringement.

[147] The term "works" used in this Chapter refers to works eligible for copyright protection where there is a statutory requirement for there to be an author, such as literary, dramatic, artistic and musical works (generally known as authorial works).

2.1 Can an AI system be named as an author?

The short answer to this question, for now and the foreseeable future, is: "no". Similar to—and perhaps even more so than—patents, the debate about copyright over AI-generated and AI-assisted material touches on some of the fundamental concepts implicit within the law of copyright as it has evolved from the early modern period to the present.

Traditionally, copyright protection has been seen as rewarding and incentivising the expression of human creativity. This is due to the classical dichotomy in copyright law between ideas and their expression, and the philosophical assumptions made in the early history of copyright law about the nature of creative thought and expression: "… without an *author* who *expresses* an idea in an *original* way, there is no copyrightable work" (Emphasis in original).[148] While the Berne Convention for the Protection of Literary and Artistic Works does not define "author", it is implicit that the authorial contribution to the work must have originality or some element of (human) intellectual creation.[149]

The requirement of "originality" is a touchstone of copyright law and has traditionally been linked with the presupposition of a human author. This has been demonstrated in earlier test cases—involving animals who can create apparent "works"—where the US courts refused to recognise non-human actors as authors.[150] The mainstream position is defended on the basis that AI neither needs nor benefits from the incentives to create, which IP rights such as copyright provide.[151] Granting copyright protection to machines, the British Copyright Council suggests, would devalue the fundamental reason for copyright, namely "to protect human endeavour and spirit".[152] Another concern is the danger of "perpetual copyright protection", as copyright typically extends for the author's life plus a certain period. Moreover, problems may arise if the

[148] Matt Blaszczyk, 'Impossibility of Emergent Works' Protection in US and EU Copyright Law' (2023) 25(1) N.C.J.L. & TECH, 12.
[149] Sam Ricketson, 'Reflections on Authorship and the Meaning of a "Work" in Australian and Singapore Copyright Law' [2012] 24 SAcLJ.
[150] See example *Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018) (the "monkey selfie" dispute); David Allen Green, 'Copyright: No Time To Monkey Around' (2014) 5 *WIPO Magazine*.
[151] Robert Yu, 'The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?' 165 U. Pa. L. Rev. 5.
[152] 'Government Response to Call for Views on Artificial Intelligence and Intellectual Property' (*GOV.UK*, 23 March 2021).

work is produced by various collaborative models, such as open-source software or the collaboration of machines and human beings.[153]

Proponents for recognising AI as an author argue that the AI model's ability to generate a unique, original work constitutes a level of creative input that is deserving of copyright protection.[154] Studies have been conducted to demonstrate this point, including a study by the University of Montana which found that AI, specifically GPT-4, matches the top 1% of human thinkers on the Torrance Tests of Creative Thinking, a widely recognised tool for assessing creativity.[155]

The ongoing debate reflects the evolving landscape of creative expression in the digital age. Like the debate on the concept of inventorship in the context of patents, in broad terms it seems clear that law reform would be necessary for AI to be recognised as an author.

2.1.1 Human and non-human authorship

In common law jurisdictions such as Australia, the UK and the US, there is no express statutory provision requiring an author to be human, but these jurisdictions have consistently premised their copyright regimes on the requirement of human authorship, this being implicit in the statutory interpretation of the relevant legislation and supported by case law.[156]

Legislatively, the position in the EU may be regarded as clearer. Besides language found in most European legislation that implies that a human author is required,[157] the European Directives defined originality for computer programmes, databases and photographs as "the author's own intellectual creation".[158] This standard for

[153] Jyh-An Lee, 'Computer-Generated Works under the CDPA 1988' in Lee Jyh-An, Reto Hilty & Liu Kung-Chung (eds) *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 190–194.
[154] Chawinthorn Watiktinnakorn, Jirawat Seesai and Chutisant Kerdvibulvech, 'Blurring the Lines: How AI Is Redefining Artistic Ownership and Copyright' (2023) 3 Discov Artif Intell.
[155] Cary Shimek, 'AI Outperforms Humans in Creativity Test' (*Neuroscience News.com*, 6 July 2023).
[156] David Tan, 'Generative AI and Authorship in Copyright Law' (*NUS Centre for Technology, Robotics, Artificial Intelligence & the Law*, September 2023).
[157] See, for example: Article 5 of Spanish Copyright Law (Law 1/1996 of April 12, 1996, amended by the Law of July 7, 2006) specifically states that the author of a work is the natural person who creates it; Article 11 of Germany's Act on Copyright and Related Rights (Urheberrechtsgesetz – UrhG) states that "Copyright protects the author in his or her intellectual and personal relationships to the work".
[158] Article 6 of Council Directive 93/98/EEC of 29 October 1993 harmonising the term of protection of copyright and certain related rights, OJ L 290, 24.11.1993, now codified in Article 6 of Directive 2006/116/EC: Article 6 of the Copyright Term Directive 2006/116/EC; Article 2 of the Software Directive 2009/24/EC; Article 4(1) of the Database Directive 96/9/EC.

originality was extended by the Court of Justice of the European Union (CJEU) to all copyright subject matter[159] and is now codified in Article 14 of the EU Directive on Copyright and Related Rights in the Digital Single Market 2019. Academics have noted that this imports a requirement for the author to be human and that such a definition of authorship is "completely embedded to personal creativity" and would exclude computer-generated works resulting from an advanced AI programme from its ambit, especially if the AI is perfectly capable of making decisions "entirely independent of human input" when creating works.[160]

The US Copyright Office has been steadfast in its requirement for human authorship for a grant of copyright registration[161] (see below on decisions by the office). In its Copyright Registration Guidance note issued on 15 March 2023,[162] Section II clearly states that the requirement of human authorship dates as far back as the 1973 edition of the Office's Compendium of Copyright Office Practices. In evaluating works submitted for registration that combine human authorship with materials generated by or with the assistance of technology, Section III states that the starting question for the Office is:

> "[W]hether the `work' is basically one of human authorship, with the computer [or other device] merely being an assisting instrument, or whether the traditional elements of authorship in the work (literary, artistic, or musical expression or elements of selection, arrangement, etc) were actually conceived and executed not by man but by a machine. In the case of works containing AI-generated material, the Office will consider whether the AI contributions are the result of 'mechanical reproduction' or instead of an author's 'own original mental conception, to which [the author] gave visible form.' The answer will depend on the circumstances, particularly how the AI tool operates and how it was used to create the final work. This is necessarily a case-by-case inquiry."[163]

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[159] *Infopaq International A/S v Danske Dagblades Forening* [2009] ECR I-06569.

[160] Andres Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works' in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 162, citing an example of Google's Deep Dream image manipulation project, whose creators do not know exactly what happens at all stages of the production of an image.

[161] In the US, registration of a work with the US Copyright Office is required before an infringement lawsuit may be filed.

[162] 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' (*Federal Register*, 16 March 2023).

[163] 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' (*Federal Register*, 16 March 2023), Section III.

Nonetheless, the US Copyright Office has included questions on the copyrightability of material generated using AI systems in its Notice of Inquiry on Artificial Intelligence and Copyright issued on 30 August 2023.[164]

2.1.2 Judicial treatment of works by non-human "authors"

To date, commentaries have focussed on significant decisions in the US and China on the question of authorship of AI-generated outputs. The decisions in both jurisdictions are clear that a human author is required to confer copyright protection on a work.

In the US, similar to his attempts in getting IP offices to recognise his AI system as an inventor for the grant of patents, Dr Stephen Thaler applied in 2018 for copyright registration of a piece of visual art called *A Recent Entrance to Paradise*, which he claimed had been independently generated by his "creativity machine" and as a work made for hire, since he owned the AI system. The application was repeatedly rejected by the US Copyright Office and his subsequent appeal to a Federal District Court was dismissed. The court held that human authorship is a "bedrock requirement of copyright" based on "centuries of settled understanding".[165] Thaler has since filed a notice of appeal with the US Court of Appeals for the District of Columbia Circuit and a decision is expected sometime later in 2024.[166]

Apart from its rejection of *A Recent Entrance to Paradise* by Thaler's creativity machine, the US Copyright Office has also issued the following significant decisions involving AI-generated works:

- The rescission of the decision to register the copyright for a graphic novel *Zarya of the Dawn* by digital artist Kris Kashtanova.[167] The artist had used Midjourney, a generative AI software, to produce a series of images to accompany her text and a storyline of her own creation. Initially, the US Copyright Office granted copyright protection to the graphic novel in its entirety; however, on secondary review, it refused to recognise copyright in the images while recognising partial copyright in the work (i.e., over the text and storyline).

[164] See 'US Copyright Office's Notice of Inquiry' (2023) 88 Federal Register 167 [18-20].
[165] *Thaler v Perlmutter*, Civil Action 22-1564 (BAH) (D.D.C. Aug. 18, 2023). It was noted by the court that Thaler had consistently represented to the US Copyright Office that the AI system generated the work "autonomously" and that he played no role in its creation.
[166] Peter Hayes, 'Ruling That AI-Generated Art Not Copyrightable Gets Appeal' (*Bloomberg Law*, 13 October 2023).
[167] US Copyright Office, *Zarya of the Dawn* (Registration # VAu001480196) (21 February 2023).

- The rejection of the registration by an artist, Jason M Allen, for his award-winning piece of digital art, *Théâtre D'opéra Spatial*.[168] While it was generated by Midjourney as well, the artist had inserted more than 624 prompts and renditions of the art before editing the output further in Adobe Photoshop. The Office asked Allen to disclaim the parts of the image that Midjourney had generated to receive copyright protection. It rejected Allen's application after he declined to do so, and this decision was affirmed by the Office's Copyright Review Board, which found that the image as a whole was not copyrightable because it contained more than a minimal amount of AI-created material.

There is a common but mistaken assumption that the courts in China are willing to recognise AI as an author to protect computer-generated works. While the courts there have probably gone the furthest in their willingness to recognise some form (and degree) of copyright protection for AI-generated works, this is expressed as part of the human-centred copyright framework[169] and the author requirement still poses a significant barrier. On an analysis of the cases whereby the PRC courts conferred copyright protection over AI-generated content, it is clear that the courts did not hold that AI could be an author but instead required the finding of a human author for copyright to subsist in a work.

In China, Article 1 of the Copyright Law of the People's Republic of China (CLC) provides protection to authors for "their literary, artistic and scientific works" and the definition of works was amended in 2021 to "intellectual achievements in areas such as literature, arts, and sciences, that have originality, which can be fixed in certain forms".[170] The requirement of human authorship was definitively laid down by the Beijing Internet Court in *Beijing Felin Law Firm v Baidu Corporation* (*Beijing v Felin*):[171] while a work produced by a machine could be viewed as original, human authorship was vital in determining whether a work was eligible for copyright protection.[172] The court in that case found that there had been sufficient modifications and analysis of

[168] US Copyright Office, *Second Request for Reconsideration for Refusal to Register Théâtre D'opéra Spatial* (SR # 1-11743923581; Correspondence ID: 1-5T5320R) (5 September 2023). The artist is no relation of this Report's co-author Jason Grant Allen.
[169] Yong Wan and Hongxuyang Lu, 'Copyright Protection for AI-Generated Outputs: The Experience from China' (2021) 42 Computer Law & Security Review 105581.
[170] See Article 3 of 'Copyright Law of the PRC (2021 Version)' (*China Law Translate*, 12 November 2020).
[171] *Beijing Feilin Law Firm v Baidu Corporation*, No 239 [2019], Civil First Instance.
[172] Andres Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works' in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 171.

the statistics by the plaintiff's (human) employees in producing the final report, for copyright to subsist in the report.

This requirement has been affirmed by subsequent decisions in the PRC. In the case of *Shenzhen Tencent Computer System Co. Ltd. v Shanghai Yingxun Technology Co., Ltd*[173] involving an AI-generated article, the court held that Tencent's creative team were the authors due to the selection and arrangement of text and the "Dreamwriter" software was merely a writing tool.[174] More recently, in *Li Yunkai v Liu Yuanchun*,[175] a case involving the copyrightability of AI-generated images, the Beijing Internet Court decided that the AI-generated images of the plaintiff should be recognised as a work involving human authorship (due to his intellectual input throughout the picture generation process), and the copying of one of the images by the defendant in her article without permission constituted copyright infringement.[176]

Singapore

Under Singapore law, "authorial works"[177] must be created by human authors to be protected by copyright. While this is not expressly stated in the Singapore Copyright Act 2021, it is implicit in certain provisions of the statute that the author must be a natural person.[178]

This core principle was established in the case of *Asia Pacific Publishing v Pioneers & Leaders (Publishers) Pte Ltd*, where the Court of Appeal held that an author must first be identified before the work in question can be deemed to be original, and "without the identification of a human author from whom the work originates, there can be no 'original work' capable of copyright protection".[179] The court elaborated that granting

[173] *Shenzhen Tencent Computer System Co. Ltd. v Shanghai Yingxun Technology Co., Ltd.*, No 14 010 Minchu (Shenzhen Nanshan District Ct. 2019).
[174] Vivian Desmonts and Ivy Liang, 'Is the Chinese "Dreamwriter" Case Really a Groundbreaking Case for AI-Generated Works?' (*Gowling WLG*, 12 June 2020).
[175] Beijing Internet Court (2023) Jing 0491 Min Chu 11279.
[176] Seagull Song, 'China's First Case on Copyrightability of AI-Generated Picture' (*King&Wood Mallesons*, 7 December 2023).
[177] Section 9 of the Singapore Copyright Act 2021 defines "authorial work" as a literary, dramatic, musical or an artistic work.
[178] For example, the duration provisions for authorial works are pegged to the death of a person (see section 114 of Singapore Copyright Act 2021), and the connecting factor provisions provide that copyright subsists if the author is a "qualified individual" (see sections 109 and 110 of Singapore Copyright Act 2021).
[179] *Asia Pacific Publishing Pte Ltd v Pioneers & Leaders (Publishers) Pte Ltd* [2011] SGCA 37 [75], [82]. The claimant in this case was a corporation, but the point would likely apply to non-human entities such as AI systems as author candidates.

copyright protection in perpetuity goes against public policy, given that the standard duration of copyright protection is the author's life plus 70 years,[180] and that in cases involving a high degree of automation, there will be no original work produced as there are no identifiable human authors.[181]

This understanding for the requirement of human authorship was affirmed by the Court of Appeal in the more recent case of *Global Yellow Pages Ltd v Promedia Directories Pte Ltd* (*Global Yellow Pages*), where the same court held that for copyright to subsist in any literary work, "there must be an *authorial* creation that is *causally connected* with the *engagement of the human intellect*" (Emphasis in original).[182]

2.2 Is there copyright protection for works generated by AI?

If AI systems are not capable of being considered as authors, the question then arises as to whether copyright may subsist in their output *at all*. Some advocate vigorously for the protection of works generated by AI,[183] while others argue that "emergent works" ("works of apparently creative expression that arise from the operation of a computer programme but cannot be traced directly to a human source"[184]) are simply not fitting subject matter for copyright protection.[185]

Those opposing the grant of copyright protection for AI-generated works point to the key function of the copyright regime: to reward and incentivise human creativity. AI does not need to be rewarded or incentivised. Further arguments are premised on the idea that to grant protection would be granting "a monopoly to individuals and corporates who did not provide the requisite creativity that is connected to the creation of the final products".[186] Not granting any protection would mean that such output would be in the public domain and free for the world to use.

[180] *Asia Pacific Publishing Pte Ltd v Pioneers & Leaders (Publishers) Pte Ltd* [2011] SGCA 37 [67].
[181] *Asia Pacific Publishing Pte Ltd v Pioneers & Leaders (Publishers) Pte Ltd* [2011] SGCA 37 [81].
[182] *Global Yellow Pages Ltd v Promedia Directories Pte Ltd* [2017] 2 SLR 185 [24].
[183] See, for example: Nina I Brown, 'Artificial Authors: A Case For Copyright In Computer-Generated Works' (2019) 20 Science and Technology Law Review 1; Andres Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works' in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021).
[184] Bruce E. Boyden, 'Emergent Works' (2016) 39 The Columbia Journal of Law & The Arts, 337,339.
[185] Matt Blaszczyk, 'Impossibility of Emergent Works' Protection in US and EU Copyright Law' (2023) 25 North Carolina Journal of Law & Technology.
[186] David Tan, 'AI and Copyright: Death of the Author?' (*The Singapore Law Gazette*, November 2022).

On a more abstract level, it is helpful to put this question in its broader context. Currently, there is some controversy surrounding the use (and alleged misappropriation) of copyrighted materials in AI training data sets.[187] As we elaborate in Chapter 4 (AI and Infringement), claims based on copyright infringement have not proceeded beyond the pleadings stage, and it remains to be seen how the arguments for and against infringement will be dealt with. There are arguments therefore about the necessity of reconsidering the distribution of benefits (such as rights of use, including commercial use) from the windfall of the Internet-derived data currently being exploited by AI system developers and deployers, and the consignment of AI-generated output to the public domain has been suggested by commentators at various fora as a plausible policy response.[188]

However, a default position that all AI-generated works should be in the public domain may itself seem intuitively troubling, and it has been argued that a lack of copyright protection could in turn significantly disincentivise (re)investment in AI research and innovation.[189] This position also overlooks the possible commercial value of such works and may undervalue the involvement of human input in AI-generated works that initiate and/or enable the works' creation. Hence, it has been posited by some legal scholars that the issue should not be seen as a zero-sum game of copyright protection or no copyright protection; perhaps a *sui generis* framework (with a shorter period of protection) could be created for the protection of AI-generated works.[190]

Regardless, it appears that the only means by which AI-generated output could be conferred copyright protection currently is by assigning authorship to a human actor, or if the jurisdiction in question has a statutory category for protection of computer-generated works. We will examine each of these in turn.

[187] Will Bedingfield, 'The Generative AI Battle Has a Fundamental Flaw' (*WIRED UK*, 25 July 2023).
[188] See, for example: Brent Moran and Brigitte Vézina, 'Artificial Intelligence and Creativity: Why We're Against Copyright Protection for AI-Generated Output' (*Creative Commons*, 10 August 2020).
[189] See, for example: Mauritz Kop, "AI & Intellectual Property: Towards an Articulated Public Domain" (2020) 28 *Texas Intellectual Property Law Journal* 297.
[190] See, for example: Victoria Fricke, 'The End of Creativity?! – AI-Generated Content under the Canadian Copyright Act' (*McGill Business Law Platform,* 17 October 2022).

2.2.1 Assigning authorship: Degree of human and AI involvement and understanding of originality

For current copyright laws to recognise copyrightability in authorial AI-generated works, there must be a natural person with whom to vest legal authorship. Where AI is involved, it is generally easier to argue for the subsistence of copyright if the work can be shown as AI-assisted. In academic circles, the developer, the programmer, the machine operator or the user who fixes the work in its final form have been considered as alternate candidates for the authorship of AI-generated works; all of these parties may play indispensable roles in the creation of such works. New creative AI-enabled models and digital technologies will make authorship identification even more challenging.[191] So far, case law developments on AI-generated works have only addressed the issue of the user as the possible author.

Assigning a human author to the AI-generated work enables the fulfilment of the requirement for originality, which is (again) conceptually linked with the presupposition of a human author. Much has been written about determining whether the human contribution to the generation of the AI output amounts to the exercise of a sufficient creative choice.[192] This can range from the initial human conception of the work before it is expressed, to human creative choice and conception throughout the stages of work such as input data, selection of subject matter, style preferences, language of prompts, and refinement of initial output.

In *Thaler v Perlmutter,* Judge Beryl A. Howell of the US District Court for the District of Columbia commented that the "increased attenuation of human creativity from the actual generation of the final work will prompt challenging questions regarding how much human input is necessary to qualify the user of an A.I. system as an author of a generated work".[193] It would appear from decisions in the US and the PRC that the debate may be morphing beyond a fact-centric question of how much human input

[191] For a more thorough discussion of these possible candidates, see for example: Nina I Brown, 'Artificial Authors: A Case For Copyright In Computer-Generated Works' (2019) 20 Science and Technology Law Review 1; Ichiro Nakayama, 'Patentability and PHOSITA in the AI Era—A Japanese Perspective', in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021), 94.

[192] See for example: Peter Georg Picht, Valerie Brunner and Rena Schmid, 'Artificial Intelligence and Intellectual Property Law: From Diagnosis to Action' (2022) 22 Max Planck Institute for Innovation and Competition Research Paper 19–21.

[193] *Thaler v Perlmutter* [2023] Civil Action 22-1564 (BAH) (D.D.C. Aug. 18, 2023). This point was however not further explored as Thaler had consistently represented to the US Copyright Office that the AI system generated the work "autonomously" and that he played no role in its creation.

and control over the form or content of the AI-generated output suffices, to a question of the fundamental concept of originality to attribute human authorship. In this, certain jurisdictional differences may be emerging.

While US copyright law requires independent creation by a human author whereby the work has a "spark" and "modicum" of creativity, the US Copyright Office has acknowledged that works created by humans using machine assistance can qualify for copyright protection.[194] However, in respect of the use of AI-generated tools, the US Copyright Office takes the view that current generative AI technologies act like "a commissioned artist", as the users can only give instructions but do not exercise creative control over how such systems interpret prompts and generate the materials.[195] Hence, the Office in its Guidance Note has directed applicants to disclose the inclusion of AI-generated content in a work submitted for registration and to provide a brief explanation of the human author's contributions to the work and that AI-generated content that is more than *de minimis* should be explicitly excluded from the application.[196]

These principles are clearly reflected in the decisions by the US Copyright Office relating to AI-generated content.[197] In particular, the rejection of *Théâtre D'opéra Spatial* despite the artist, Jason M Allen, having inserted more than 624 prompts and renditions of the art before editing the output further in Adobe Photoshop. Concerns have arisen over this decision, including whether adjustment of prompts can be viewed as refinement of a creative vision and if such an approach considers technology advancements such as incorporation of AI features in "acceptable" tools (such as Adobe Photoshop), leading to digital artists to omit mention of the use of AI tools in their copyright applications.[198] The central question arising from the US Copyright

[194] Copyright Office, Library of Congress, 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' (*Federal Register*, 16 March 2023) s III 16190,16192.

[195] Copyright Office, Library of Congress, 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' (*Federal Register*, 16 March 2023) s III 16190,16192.

[196] Copyright Office, Library of Congress, 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' s IV.

[197] In the decision by the Review Board of the US Copyright Office affirming the refusal to register a two-dimensional computer-generated image titled "SURYAST" that was created by Ankit Sahni using the RAGHAV painting app, the conclusion was that the creative expression in SURYAST "is a function of how the model works and the images on which it was trained—not specific contributions or instructions received from Mr. Sahni." US Copyright Office, *Second Request for Reconsideration for Refusal to Register SURYAST* (SR # 1-11016599571; Correspondence ID: 1-5PR2XKJ) (11 December 2023).

[198] See, for example: Kate Knibbs, 'Why This Award-Winning Piece of AI Art Can't Be Copyrighted' (*Wired*, 6 September 2023); Ashley Belanger, 'Authors Risk Losing Copyright If AI Content Is Not Disclosed, US Guidance Says' (*Ars Technica*, 17 March 2023).

Office's position is how much AI processing is acceptable before an image is deemed AI-generated?

Commentators have observed the very different approach taken in the PRC to ascribe a human author. In *Li Yunkai v Liu Yuanchun,* the Beijing Internet Court held that the intellectual investment made by the plaintiff in operating the AI programme, such as deliberately picking the presentation of characters, selecting prompt words and arranging the order of the prompt words (including 120 negative prompts, much fewer than Allen's 624 prompts) and choosing parameters, was sufficient to reflect the human author's personalised expression and originality and were not "mechanical intellectual achievements".[199]

Notably, while the court acknowledged that technological developments may result in less human input, it reasoned that the core purpose of the copyright regime is to encourage creativity and that the correct application of the copyright system would encourage more people to create with the latest tools and foster the development of AI technology. In contrast with the position taken by the US Copyright Office, the court held that it is still the human being who uses the tool to create and makes the intellectual investment in the entire creative process—not the AI model.[200] It has been pointed out that such a decision has far-reaching implications for China's AI industry and would benefit Chinese big tech companies.[201]

In other jurisdictions, there is a growing convergence towards a standard of intellectual creations or creative choices, away from the labour-based "sweat of the brow" common law standard. For instance, in Australia, the leading case of *IceTV v Nine Network Australia Pty Ltd*[202] has set the threshold for determining originality at the requirement of an element of "intellectual effort" that must be "directed to the particular form of expression", moving away from the lower threshold of "substantial labour". Decisions by the CJEU on originality have cemented the EU standard of "author's own intellectual creation" as requiring more than simple "skill, labour or effort" and a work must be the result of "creative freedom" and "free and creative choices" and ultimately carry the "personal touch" of the author to enjoy copyright

[199] Andres Guadamuz, 'Chinese Court Declares That AI-Generated Image Has Copyright' (*TechnoLlama*, 9 December 2023).
[200] Zhen (Katie) Feng and others, 'Beijing Internet Court Grants Copyright Protection for AI Artworks, but Copyrightability Debate of AI-Generated Output Continues' (*Hogan Lovells*, 6 December 2023).
[201] Iris Deng, 'Beijing Court Rules AI-Generated Content Covered by Copyright, Eschews US Stand' (*South China Morning Post*, 1 December 2023).
[202] *IceTV v Nine Network Australia Pty Ltd* [2009] 239 CLR 458, 481

protection.[203] While the UK courts may appear to have reverted to the old "sufficient skill, labour or effort" test post-Brexit, the incorporation of CJEU case law has resulted in a higher standard[204] as demonstrated in the recent ruling by the Court of Appeal in *THJ Systems Ltd v Sheridan*[205] involving the question of whether a software developer could own copyright in a graphic user interface; here, the court clarified that the test of originality is that of the "author's own intellectual creation".[206] In discussing the low level of visual creativity in the work in question, Arnold LJ held that copyright protection would be available, but that its scope would be correspondingly narrow.[207] Since the decision of *Li Yunkai v Liu Yuanchun*, there is a suggestion that the language used by the Beijing Internet Court in explaining the intellectual achievements of the plaintiff could be compatible with such a standard of creativity.[208]

Tellingly, the section on the copyrightability of generative AI outputs in the US Copyright Office's Notice of Inquiry poses the following questions:

> "20. Is legal protection for AI-generated material desirable as a policy matter? Is legal protection for AI-generated material necessary to encourage development of generative AI technologies and systems? Does existing copyright protection for computer code that operates a generative AI system provide sufficient incentives?
>
> 20.1. If you believe protection is desirable, should it be a form of copyright or a separate sui generis right? If the latter, in what respects should protection for AI-generated material differ from copyright?"

[203] Eleonora Rosati, 'Originality in Copyright Law: An Objective Test without Any Artistic Merit Requirement, Recalls Arnold LJ - The IPKat' (*The IPKat*, 30 November 2023).
[204] Eleonora Rosati, 'Originality in Copyright Law: An Objective Test without Any Artistic Merit Requirement, Recalls Arnold LJ - The IPKat' (*The IPKat*, 30 November 2023).
[205] *THJ Systems Ltd v Sheridan* [2023] EWCA Civ 1354
[206] *THJ Systems Ltd v Sheridan* [2023] EWCA Civ 1354 [23]
[207] *THJ Systems Ltd v Sheridan* [2023] EWCA Civ 1354 [27]
[208] Andres Guadamuz, 'Chinese Court Declares That AI-Generated Image Has Copyright' (*TechnoLlama*, 9 December 2023).

Singapore

In Singapore, the "sweat of the brow" standard for originality has been supplanted by the "creativity" approach as confirmed by the Court of Appeal in *Global Yellow Pages*. In describing what would constitute an "intellectual creation", the court explained as follows:

> "By the human intellect, we mean the application of intellectual effort, creativity, or the exercise of mental labour, skill or judgment. Effort (even intellectual) that is applied not towards the authorial creation but towards other ends such as the verification of facts will not be relevant in this context even if such verified facts might be the eventual subject of the authorial creation."[209]

The court further expressed its view that "there is no meaningful difference in the standards used by the various jurisdictions today to describe the requisite standard of creativity directed at the expression in question; the differences in language are essentially semantic."[210]

2.2.2 Treatment of AI-generated output as a separate category for copyright protection

One possible approach to the copyright protection of AI-generated works is to grant them protection as a separate category of works with either a different set of rules for authorship or without any requirement for authorship.

The UK was first of a small handful of jurisdictions[211] to have a specific statutory provision dealing with the authorship and protection of computer-generated works. Section 9(3) of the UK CDPA 1988 provides that: "In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken".

[209] *Global Yellow Pages Ltd v Promedia Directories Pte Ltd* [2017] 2 SLR 185 [24].
[210] *Global Yellow Pages Ltd v Promedia Directories Pte Ltd* [2017] 2 SLR 185 [27].
[211] Other jurisdictions include New Zealand, Ireland and India.

When this provision was proposed in Parliament in 1987, it was said by Lord Young of Graffham (Secretary of State for Trade and Industry) to be "the first copyright legislation anywhere in the world which attempts to deal specifically with the advent of artificial intelligence".[212] This accords AI-generated output, which cannot meet the level of human authorship, the same status as non-authorial works such as films and sound recordings where the maker is the one who made the *arrangements necessary* to create the work. It is interesting that, while the provision acknowledges that there is no human author, it still necessarily imposes the need for some form of authorship.

How this provision will apply to works created by generative AI is untested. The only case that addressed the meaning of "arrangements necessary" is *Nova Productions v Mazooma Games,*[213] which identified the developer of a video game as the author of the composite images (being artistic works) under section 9(3) on the basis that he devised the appearance of the various elements of the game and the rules and logic by which each frame was generated, and wrote the relevant computer programme.

In relation to a work created by generative AI, the person who made the necessary arrangements for the creation of the work to occur would likely be the developers who had designed and built the AI (or, more likely, their employer), or the user who had inputted the relevant prompts. However, in the case of the former, there may be too little connection with the actual generation of the output. In the case of the latter, this would depend on the extent of involvement of the user in shaping the content through the prompts, as AI models increasingly generate output independently.[214]

There have been suggestions[215] that AI-generated output could be protected under neighbouring rights.[216] In China, the court in *Beijing v Felin* was clearly more concerned with protecting the *investment* in the generation of a work, rather than the generation of the work itself. However, it is still debatable whether there is a possibility for

[212] This was debated by the House of Lords, see: Copyright, Designs and Patents Bill [H.L.] (HL deb 12 November 1987, vol 489, cols 1476-540).
[213] *Nova Productions v Mazooma Games* [2007] EWCA Civ 219.
[214] See, for example: Aaron Hayward and others, 'The IP in AI: Does Copyright Protect AI-Generated Works?' (*Herbert Smith Freehills*, 3 October 2023); Sunny Kumar, 'AI and IP: Copyright - the Wider Picture and Practical Considerations for Businesses' (*Ashurst*, 12 September 2023).
[215] See, for example a recent survey of 48 jurisdictions by the AI Subcommittee of the Copyright Committee of the International Trademark Association (INTA): Tobias Kempas, 'Copyright Committee Issues Report on Copyrights and Neighboring Rights in AI-Generated and AI-Assisted Works' (*INTA*, 4 October 2023).
[216] "Neighbouring rights" (also known as "related rights") are rights related to copyright which protect three categories of people or corporate entities who are not technically authors: performing artists, producers of sound recordings and audio-visual content, and those involved in radio and television broadcasting, see: Tobias Kempas, 'Copyright Committee Issues Report on Copyrights and Neighbouring Rights in AI-Generated and AI-Assisted Works' (*INTA*, 4 October 2023).

computer-generated works to be granted some form of intellectual property rights. Some academics suggest that the "neighbouring rights" framework[217] of the CLC is an ideal candidate, and that granting neighbouring rights over AI-generated works would not only promote distribution but may also help to protect creations that are excluded from copyright protection.[218] They argue that the PRC could refer to the US's "work-for-hire" approach and the UK's "arrangements necessary model", noting that if the law has created a legal fiction to enable corporate employers to be authors, an extension could likewise be made to include AI owners.[219]

Singapore

There is no equivalent provision in the Singapore Copyright Act 2021 to the UK's provision for the protection of computer-generated works. Singapore, similar to the UK, uses the term "works" in its recently re-enacted Copyright Act 2021 to refer to both authorial works and non-authorial works (what was previously called "subject matter other than works"). The statutory provisions in relation to non-authorial works that could possibly be generated by AI, i.e., sound recordings and films, refer to a "maker". In relation to a sound recording, this is defined as "the person who owns the first record embodying the sounds when the recording is produced",[220] and in relation to a film, "maker" is defined as "the person who undertakes the arrangements needed to make the film".[221] As the "person" in the definition of "maker" includes any company or association or body of persons, corporate or unincorporate,[222] it is conceivable that copyright may subsist in a sound recording or film produced by AI since the company who owns the master sound recordings or made the arrangements for the film would be the "maker". However, the underlying constituents of the sound recording or film, such as the music, lyrics, and script, would still be unprotected if no human author had been involved in creating them.

[217] In China, this concept of "neighbouring rights" is set out in Chapter IV of the CLC titled "Rights Related to Copyright". These rights include the rights of publishers' typographical designs, the rights of performers, the rights of producers of sound or video recordings, and the rights of radio stations or television stations.
[218] Tianxiang He, 'The Sentimental Fools and the Fictitious Authors: Rethinking the Copyright Issues of AI-Generated Contents in China' (2019) 27 Asia Pacific Law Review 232.
[219] Tianxiang He, 'The Sentimental Fools and the Fictitious Authors: Rethinking the Copyright Issues of AI-Generated Contents in China' (2019) 27 Asia Pacific Law Review 231.
[220] Singapore Copyright Act 2021, s23.
[221] Singapore Copyright Act 2021, s26.
[222] Interpretation Act 1965 (2021 Rev Ed), s2(1).

2.3 Who is the owner of an AI-generated work?

Assuming that AI-generated works may be protected by copyright, the question arises as to who the owner of such copyright would be. Ownership is important for obvious reasons: it confers on the copyright owner the right to control the reproduction and commercial exploitation of the copyright work as well as the *locus standi* to bring an action for infringement of copyright.

As discussed in the section on ownership of AI-generated inventions in Chapter 1 (AI and Patents) above, there are no calls for AI ownership of intellectual property rights. Ownership of AI-generated works could, then, be vested in the owner of the AI system, the developer of the algorithms, the trainer of the AI, or the user (sometimes referred to as the deployer or operator)—or no one.[223]

With regard to the owner of the AI system, the DABUS litigation has made clear that there is no basis in law entitling the owner of an AI system to ownership of any inventions generated by that system (elaborated on in Chapter 1 (AI and Patents) above). Further, in the case of Thaler's application for copyright registration of the AI-generated visual artwork, he claimed copyright ownership over the artwork as being a "work made for hire", since he owned the AI system. This claim was rejected by the Copyright Office Review Board on the basis that the "Creativity Machine" cannot enter into a binding legal contract to agree that the work is "for hire" to bring it within the scope of that doctrine.

An argument may be made for the system developer as the copyright owner. This would fit well in the sense that the developer "writes" the algorithm and typically is the *prima facie* copyright owner of the code underlying the AI system. It would also provide a direct commercial incentive to the investment of effort in AI innovation. However, given the nature of data-driven AI systems, the connection between the system's developer and the system's output is attenuated. The instructions (i.e., prompts) to create the output are given by the end-user in most cases.

The rationale behind the argument for attributing ownership to AI users relies on the user being the one who provides the prompts, with AI merely serving as a tool to execute and enforce the user's intentions. However, as discussed in the section on

[223] Andres Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works' in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), *Artificial Intelligence and Intellectual Property* (Oxford University Press 2021) 159.

authorship above, the contribution by the user to the final output generated varies depending on the nature and extent of the prompts, and the modifications and revisions made by the user.

Increasingly, businesses can be observed to resolve the issue of copyright ownership through express contractual provision. For instance, the Terms of Use provided by OpenAI, which includes ChatGPT and DALL-E stipulate: "As between you and OpenAI, and to the extent permitted by applicable law, you (a) retain your ownership rights in Input and (b) own the Output. We hereby assign to you all our right, title, and interest, if any, in and to Output."[224] The end users own the content generated. Of course, if there is no copyright over the output then there is nothing for users to own; putting this point to one side for the moment, many law firm commentaries on this subject suggest contractual terms could be the way to deal with copyright ownership in the AI context.

Singapore

The relevant provisions in Singapore in relation to copyright ownership are set out in sections 133 and 134 of the Singapore Copyright Act 2021. Section 133 provides that the first owner of copyright in an authorial work is the author[225] unless there is an agreement to the contrary,[226] while section 134 provides that where the work is created in the course of employment, the employer would be the first copyright owner unless otherwise agreed. Unlike an author, who must be a natural person, an owner of copyright may be a non-natural person with legal personality (e.g., a corporation) who has acquired ownership by virtue of an assignment.

[224] OpenAI, 'Terms of Use' (14 November 2023).
[225] Singapore Copyright Act 2021, s133(1).
[226] Singapore Copyright Act 2021, s133(3).

Chapter 3. AI and Other Forms of IP

The debate on issues arising from the intersection of AI and IP have been largely focussed on copyright and patent laws, where AI systems seem to have had the most impact. Nevertheless, the breath-taking speed and breadth of AI development has been continuously throwing up new scenarios, and this Chapter takes a look at the impact of such developments in other areas of IP law.

3.1 Registered Designs

Much of the discussion and analysis of the issues under patent and copyright laws apply equally to AI-generated designs. There has been no case law development to date, and little commentary specifically in respect of AI-generated product designs. This area is likely to develop in tandem with patent and copyright laws and the implications for laws pertaining to designs should not be overlooked in those discussions.

3.1.1 Can an AI system be a designer?

In terms of authorship of AI-generated designs, it appears that the UK is a key jurisdiction that has legislative provisions for computer-generated designs, which are akin to its legislative provisions for copyright authorship of computer-generated works.[227] Similarly, both the UK Registered Designs Act 1949 (which protects registered designs) and the UK CDPA 1988 (which protects unregistered designs) provide that the designer of a design means the person who creates it, and in the case of a design generated by computer in circumstances such that there is no human author, the person by whom the arrangements necessary for the creation of the design are made shall be taken to be the designer.[228]

[227] See the section on copyright protection of computer generated designs in Chapter 2 (AI and Copyright).
[228] See: UK Registered Designs Act 1949, s2(3), (4) which use the term "author"; UK CDPA 1988, s214(1), (2).

Singapore

Under the Singapore Registered Designs Act 2000, the designer of a design is the "person who creates it",[229] and in the case of a design "generated by computer in circumstances such that there is no human designer, the person by whom the arrangements necessary for the creation of the design are made shall be taken to be the designer."[230]

3.1.2 Who is the owner of an AI-generated design?

As with inventions and creative works, an AI system would not currently be able to own a design since it does not have legal personality. However, in identifying a party to vest ownership in, there are issues of certainty as well as connection with the actual design to achieve the policy aim of encouraging innovation in AI and, in turn, AI-enhanced innovation.

In the UK, the designer is the owner of the design.[231] Based on the provisions stipulating who is to be seen as the designer, attribution of ownership in the case of designs without a human designer would be to "the person by whom the arrangements necessary for the creation of the design are made".[232]

Using the concept of the "person making the arrangements" for the creation of the design to determine ownership does, however, throw up the problem of identifying the appropriate person in the cases of complex AI where there are multiple actors involved.[233] This raises similar issues as the same suggestion for resolving the issues of authorship and ownership for copyright. It was acknowledged by the UKIPO in its response to the Call for Views on Artificial Intelligence and Intellectual Property 2021[234] that the use of AI in generating designs is a developing area of technology and

[229] Singapore Registered Designs Act 2000, s2(1).
[230] Singapore Registered Designs Act 2000, s4(6). This provision was introduced with the enactment of the Singapore Registered Designs Act 2000, which established a Designs Registry. Prior to that development, a design would receive automatic protection in Singapore if it had been registered in the UK. The new statute took reference from the UK Registered Designs Act 1949, which has a similar provision (see s2(4)).
[231] See: UK Registered Designs Act 1949, s2(1); UK CDPA 1988, s215(1).
[232] See: UK Registered Designs Act 1949, s2(4); UK CDPA 1988, s214(2).
[233] See: United Kingdom Intellectual Property Office, 'Government Response to Call for Views on Artificial Intelligence and Intellectual Property' (*GOV.UK*) ch Designs.
[234] 'Government Response to Call for Views on Artificial Intelligence and Intellectual Property' (*GOV.UK*, 23 March 2021).

that this issue will be kept under review, in line with any review of the similar copyright provisions.

Singapore

In Singapore, similar to the UK, the Registered Designs Act 2000 provides that the designer of the design is treated as the owner of the design and in the case of a design with no human designer, the owner would therefore be "the person by whom the arrangements necessary for the creation of the design are made".[235]

3.2 Trade Marks

Trade mark laws do not have the equivalent concept of an author or inventor. In many jurisdictions, trade marks are typically registered in the name of a legal entity or an individual. The position in most jurisdictions is to treat the person in whose name the trade mark is registered as the owner (or proprietor in trade mark law parlance). In the UK, the form for an application to file a trade mark by the UKIPO refers to the applicant as the "proposed owner", and Section 1.1 of the UKIPO's *Manual of Trade Mark Practice*, in explaining the essential requirements for filing, explains that the applicant becomes the "proprietor" once the mark is registered. Under the US trade mark laws, rights to a trade mark could be acquired by being the first to use the mark in commerce; or by being the first to register the mark with the USPTO. This appears to remove any live question as to whether AI-generated content that could function as a trade mark can be legally protected: if it is duly registered, it does not matter how it was created. It would thus appear that anything produced by AI that could function as a trade mark would be available for adoption and registration as a trade mark.

The question of who is the owner of an unregistered AI-generated trade mark will likely generate the same issues as the question of who is the owner of AI-generated output under copyright law in the preceding Chapter.

[235] Singapore Registered Designs Act 2000, s4(1) read with s4(6).

Singapore

Section 2(1) of the Singapore Trade Marks Act 1998 provides that, in relation to a registered trade mark, the proprietor is the person in whose name the trade mark is registered; in relation to an unregistered trade mark that is a well-known trade mark, the proprietor is the person to whom the trade mark belongs.[236]

3.2.1 Will the use of AI affect traditional trade mark law concepts?

Commentaries on AI and trade marks generally discuss how increased usage of AI in consumer recommendations and purchases could affect the way consumers perceive and interact with brands. In turn, this may challenge the application of traditional tenets of trade mark laws.[237] The increase in the use of AI assistants such as Alexa and Siri, search engines, and customer service bots in online marketplaces to assist consumers in purchasing products may correspondingly result in less direct participation by consumers in purchasing decisions. For instance, data-driven recommender algorithms make personalised product suggestions which have less to do with brand recognition and quality and more to do with subscription or historical purchasing decisions. Consumers may not always be aware of these pre-selected factors. A common example cited is Amazon.com, which has a general product suggestion feature and "recommendations based on your order". Consumers may also set instructions for online purchase recommendations based on price point and availability for shipping rather than perusing physical products along the aisles of a shop. Increasingly, online shopping retailers provide for product substitution whereby the selection of a substitute may be determined by other factors other than brands and product quality. As of 2023, there were some 310 million Alexa users worldwide, and it was estimated that 130 million Amazon Echos will be sold globally by 2025.[238]

[236] See: Singapore Trade Marks Act 1998, s2(1) which provides that in the case of an unregistered trade mark that is a well-known trade mark, the proprietor is the person to whom the trade mark belongs. This is a factual determination.
[237] Lee Curtis and Rachel Platts, 'AI Is Coming and It Will Change Trade Mark Law' [2017] Trade Mark Artificial Intelligence.
[238] Mohammad Y, '10+ Amazon Statistics + How Many People Shop on Amazon?' (13 September 2023).

Potential changes in purchasing behaviour have raised concerns on how legal principles governing the registrability of trade marks and trade mark infringement will be affected. Some of the common issues being raised include:[239]

1. Who is the "average consumer" for determining likelihood of confusion between conflicting marks, and what are the parameters of an AI consumer?
2. Would "marketplace confusion" apply to AI?
3. Do the concepts of "imperfect recollection" continue to apply when AI is supposed to have perfect recollection?
4. As voice assistant technologies develop further, what is the importance of aural and conceptual comparison of marks in the future in determining likelihood of consumer confusion between conflicting trade marks? Should phonetic similarities be granted additional weight?
5. If the AI suggests a product that infringes a registered trade mark or is a counterfeit, would the purchaser be liable?

The consensus from the UKIPO's call for views in 2021 was that the notional "average consumer" in trade mark law is still considered to be human, and this is unlikely to change for the foreseeable future: AI is not a consumer in its own right.[240] It would be difficult to envisage that AI technology could be the primary or sole purchaser (especially because of the legal inability of AI to enter into contractual relations) and human purchasers are the ultimate target of retailers. Nevertheless, by acting as a filter between the consumers and product brands, making unique recommendations based on past purchasing decisions, AI tools have significant implications for trade mark laws and their applications.[241] Without case law developments, however, much remains speculative.

[239] See: 'Government Response to Call for Views on Artificial Intelligence and Intellectual Property' (*GOV.UK*, 23 March 2021) ch Trade Marks; Renee Keen and others, 'Artificial Intelligence (AI) and the Future of Brands: How Will AI Impact Product Selection and the Role of Trademarks for Consumers?' (International Trademark Association 2019).

[240] See: United Kingdom Intellectual Property Office ("UK IPO"), 'Artificial Intelligence and Intellectual Property: Copyright and Patents: Government Response to Consultation' (*GOV.UK*, 28 June 2022).

[241] Lee Curtis and Rachel Platts, 'Trademark Law Playing Catch-up with Artificial Intelligence?' (*WIPO Magazine*, June 2020).

Alexa, find me deals for puzzles for a 6-year-old

Alexa is the natural language processing system by Amazon, powered by data and machine learning, that talks to users of Amazon's Echo products. It is based on a patent filed in 2021 filed by four Amazon engineers for an AI system designed to engage with human speech.

Alexa-enabled devices can play music from Amazon Music, control smart home devices, order products, answer user questions, and play games with Alexa Gadgets. One of its functions is to aid Amazon Prime members shop on the Amazon website. If a user knows exactly what he/she wants, the user may mention brand and quantity. However, if the user does not know or have any particular brand in mind the user could give a description and Alexa will pick an Amazon Prime item.

While there is continued commentary that consumers' allegiance will shift from trusted brands to a trusted AI assistant,[242] security and privacy concerns remain. In June 2023, Amazon was fined a combined total of nearly US$31 million by the Federal Trade Commission for "prevent[ing] parents from exercising their deletion rights under the US Children's Online Privacy Protection Act, … [keeping] sensitive voice and geolocation data for years, and us[ing] it for its own purposes, while putting data at risk of harm from unnecessary access."[243]

[242] Niraj Dawar, 'Marketing in the Age of Alexa' (*Harvard Business Review*, June 2018); David R. Mayer and Nick Harrison, 'As Customers Begin to Shop Through Voice Assistants, What Can Brands Do to Stand Out?' (*Harvard Business Review*, 13 August 2019).

[243] James Wohr, 'Voice Assistants: What They Are and What They Mean for Marketing and Commerce' (Insider Intelligence, 17 October 2023).

3.3 AI, Passing Off and Right of Publicity

AI systems are increasingly able to produce material that convincingly replicates the voice and appearance of a person—what is being termed as "digital replicas" of a person. AI video manipulation can be used in non-controversial ways (for example, the pioneering virtual concerts featuring the band ABBA). However, the rise of deepfake content and the unauthorised use of a person's image, voice, or other indicia of identification around the world are of increasing concern to policymakers, celebrities and the general public. These issues traverse different laws, ranging from personal data and privacy to defamation, and from intellectual property to publicity or personality rights. While broader privacy and online harm dimensions of this growing problem are beyond the scope of this Report, associated areas of IP laws may be relevant in seeking to prevent such unauthorised use.

In general, traditional forms of IP law may not accord protection to unauthorised use or replication of forms of identification of persons. The voice of a person or a style of singing or the physical likeness of a person are not copyright protected subject matter, and the scope of protection of a sound recording only extends to making a copy of the recording and does not extend to preventing the creation of a sound-alike recording.[244] While it may be possible to register signature poses,[245] voices, and even faces[246] as trade marks, the scope of protection is generally limited only to the registered class(es) of goods and services and the representation of the mark. Hence, should an AI system be used to create content leveraging a person's style, reputation or voice, claims may need to be made based on associated areas of law such as passing off and personality rights.

[244] Copyright Act 2021, s121 (a)(i); UK CDPA 1988, s17(1); 17 U.S.C s114(b).

[245] Usain Bolt's lightning bolt pose and Michael Jordan's jump shot are well-known examples.

[246] Dutch model Maartje Verhoef is the first person to successfully register her face as a trademark with the European Union Intellectual Property Office (EUIPO) in April 2020. However, the logo registered was a simple black and white outline of Verhoef's face. Eleonora Rosati, 'Can Someone's Face Be a Trade Mark?' (*The IPKat*, 29 December 2022).

"There's a video out there promoting some dental plan with an AI version of me", Tom Hanks wrote on Instagram on 1 October 2023. "I have nothing to do with it."

In April 2023, the AI-generated track *Heart On My Sleeve* was uploaded by TikTok user ghostwriter977 on platforms like Spotify and YouTube and accumulated millions of views with its compelling mimicry of Drake and The Weeknd's voices. The track was taken down by Spotify and YouTube after takedown notices were issued by Universal Music Group. In May 2023, Chinese video platform Bilibili was flooded in May 2023 with covers of AI-generated songs that replicated the voice of Singaporean singer Stefanie Sun. The singer herself posted on her blog, stating that she had become an "obscure singer" while her AI persona was the "current hot property". (According to Taiwanese media at that time, Sun's management label was not considering legal action due to the lack of regulation regarding AI.) In October 2023, Hollywood star Scarlett Johansson filed legal proceedings against an AI image-generating app called Lisa AI: 90s Yearbook & Avatar for using real footage of Johansson to generate her voice and likeness in an online advertisement without permission.

The first known decided case involving the use of AI-generated likeness took place in India in September 2023. The Delhi High Court ruled in favour of well-known Bollywood actor, Anil Kapoor, against defendants that included Simply Life India for using his image and likeness with AI tools to generate materials for commercial use without his consent. Kapoor obtained an omnibus injunction against the defendants from using his name, likeness, image, using technological tools like Artificial Intelligence, face morphing and even GIFs for monetary gain or commercial purposes. The claims brought by Kapoor included those in personality rights and passing off.[247]

[247] *Anil Kapoor v Simple Life India & Ors*, CS (COMM) 652/2023 and I.A. 18237/2023-18243/202

3.3.1 The law of passing off

The common law tort of passing off occurs when someone misrepresents their goods or services as those belonging to another party. This misrepresentation often damages the goodwill of a person or business, causing financial or reputational damage. The law of passing off does not recognise a proprietary interest in a name, image or other indicia of identity, but may protect goodwill by preventing a trader from gaining an unfair competitive advantage through associating itself or its products with a well-known personality.[248] It appears to be possible in most common law jurisdictions to seek to bring a claim in passing off against traders that use AI systems to replicate without consent a well-known personality's voice or likeness to promote or market a product or service.

In the UK and Australia, the courts have increasingly recognised that it is prevalent commercial practice for businesses to gain a competitive advantage in marketing their goods or services by associating a well-known personality with such goods or services to make them more desirable to consumers, with the courts ruling in favour of passing off claims by celebrities.[249] While the traditional principles of passing off require a common field of activity, the UK courts have broadened these principles to take into account the changing needs of modern commerce—in particular, the advent of product endorsements by public personalities. This means that there can be a valid claim in passing off without a common field of activity between the celebrity and the trader if it can be shown that there is a misrepresentation that the goods or services are associated with the celebrity and there has been use of goodwill "as to reduce, blur or diminish its exclusivity".[250] The lack of a common field of activity between the parties merely imposes a higher burden of proof in proving confusion. Australian courts have similarly adopted such principles and appear to be more willing to consider impressionistic association as a form of misrepresentation in the use of celebrity images in advertisements, taking into account how the "subliminal effect of an advertisement" may be deceptive.[251] The US also recognises the tort of passing off but

[248] David Tan, 'The Celebrity Halo Effect and Passing Off' (*Singapore Law Gazette*, 2017).
[249] UK: *Irvine v Talksport Ltd* [2002] 1 WLR 2355 affirmed in *Irvine (Damages)* [2003] 2 All ER 881 where Formula One driver Eddie Irvine brought a claim against Talksport for using a digitally altered photograph of him holding a portable radio bearing the name of the radio station in a promotional brochure, and *Fenty & Ors v Arcadia Group Brands Ltd (trading as Topshop)* [2013] EWHC 2310 (Ch) affirmed in *Fenty & Ors v Arcadia Group Brands Ltd (trading as Topshop)* [2015] EWCA Civ 3 where pop music icon Rihanna sued Topshop for using her photograph on a range of clothing. Australia: The Crocodile Dundee litigation cases involving the star Paul Hogan; *Crocodile Dundee* (1989) 25 FCR 553; *Koala Dundee* (1988) 20 FCR 314.
[250] *Irvine v Talksport Ltd* [2002] 1 WLR 2355 [38]
[251] David Tan, 'The Celebrity Halo Effect and Passing Off' (*Singapore Law Gazette*, 2017).

claims by celebrities against false endorsement are largely based on laws and statute relating to the right of publicity, which we will elaborate on in the next section.

In claims for passing off, there must be some form of misrepresentation made that the celebrity endorsed or approved or is associated with the advertiser's product or services. What happens when there is no such misrepresentation? For instance, in the case of Scarlett Johansson's claim (see above), there was fine print under the advertisement which read "*Images produced by Lisa AI. It has nothing to do with this person*."[252] One may therefore need to turn to other types of law that protect the unauthorised use of a person's identity.

Singapore

There have been no cases in Singapore involving well-known personalities who allege passing off. There have been only two cases involving the unauthorised use of photographs in Singapore (of politician Chiam See Tong and fashion model Hanis Hussey, by a restaurant and escort agency respectively). However, these were successfully brought in defamation rather than passing off.[253] Nevertheless, the courts have held that the lack of a common field of business activity does not preclude confusion arising for the purposes of a claim in passing off.[254] Therefore, whether a passing off action will assist a celebrity against traders who use their name, image, or likeness in AI-generated audio-visual collaterals—or even their likeness in an AI-powered avatar—is likely to turn on whether the celebrity is able to demonstrate to the courts that there is a misrepresentation by the trader that misleads the public into thinking that the goods or services in question are in some way associated with the celebrity.[255]

[252] The Straits Times, 'Scarlett Johansson Takes Legal Action against AI App That Used Her Likeness without Permission' *The Straits Times* (Singapore, 2 November 2023).
[253] *Chiam See Tong v Xin Zhang Jiang Restaurant* [1995] 1 SLR(R) 856; *Hanis Hussey v Integrated Information* [1998] SGHC 219
[254] *CDL Hotels International Ltd v Pontiac Marina Pte Ltd* [1998] 1 SLR 975; *Novelty Pte Ltd v Amanresorts Ltd* [2009] 3 ALR(R) 216
[255] Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Second, Sweet & Maxwell 2014) ch 18.4.3.

3.3.2 The right of publicity

The right of publicity—sometimes called personality rights—broadly refers to the right to prevent the unauthorised commercial use of an individual's name, likeness, or the other recognisable aspects of one's persona. The existence and scope of the right of publicity vary significantly between jurisdictions, so attempts to assert such rights internationally may meet with varying degrees of success.

The UK and Australia do not recognise a right of publicity. The leading common law jurisdiction in this respect is the US. There, the right of publicity is not the subject of federal law but a majority of states recognise the right by statute and/or case law—including the key states of California and New York. The right does not require proof of a likelihood of confusion and has been invoked by celebrities to monetise their identity and to prevent unauthorised commercial uses of various aspects of their personae. A seminal case in the Court of Appeals of the Ninth Circuit, California is that of *Midler v Ford Motor Co*,[256] which held that the common law right of publicity can be violated when the distinctive voice of a well-known professional singer is deliberately imitated in order to sell a product. The case concerned the use by Ford's advertising agency of a former backup singer for entertainer Bette Midler to record one of Midler's songs for a commercial by imitating her voice. The Ninth Circuit held that Midler could not state a claim under California's right of publicity statute[257] because the "voice" used in the commercial was of the backup singer, not Midler's. The court did, however, permit Midler to pursue a right of publicity claim under California common law, which more broadly protects against the misappropriation of a person's identity, including vocal performances. Relying on this case, famous 80s pop singer Rick Astley recently brought a similar case for the imitation of his voice by Yung Gravy in an interpolation of his track *Never Gonna Give You Up*. The pleadings argued for an expansion of the *Midler* judgment to apply to imitation for any commercial purpose, rather than solely in relation to false endorsement.[258] While this case was settled out of court in September 2023, it would be conceivable that a similar action could be brought under California law against vocal imitations made with the assistance of AI such as a "deep fake".

[256] *Midler v Ford Motor Co*., 849 F.2d 460 (9th Cir. 1988)
[257] California Civil Code 1995, s3344
[258] *Richard "Rick" Paul Astley v Matthew Hauri PKA Yung Gravy; Nick Seeley PKA Popnick; Dillon Francis; David Wilson PKA dwilly; Republic Records,* Complaint No. 23SMCV00351 (Cal. Super. Ct. filed 26 January 2023)

Legislative intervention appears to be being considered in the US. One of the policy areas in the Notice of Inquiry issued by the US Copyright Office on 30 August 2023 relates to "the treatment of generative AI outputs that imitate the style or identity of human artists."[259] In addition, four US Senators have presented a bipartisan "discussion draft" of legislation intended to protect actors, singers and others from having AI programmes generate their likenesses and voices without their informed written consent. Called the "Nurture Originals, Foster Art and Keep Entertainment Safe" (NO FAKES) Act, the draft imposes liability on people, companies and platforms for producing or hosting so-called "digital replicas" and excludes from potential liability news, public affairs or sports programmes; documentaries, docudramas or historical or biographical works; comment, criticism, scholarship, satire or parody usages; advertisements or commercial announcements for any of the above three categories; and *de minimis* or incidental usages.[260]

In the EU, regulations of right of privacy and personality rights are decided upon by each of the member states, leading to a diverse variation of protection across the Union. The European Court of Human Rights does not mention in its cases the right of publicity directly but safeguards a person's image rights within the Right of Privacy under Article 8 of the European Convention of Human Rights.[261]

In China, the new Civil Code of China (that took effect 1 January 2021) introduced the protection of personality rights. The Code devotes an entire Book 4 to addressing the rights to name, portrait, reputation, and privacy.[262] It provides that a person enjoys the right to likeness, and is entitled to make, use, publicise, or authorise others to use his image in accordance with law. Likeness is defined as "an external image of a specific natural person reflected in video recordings, sculptures, drawings, or on other media by which the person can be identified."[263] The regulations creating personality rights were introduced to address the challenges of the digital age,[264] and have been used to prevent unauthorised use of the likeness of well-known personalities and public figures. In a recent decision under these laws released by China's Supreme People's Court, a travel agency was held liable for using AI software to generate a virtual character of a public figure based on his name, likeness and personality characteristics

[259] See: Copyright Office, Library of Congress, 'Artificial Intelligence and Copyright' (*Federal Register*, 30 August 2023) questions 30–33.
[260] Douglas Mirell, 'How AI Concerns About "Digital Replicas" Are Being Debated by Congress' (*The Hollywood Reporter*, 26 October 2023).
[261] *Von Hannover v. Germany* App no.59320/00 (ECHR, 24 June 2004)
[262] Civil Code of the People's Republic of China Art 990, Chapter I, Book 4
[263] Civil Code of the People's Republic of China Art 1018, Chapter IV, Book 4
[264] Xinhua, 'Xinhua Special: China Adopts World's First Modern-Day Civil Code' (*Xinhua*, 28 May 2020).

for interactions on the agency's system.[265] However, despite the use of "AI singers" on Chinese online platforms (including "AI Stefanie Sun", "AI Jay Chou", "AI Faye Wong" and "AI G.E.M"), currently no music label or singer's agency has pursued legal proceedings.[266]

Singapore

Like many other Commonwealth jurisdictions, Singapore does not recognise any right of publicity or privacy or image rights by way of common law or statute. The closest form of protection over a person's image or persona could potentially be under the Singapore Personal Data Protection Act 2012 (PDPA). Section 2(1) of the PDPA defines personal data as "data, whether true or not, about an individual who can be identified (a) from that data; or (b) from that data and other information to which the organisation has or is likely to have access", and the Singapore Personal Data Protection Commission has issued guidelines that such personal data may include photographs or video images of an individual.[267] False personal data such as digital replicas of an individual could fall within the scope of the Singapore PDPA, which has provisions to cease the use and disclosure of personal data where no consent was provided, although commentators have opined that the personal data protection framework is ill-suited to address this issue.[268]

[265] Aaron Wininger, 'China Releases Typical Cases of Judicial Protection of Personality Rights' (*China IP Law Update*, 4 December 2022).
[266] China Desk, 'AI Stefanie, Scams and Fake News: China Acts on AI Regulation, Technology News' (Lianhe Zaobao, 31 May 2023).
[267] Personal Data Protection Commission, "What You Should Know about the Personal Data Protection Act" (2013).
[268] See, for example: Hannah Yee-Fen Lim, "Are we equipped to confront AI-generated deepfakes?" (*The Straits Times,* 18 October 2023).

Chapter 4. AI and Infringement

As AI systems evolve beyond being mere tools and become increasingly adept at autonomously generating ideas, designs, solutions and content, questions have arisen as to whether and how IP infringement can arise in relation to such AI-generated output. This is largely complicated by the black box nature of AI, where the inner workings of the algorithms are often complex and inscrutable, making it difficult to track, trace and understand the decision-making process.

Assuming that the operation and use of AI systems give rise to IP infringement, there is also the question of who would be held liable, since AI systems lack the legal personality to be sued.

The debates in relation to AI and IP infringement have thus far centred primarily on copyright, as generative AI currently poses significant challenges to the principles of copyright protection. This is due to the manner in which generative AI systems are trained and their ability to autonomously create content that may be similar to or mimic, existing materials protected by copyright (i.e., copyright works or works).

This Chapter will therefore delve into the following issues:

1. Does the use of copyright works for machine learning infringe copyright?
2. Could AI models and tools infringe IP?
3. Who would be liable for IP infringement?

4.1 Does the use of works for machine learning infringe copyright?

Long a valued tool in research, text and data mining (TDM) forms the backbone for training AI models, particularly, generative AI models. The process of machine learning involves both developing algorithms and feeding the AI model large quantities of data and materials, for the analysis and identification of patterns, correlations, and

structures within the data.[269] This allows the model to make predictions on new and unseen data, devise solutions to a problem or generate content that mirrors the patterns and styles observed during its training. The quality and diversity of the training materials are crucial for the performance and capabilities of the resulting AI model and to mitigate the risk of AI bias.

While data *per se* is not protected by copyright, other materials used in the TDM process may include a wide array of subject matter protected by copyright, including books, articles, graphs, diagrams, artworks, photographs, music, and films. Using copyright works for TDM may well infringe copyright, as the process typically involves making copies of the works to train the AI model (e.g., through web-scraping or digitisation of copyright works).

The debate needs to be examined on two levels. Firstly, whether such activities are infringing; and secondly, whether there are exceptions that would render such activities non-infringing.

Content creators and rights-holders allege that such activities infringe their copyright and have asked to be remunerated for the use of their works to train generative AI systems, particularly in light of their concerns that such systems may compete with them for their livelihoods.[270] These concerns have been amplified by recent lawsuits filed by various artists and authors in the US against companies such as Stability AI, OpenAI, Microsoft—alleging copyright infringement and claiming compensation for their copyright works that had allegedly been scraped for training the generative AI models of these companies.

Arguments have been made by various commentators that the training of AI models using copyright works should *not* constitute infringement (or at least in the US, this ought to be considered "fair use"), because the training involves the extraction of unprotectable ideas and patterns from the works, and not the copying and use of the creative expression of the works (which is what copyright protects).[271]

[269] As an example, Stable Diffusion V1 was trained with over 5 billion images taken from three massive datasets collected by LAION-5B, a publicly available dataset derived from data scraped from Common Crawl, which was specifically created to scrape billions of web pages on a monthly basis and then released as massive datasets.
[270] See the open letter by the Authors Guild of America (signed by more than 8,500 writers including well-known authors) urging tech companies responsible for generative AI applications to cease using their works without authorisation or compensation. The Authors Guild, 'More than 15,000 Authors Sign Authors Guild Letter Calling on AI Industry Leaders to Protect Writers' (*The Authors Guild*, 18 July 2023).
[271] See, for example: Kit Walsh, 'How We Think About Copyright and AI Art' (*Electronic Frontier Foundation*, 3 April 2023); Mark A. Lemley and Bryan Casey, 'Fair Learning' (2021) 99 Texas Law Review 749–750.

Copyright exceptions for TDM activities for training AI models thus serve as a kind of "legal shelter";[272] without such exceptions, AI users would have to seek licences from all copyright owners for every piece of work that they use, to avoid committing copyright infringement.

Rights-holders would generally prefer having no exception at all and instead have recourse to licensing solutions to facilitate TDM, or restricting the scope of copyright exceptions to avoid unduly impinging on their commercial interests. Provisions that limit contractual restrictions on TDM use are contentious, with rights-holders expressing concerns that prohibitions against opting out or contracting around the exception constitute a major business risk.[273]

Proponents of TDM exceptions however argue that access to copyrighted works is crucial for training AI models. Research communities have confirmed the importance of an exception that applies to the uses of all kinds of works and enables the sharing of materials for the purposes of collaboration and validation.[274] Further, researchers[275] and users[276] have cautioned that contractual restrictions or a licensing-only model will negatively impact on the quality of the output. Apart from the impracticality of obtaining consent from every rights-holder, including those who cannot be identified or are unwilling to grant licences, the risks of using only licensed or public domain content include curatorial bias, restrictions on the topics of study, and the hampering of reproducibility and validation. Licensing costs may also be prohibitive for start-ups and small enterprises, therefore limiting this technology development to the very largest companies.[277]

[272] See suggestion for a special AI analysis and data mining copyright exception under the Copyright law of China in Tianxiang He, 'Copyright Exceptions Reform and AI Data Analysis in China: A Modest Proposal' in Jyh-An Lee, Reto Hilty and Kung-Chung Liu (eds), Artificial Intelligence and Intellectual Property (Oxford University Press 2021), 203.
[273] See, for example: Publishers Association, 'Publishers Association Briefing on Text and Data Mining (TDM)' para 4.3.9; Rachel Kim, 'AI and Copyright: AI Policies Must Respect Creators and Their Creativities' (*Copyright Alliance*, 8 December 2022).
[274] Sean M Fiil-Flynn and others, 'Legal Reform to Enhance Global Text and Data Mining Research' (2022) 378 Science 951, 952.
[275] Sean M Fiil-Flynn and others, 'Legal Reform to Enhance Global Text and Data Mining Research' (2022) 378 Science 951.
[276] UKIPO, 'Government Response to Call for Views on Artificial Intelligence and Intellectual Property' (*GOV.UK*) ch Designs.
[277] See, for example: Katharine Trendacosta and Cory Doctorow, 'AI Art Generators and the Online Image Market' (*Electronic Frontier Foundation*, 3 April 2023); Mark A. Lemley and Bryan Casey, 'Fair Learning' (2021) 99 Texas Law Review 754-759.

A fundamental tenet of any copyright regime is the reward and incentivisation of creativity. Allowing creators to prevent the unauthorised copying or use of their works ensures that they receive due recognition and fair compensation for their intellectual creations. This fosters creativity and innovation as well as economic growth, as copyright cuts across all sectors. Strong protection, however, must be balanced with reasonable exceptions to allow society to make use of copyright works for purposes that benefit society, such as education, the preservation of cultural heritage and innovation.

In seeking to strike a balance between the protection of rights-holders' interests and support for AI innovation, policymakers around the world have been reviewing current legislation, issuing requests for comments from the public, convening internal studies and/or looking into non-legislative solutions with the participation of key stakeholders. As of the time of completion of this Report, no amendments to copyright laws appear to have been enacted in any jurisdiction to specifically deal with generative AI. The current legal frameworks concerning TDM, machine learning and copyright infringement vary widely across jurisdictions, but they can be generally classified into three groups—statutory exceptions specifically created for TDM and machine learning (introduced before the advent of generative AI); an open-ended "fair use" exception that may permit TDM and machine learning for generative AI; and where there are no exceptions that could apply to TDM and machine learning.

4.1.1 Statutory Exceptions for TDM activities

Jurisdictions that have introduced exceptions for TDM with the express intention of removing uncertainties for their tech industries and positioning themselves in the AI race include the UK, Japan, Switzerland, and the EU. These exceptions all pre-date the development of generative AI systems. A comparative table of these exceptions are set out in Table 1 of this Chapter: TDM Exceptions Across Jurisdictions.

Japan's key copyright exception, which came into force on 1 January 2019, is titled "*Exploitation without the Purpose of Enjoying the Thoughts or Sentiments Expressed in a Work*",[278] and is generally regarded as the most permissive as it applies "*regardless of the method used*" (Emphasis added), and permitted purposes include use for data, use in the course of information processing by computer and any other use without

[278] Japan Copyright Act, Art 30-4.

any human perceptual recognition of the expression of the work.[279] The only qualification is that the permission of the copyright owner is required where such use would unreasonably prejudice the interests of the copyright owner, considering the nature or purpose of the work or the circumstances of its exploitation. This is determined on a case-by-case basis and the Agency for Cultural Affairs has issued guidelines that this should be evaluated from the perspective of whether such use will conflict with the market for the copyright owner's works or hinder the potential market for the work in the future. The guidance has however given only the limited example of where the unauthorised use of a commercially available database meant for information analysis would interfere with the market for the sale of the database.

As this exception was devised in 2018, before the advent of generative AI models, it is possible that this exception may not apply to the training of such models, which do produce content meant for the enjoyment of the ideas and expression of the work, and which may conflict with the market for the copyright owners' works or contractual restrictions imposed on the use of their works.[280] Recent discussions by governmental organisations have suggested that this provision does indeed apply to the training of generative AI models and that opt-out contractual provisions should not be valid, as such clauses would impede innovation.[281] The Agency for Cultural Affairs convened a panel of legal experts in September 2023 to discuss these issues and guidelines are anticipated to be announced sometime in 2024. A draft report issued by the panel indicates that the unauthorised use of copyright works to train AI may be infringing, and that while similarity in styles between AI-generated material and copyright works does not, in and of themselves, infringe copyright, the training of AI models only on works of specific creators could be infringing.[282]

At the other end of the spectrum are more restrictive exceptions, such as the EU Directive on Copyright and Related Rights in the Digital Single Market of 2019 (the Copyright DSM Directive), which permits TDM of lawfully accessed works by research and cultural organisations for the purpose of "scientific research" without

[279] The other related exceptions which were introduced at the same time are Art 47-4 which permits electronic incidental copies of works where the process is necessary to carry out machine learning activities and Art 47-5 which permits the use of copyrighted works for data verification when conducting research.
[280] Shinnosuke Fukuoka, Tomonobu Murata, and Atsuki Mizuguchi, 'Legal Issues in Generative AI under Japanese Law – Copyright' (*Nishimura & Asahi*, 11 July 2023).
[281] Michihiro Nishi, 'Japanese Law Issues Surrounding Generative AI: ChatGPT, BARD and Beyond' (*Clifford Chance*, 5 October 2023).
[282] Hiroyuki Omoto and Kaoru Yamada, 'Japan Panel Pushes to Shield Copyrighted Work from AI Training' (*Nikkei Asia*, 21 December 2023).

restriction,[283] and by any entity for any purpose, so long as the TDM is not prohibited by restrictions imposed by rights-holders contractually or by technical means.[284] This caveat of allowing contractual restrictions in relation to TDM for all other purposes was a concession to rights-holders that was introduced during the very last stage of the Copyright DSM Directive's adoption process. Further, the EU's proposed Artificial Intelligence Act (the text of which was finalised on 9 December 2023) has two provisions related to copyright under the rules for general-purpose AI models (previously referred to as foundational models). According to the compromise text published by Politico,[285] the providers of such models are to "put in place a policy to respect Union copyright law in particular to identify and respect, including through state of the art technologies where applicable, the reservations of rights expressed pursuant to Article 4(3) of Directive (EU) 2019/790" and "draw up and make publicly available a sufficiently detailed summary of the content used for training of the general-purpose AI model, according to a template provided by the AI Office". It is expected that guidance will be issued as to what constitutes "a sufficiently detailed summary" and more analysis by commentators of the text and its implications for AI companies should emerge in the weeks following the release of the finalised agreed text. At this juncture, it is noted that there will be no change to the existing copyright laws within the EU.

While more recent TDM exceptions such as those passed by Switzerland[286] and Singapore do not distinguish between non-commercial and commercial research purposes, the UK, which was the first jurisdiction to introduce a TDM exception in 2014, has found itself unable to reform its exception. The UK's current exception permits TDM of lawfully accessed works only for the purposes of non-commercial scientific research; there is no opt-out system for rights-holders.[287] One of the key outcomes of the UKIPO's 2021 consultation into AI and IP was to expand this exception for any purpose with the intention of supporting AI and wider innovation in the UK.[288] However, this was subject to significant backlash from the creative industries. A significant concern was that the exception would result in no economic reward for

[283] EU 2019 DSM Directive Art 3.
[284] EU 2019 DSM Directive Art 4.
[285]Politico, 'Compromise proposal on general purpose AI models/general purpose AI systems' (2023) as referenced by the Kluwer Copyright Blog: Paul Keller, 'A First Look at the Copyright Relevant Parts in the Final AI Act Compromise' (*Kluwer Copyright Blog*, 11 December 2023); the Creative Commons: Connor Benedict, 'On Openness & Copyright, EU AI Act Final Version Appears to Include Promising Changes' (*Creative Commons*, 11 December 2023).
[286] Swiss Copyright Act, Art 24(d), introduced in 2020.
[287] UK CDPA 1988, s29(A), introduced in 2014.
[288] United Kingdom Intellectual Property Office, 'Artificial Intelligence and Intellectual Property: Copyright and Patents: Government Response to Consultation' (*GOV.UK*, 28 June 2022).

artists for the exploitation of their works for commercial gain by AI companies. On 3 February 2023, the UK Minister for Science, Research and Innovation confirmed that the proposal would not be moving forward.[289]

Nevertheless, Sir Patrick Vallance's Pro-innovation Regulation of Technologies Review: Digital Technologies (which was issued the following month) (the Vallance Report)[290] contained language that was pro-investment and pro-innovation. The Vallance Report recommended that the UK government announce a policy position on IP law in the context of generative AI to lend confidence to AI companies and investors, and called on the government to "prioritise practical solutions to the barriers faced by AI firms in accessing copyright and database materials" and work with the AI and creative industries to enable TDM for any purpose. The Vallance Report also suggested a code of practice and a requirement for altered images to be labelled as generated or assisted by AI. This recommendation was accepted by the government, which tasked the UKIPO to work with the AI and creative sectors to create such a code, indicating that AI companies which adhered to the code could expect to be able to have a reasonable licence offered by rights-holders in return. The government further indicated that legislation may be enacted if agreement could not be reached or a code not adopted.[291] The UKIPO has been working with users and rights-holders on such a code of practice, with the stated intentions of making licences for data mining more available, helping to overcome barriers that AI firms and users currently face, and ensuring that protections exist for rights-holders.[292]

Afternote: The UK government announced on 6 February 2024 that while this working group had provided a valuable forum for stakeholders to express their views, it "will not be able to agree on an effective voluntary code", and the Department for Science, Innovation and Technology and the Department for Culture, Media and Sport "will now lead a period of engagement with the AI and rights holder sectors, seeking to ensure the workability and effectiveness of an approach that allows the AI and creative sectors to grow together in partnership."[293]

[289] Rachel Montagnon and Sungmin Cho, 'UK Withdraws Plans for Broader Text and Data Mining (TDM) Copyright and Database Right Exception' (*Lexology*, 1 March 2023).
[290] Patrick Vallance, 'Pro-innovation Regulation of Technologies Review Digital Technologies' (2023).
[291] HM Government, 'HM Government Response to Sir Patrick Vallance's Pro-Innovation Regulation of Technologies Review Digital Technologies' (2023).
[292] United Kingdom Intellectual Property Office, 'The Government's Code of Practice on Copyright and AI' (*GOV.UK*, 29 June 2023).
[293] Sarah Speight, 'UK fails in bid to create AI voluntary code as talks collapse' (*World Intellectual Property Review*, 7 February 2024) (accessed on 20 February 2024).

4.1.2 "Fair Use" exception

The US addresses TDM activities for the training of AI models through its doctrine of "fair use", which permits the use of copyright-protected material without having to first acquire permission from the copyright holder—particularly where the contemplated use is deemed "transformative." The four factors that are considered when determining whether a use is fair are listed in the US Copyright Law as follows:[294]

1. The purpose and character of the use, including whether it is for commercial or educational purposes.
2. The nature of the copyrighted work.
3. The amount and substantiality of the portion used in relation to the copyrighted work as a whole.
4. The effect of the use on the potential market for or value of the copyrighted work.

A report published by the USPTO in October 2020 pursuant to a Request for Comments in August 2019 indicated that "the majority of commenters believe the US legal system is well equipped to handle the emerging issues raised by AI".[295] One of the key commentaries on this issue[296] puts forth the argument that the analysis of fair use for machine learning should incorporate a principle called "fair learning", i.e., if the purpose of the AI model's use is not to obtain or incorporate the copyrightable elements of a work but to access, learn, and use the unprotectable parts of the work (e.g., ideas, facts and linguistic expression), then such use should be presumptively fair under the first factor. This would not only encourage innovation but allow for the development of better AI systems and tools.

To date, there has been no decision by the US courts on the application of the "fair use" doctrine in the context of generative AI models or AI-generated materials. It is generally expected that fair use will be pleaded by the defendants in the various lawsuits being initiated against generative AI developers.[297] The doctrine was

[294] 17 U.S. Code § 107.
[295] USPTO, 'USPTO Releases Report on Artificial Intelligence and Intellectual Property Policy' (*United States Patent and Trademark Office*, 6 October 2020).
[296] Mark A. Lemley and Bryan Casey, 'Fair Learning' (2021) 99 Texas Law Review 749–750.
[297] Christopher J. Valente and others, 'Recent Trends in Generative Artificial Intelligence Litigation in the United States' (*K&L Gates*, 5 September 2023).

successfully pleaded in analogous situations, such as in *Authors Guild v Google, Inc.*,[298] where it was held that a search engine's publication of small portions of copyrighted books was transformative because it improved access to that information, and in *Kelly v Arriba Soft Corp.*,[299] where the same conclusion was reached with respect to searchable images of copyrighted visual artwork. However, the recent US Supreme Court decision in *Andy Warhol Foundation for the Visual Arts, Inc v Goldsmith*[300] has complicated this analysis, with the Supreme Court's emphasis on the need to closely examine whether the unauthorised copying was done for a commercial purpose, when evaluating fair use. This purpose-driven enquiry and emphasis on market competition (as opposed to transformative use in previous cases) was welcomed by the creative industries but have left legal commentators uncertain as to the application of fair use to machine learning.[301] In the meantime, the Notice of Inquiry by the US Copyright Office issued on 30 August 2023 seeks comments on "the use of copyrighted works to train AI models".[302]

In other countries that have similar "fair use" exceptions, there have also been no case law developments in this area. The Israeli Ministry of Justice issued an opinion in December 2022 recognising that training a machine learning model would generally constitute fair use and cited US fair use court cases.[303] Notably, the opinion included a caveat that this exception would not apply in cases where the AI model is trained with datasets that consist exclusively of works created by a single author in order to compete with this author in existing markets.[304] South Korea has been looking into developing guidelines on copyright issues in AI-generated content; these were scheduled to be issued by end 2023.[305]

[298] *Authors Guild v Google, Inc.*, 804 F.3d 202 (2d cir. 2015).
[299] *Kelly v Arriba Soft Corp.*, 336 F.3d 811 (9th Cir. 2002).
[300] *Andy Warhol Foundation for the Visual Arts, Inc v Goldsmith.,* 17 U.S.C. § 107(1).
[301] See, for example: Isaiah Poritz, 'Generative AI Debate Braces for Post-Warhol Fair Use Impact' (*Bloomberg Law*, 30 May 2023); see also: Aaron Moss, 'Let's Go Hazy: Making Sense of Fair Use After Warhol' (*Copyright Lately*, 22 May 2023).
[302] See: Notice of Inquiry, 88 Fed. Reg. 59942 (Aug. 30, 2023) [25]-[27] questions 6-8.
[303] Ministry of Justice, State of Israel, "Opinion: Uses of Copyrighted Materials for Machine Learning" 18 December 2022.
[304]Ministry of Justice, State of Israel, "Opinion: Uses of Copyrighted Materials for Machine Learning" 18 December 2022, 3.
[305] Park Sae-jin, 'S. Korea to Set New Standards and Guidelines on Copyrights of AI-Generated Content' (*Aju Korea Daily English*, 3 May 2023).

4.1.3 No statutory exceptions for TDM and machine learning activities

Countries such as Australia and China neither have an open-ended "fair use" exception nor exceptions specific to AI analysis or data mining. This therefore gives rise to questions as to how TDM for machine learning will be treated under their copyright laws.

Commentators in Australia (supported by big tech companies such as Google) have been calling for a reform of copyright laws so as not to impede AI innovation, whereas unions have called for compensation for the use of their members' content for the training of AI. This tension culminated in a public consultation issued by the government on 1 June 2023, on identifying the potential gaps in the existing domestic governance landscape and possible additional AI governance mechanisms to support the "safe and responsible" development of AI.[306] However, it is noted that IP was expressly excluded from the model proposed, which appears to be similar in some respects to the EU's proposed AI Act.

China's first AI regulation, "Interim Administrative Measures for Generative Artificial Intelligence Services", which came into effect on 15 August 2023, applies to generative AI service providers that use generative AI technology to provide services to the public in China. Article 7 of the measures stipulates that providers of generative AI services should ensure that the training data does not infringe on others' intellectual property rights.[307] The consultation draft on Basic Security Requirements for Generative Artificial Intelligence Service (published in October 2023) provides detailed guidance on how to avoid IP infringement, ranging from establishing an intellectual property management strategy and designating an intellectual property manager, to identifying cases of intellectual property infringement within the corpus of training data (including but not limited to copyright, trademark, patent, and trade secret infringements), and publishing summary information about the intellectual property aspects within the training corpus.[308] It has been highlighted by commentators that Article 20 of these measures appears to have extra-territorial effect, as service providers from outside China that do not meet the requirements of these measures or other Chinese laws or

[306] Department of Industry, Science and Resources, 'Supporting Responsible AI: Discussion Paper' (*Australian Government*, 1 June 2023).
[307] Yi Wu, 'China's Interim Measures to Regulate Generative AI Services: Key Points' (*China Briefing News*, 27 July 2023).
[308] Samuel Yang, Chris Fung, and Bill Zhou, 'China Proposes National Standards on Generative AI Security' (*AnJie Broad Law Firm*, 2 November 2023).

regulations may be subject to technical or other necessary measures by the Chinese authorities (e.g., blocking of access within China).[309]

Singapore

Singapore has a hybrid regime, with a general fair use exception and exceptions for specific types of permitted uses.

Singapore introduced a general open-ended fair dealing permitted use in 2004. With the changes introduced by the Copyright Act 2021, the fair use exception[310] now sets out the same four statutory factors as the fair use doctrine in the US. To date, there have been no cases in the context of AI machine learning and generated output but in the one "fair use" case since the introduction of the exception in 2004, the Court of Appeal acknowledged that the US jurisprudence "would be helpful in shaping our law".[311]

In addition, the Copyright Act 2021 introduced an exception allowing use of copyright works for the purposes of Computational Data Analysis (CDA)[312] to support Singapore's Smart Nation's objectives and grow its AI and technology sectors.[313] CDA is non-exhaustively defined[314] to include:

> "(a) using a computer program to identify, extract and analyse information or data from a work or recording [of a protected performance]; and
>
> (b) using the work or recording as an example of a type of information or data to improve the functioning of a computer program in relation to that type of information or data.
>
> Illustration
> An example of computational data analysis under paragraph (b) is the use of images to train a computer program to recognise images."

[309] See for example: Baker McKenzie InsightPlus newsletter of August 2023: Isabella F.C. Liu and Dominic Edmondson, 'China: New Interim Measures to Regulate Generative AI' (*Baker McKenzie*, August 2023); See also: Ashurst Legal Developments newsletter of 26 September 2023: Joshua Cole, Michael Sheng, and Hoi Tak Leung, 'New Generative AI Measures in China' (*Ashurst*, 26 September 2023).
[310] Singapore Copyright Act 2021 s190, 191.
[311] *Global Yellow Pages Limited v Promedia Directories Pte Ltd* [2017] SGCA 28 [76].
[312] Singapore Copyright Act 2021, s244.
[313] *Singapore Parliamentary Debates, Official Report* (13 September 2021) vol 95 (Edwin C F Tong, Second Minister for Law).
[314] Singapore Copyright Act 2021, s243.

CDA can be carried out on all subject matter that is protected under the Copyright Act 2021, i.e., works[315] and recordings of protected performances. The exception does not discriminate between whether the CDA is commercial or non-commercial in nature and applies only to acts of copying, and in very narrow circumstances, communication to the public.[316] Acknowledging the often collaborative nature of research, supply of the copies made is permitted for the limited purpose of verifying the results of the user's CDA, or for collaborative research or study relating to the user's CDA.[317] The exception is a mandatory one in that it cannot be excluded or restricted by contract; any contractual term is void to the extent that it purports, directly or indirectly, to exclude or restrict the exception.[318]

At the same time, there are important parameters and conditions[319] for the exception to apply. These are:

1. The user must not use copies of the works made under this exception for any other purpose;
2. The user must have lawful access to the works to be copied;[320] and
3. The work from which copies are made must not itself be an infringing copy (unless the use of infringing copies is necessary for a prescribed analysis) or, if it is an infringing copy, the user must not know this; and if that copy was obtained from a flagrantly infringing online location, the user must not know (or reasonably have known) that.

[315] Section 8 of the Singapore Copyright Act 2021 defines a work as an authorial work (i.e., literary, dramatic, musical or artistic work); a published edition of an authorial work; a sound recording; a film; a broadcast or a cable programme.

[316] The only circumstances in which a work or recording of a protected performance may be so communicated is if the copy that is communicated was made in circumstances in which the CDA exception applies and the user either communicates the copy for the purpose of verifying the results of the user's CDA, or for collaborative research or study relating to the user's CDA: see Singapore Copyright Act 2021, s244(4).

[317] Singapore Copyright Act 2021, s244(2)(c). These are aligned with the same circumstances in which communicating a work or recording may be permitted under the exception.

[318] Singapore Copyright Act 2021, s187.

[319] Singapore Copyright Act 2021, s244(2).

[320] Section 244(2)(e) of the Singapore Copyright Act 2021 provides illustrative examples of what does not constitute "lawful access" - if the user accesses the materials by circumventing paywalls or in breach of the terms of use of a database (ignoring any terms that are void by virtue of Copyright Act 2021 s187).

With the CDA exception, TDM activities may potentially be exempted under fair use, the CDA exception, or *both* exceptions. This is due to the operation of Section 184 of the Copyright Act 2021, which provides that a permitted use is generally independent of, and does not affect the application of, any other permitted use, even on the same facts.[321]

4.2 Could AI models and tools infringe IP?

IP infringement could occur where the output of an AI model or tool (e.g., an image, song or design) is substantially similar to an existing work or product, or where a patent is possibly infringed by the AI model in the process of developing an invention. This issue has been brought to the fore with generative AI models. There have been no decided cases on this issue and much remains speculative as to whether current laws in relation to IP infringement are adequate or if reform is required.

4.2.1 Do AI models copy the works used to train the AI to generate content?

It is a fundamental principle of copyright law that it only protects the tangible form of expression of ideas and does not prevent the reproduction of facts embodied in a work ("the idea-expression dichotomy"). Generally, it also does not protect genres, motifs and style, though in the case of style (or artistic expression), there have been calls for a reform of copyright law due to the use of generative AI models to mimic the style of creators.[322]

Many commentaries have been published on the application of traditional principles of copyright infringement to how machine learning works and how AI models produce content. Essentially, an AI model uses its structural knowledge to produce its own combinations and variations of those patterns, structures, and relationships it had learned from the input data.[323] The argument made is that the generated content is

[321] See Explanatory Statement to Clause 184 of the Copyright Bill (Bill 17 of 2021).
[322] For a discussion of the issue of protection over artistic expression and style, see, for example: Stephen Wolfson, 'The Complex World of Style, Copyright, and Generative AI' (*Creative Commons*, 23 March 2023); Riddhi Setty, 'AI Imitating Artist "Style" Drives Call to Rethink Copyright Law' (*Bloomberg Law*, 31 May 2023).
[323] See, for example: McKinsey & Company, 'What Is ChatGPT, DALL-E, and Generative AI?' (*McKinsey & Company*, 19 January 2023); Aaron Moss, 'Artists Attack AI: Why The New Lawsuit Goes Too Far' (*Copyright Lately*, 24 January 2023); Katharine Trendacosta and Cory Doctorow, 'AI Art Generators and the Online Image Market' (*Electronic Frontier Foundation*, 3 April 2023).

therefore itself original and not a copy (or even a derivative work) of any specific example from the training data. In its response to the USPTO's Request for Comments on Intellectual Property Protection for Artificial Intelligence, OpenAI argued that "[w]ell-constructed AI systems generally do not regenerate, in any nontrivial portion, unaltered data from any particular work in their training corpus" and therefore infringement "is an unlikely accidental outcome."[324] Further, the amount of copyrightable expression taken from each original image in the training set could even be considered "*de minimis*".[325]

In Getty's lawsuit against Stability AI in the US, Getty cited an AI-generated image that showed a distorted version of its watermark as proof of copying by the AI model and as the basis for its trade mark infringement claims. While it remains to be seen how this case will play out at trial, there are commentators who have sought to explain that what the AI model had merely learnt was that any image of a red carpet would contain a Getty watermark. Therefore, it maps the watermark onto similar images that it generates.[326]

There are several points to note in the District Court's dismissal of the claims in the US lawsuit of *Andersen v Stability AI Ltd.* (*Andersen v Stability AI*) against Midjourney and Deviant Art for direct infringement[327] by generative AI models.[328] One is the court's instructions to the Plaintiffs that in re-pleading their claims, they would have to provide greater clarity and additional facts regarding how the training images were stored, used and reflected in the images that were generated by the various programmes. Another point is that the court rejected the argument that the output images generated by DeviantArt and Midjourney were infringing derivative works; this was not just due to a lack of specificity in the facts alleged but also because the judge did not find it plausible that every output image relied upon the copyrighted training images, as argued by the Plaintiffs. This was especially since the Plaintiffs conceded that none of the output images generated were substantially similar to the training images.

[324] US Congress, Innovation Docket No. PTO–C–2019–0038 9-10.
[325] Kit Walsh, 'How We Think About Copyright and AI Art' (*Electronic Frontier Foundation*, 3 April 2023).
[326] See, for example: Katharine Trendacosta and Cory Doctorow, 'AI Art Generators and the Online Image Market' (*Electronic Frontier Foundation*, 3 April 2023); Andrés Guadamuz, 'A Scanner Darkly: Copyright Liability and Exceptions in Artificial Intelligence Inputs and Outputs'.
[327] In these AI infringement lawsuits, the plaintiffs generally allege both direct copyright infringement (i.e., they claim that the copying of their works for training is an infringement; that the AI model itself is an infringing derivative work; and that generated output is substantially similar to their works) and indirect copyright infringement (i.e., that the AI programs provide the means for users to create infringing works).
[328] *Andersen v. Stability AI Ltd.*, 23-cv-00201-WHO, (N.D. Cal. Oct. 30, 2023) ('William H. Orrick United States District Judge Order on Motions to Dismiss and Strike')

4.2.2 What are the evidentiary hurdles to proving infringement?

Before ascribing liability for the output, the infringement itself must be proven. AI systems are considered to work like a "black box", where although the AI's overarching goal is known, the process that connects the input to output cannot be understood or predicted, even by the programmers of the AI themselves. For strong black boxes, it may not even be possible to analyse the decision-making process by reverse engineering the AI's output.[329] Thus, it may be virtually impossible to determine what works were used as the basis for the output, for example, the copyright work or patent that had been copied or referenced.

Under copyright law, a rights-holder must not only demonstrate the similarity between his/her work and the alleged infringing work, but also establish that the alleged infringer had copied his/her work. The output of an AI model could therefore only be found to be infringing if it can be proven that it is substantially similar to another work protected by copyright and if the AI model had copied such a work. This is a factual determination. For instance, in *Andersen v Stability AI*, the court found that, at the pleadings stage, it was sufficient for Andersen to point to the results of a search for her name on haveibeentrained.com, a web portal that shows users whether their works had been included in AI training datasets. Based on the results of that search, the court found it plausible that "all of Andersen's works that were registered as collections and were online were scraped into the training datasets".[330] Therefore, if the exact works which were referenced and/or used in the creation of the output are unknown, as is often the case with AI, it can be difficult to prove that there was copying at all. This appears to be a key stumbling evidential block in the lawsuits against generative AI companies.

While much of the discussion and the cases have been on copyright, it is worth mentioning that in relation to possible patent infringement, it has been discussed that the evidentiary issues would centre around ascertaining whether another patent had been used by the AI in generating the output. Due to the black box nature of the AI, it

[329] Yavar Bathaee, 'The Artificial Intelligence Black Box and the Failure of Intent and Causation' (2018) 31 Harvard Journal of Law & Technology 906–907.
[330] *Andersen v. Stability AI Ltd.*, 23-cv-00201-WHO, (N.D. Cal. Oct. 30, 2023) ('William H. Orrick United States District Judge Order on Motions to Dismiss and Strike')

may be virtually impossible to find out if any other patents had been referenced or used by the AI in generating the output.[331]

Finally, an added complication would be ascertaining where infringement took place. Given that IP rights are territorial, claimants alleging infringement may need to show that such acts had taken place in the jurisdiction where the action is commenced. However, if, for instance, an AI system's neural network is spread across the cloud or servers across jurisdictions, it may be difficult to ascertain just where the system's decision-making took place,[332] or where the acts of copying or training of the machine occurred. As demonstrated in the legal proceedings against Stability AI Ltd in the UK by Getty Images (US), issues of jurisdiction can play a critical role (see Table 2 of this Chapter: Lawsuits in the US and UK for copyright infringement against generative AI companies).

4.3 Who would be liable for IP infringement?

The issue of pinning liability for wrongdoings committed by AI systems is one that is not confined to the realm of IP. Since AI systems cannot be held liable for acts or omissions *per se*, wrongdoings need to be traced back to a legal person. Determining responsibility when an AI system commits a legal wrong involves navigating different players and complex evolving technologies.

Commentators have questioned whether current frameworks on liability for infringement are sufficient or if new principles and rules are required to provide clarity on legal liability, especially since the wrong cannot be traced back to a specific legal person.[333] Questions arise as to whether a legal person can truly oversee AI systems or anticipate their actions or omissions in order to avoid infringement; how liability rules could affect the incentives of developers, users and other harmed parties; and whether and how allocation of liability would impede AI's development and use. Nevertheless, it is generally agreed there must be liability. Otherwise, there is no deterrent against the use of AI for infringement.

[331] Marks & Clerk, 'The Impact of Artificial Intelligence on Patent Infringement Claims' (*Marks & Clerk*, 27 October 2019).
[332] Marks & Clerk, 'The Impact of Artificial Intelligence on Patent Infringement Claims' (*Marks & Clerk*, 27 October 2019).
[333] See, for example: Kay Firth-Butterfield and Yoon Chae, 'Artificial Intelligence Collides with Patent Law' (*World Economic Forum Center for the Fourth Industrial Revolution*, April 2018); Enrico Bonadio, Plamen Dinev, and Luke McDonagh, 'Can Artificial Intelligence Infringe Copyright? Some Reflections' in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar 2022).

This section will discuss generally the arguments on the allocation of responsibility amongst the different actors, with reference to current legal frameworks. It is not the intent of this section to go into an analysis of the legal principles for liability under each type of IP right.

Commentators and studies have raised several possibilities as to who to attribute liability for infringing activities—including the programmers or developers of the AI model, the owner of the AI systems, and users of the systems.[334]

A common suggestion is to hold users of such AI models liable as they are responsible for the type of output generated through the giving of prompts. For instance, the website Lexica.art, which tracks over 10 million images and prompts generated by Stable Diffusion, reported in 2022 that the name of Greg Rutkowski (an artist well-known for producing epic fantasy artwork) had been used as a prompt around 93,000 times.[335] The degree of human intervention would be a key factor to consider for this suggestion. For instance, a user who gives very specific prompts to the AI may be regarded as (more) responsible for the generated output as opposed to one who gives vague and general prompts that leave the AI to (more) independently generate based on its inherent algorithms and parameters. However, it would be challenging to establish liability as the user may not be aware of the training data used to train the AI or a work that was copied in response to the user's prompt.[336]

This leads to the argument for holding the programmers or developers of the AI system liable, as they are the ones who had effectively developed the code and algorithms for the training and operation of the AI system. It is argued that they are usually in a relatively better position to foresee the infringement than the end users and have likely derived economic value from the AI. However, unless the system was deliberately programmed to infringe certain types of IP rights (e.g., copyrighted works) the counter argument is that the developers do not monitor or deal with the AI-generated output, and it may be problematic to hold them accountable for

[334] See, for example: Enrico Bonadio, Plamen Dinev, and Luke McDonagh, 'Can Artificial Intelligence Infringe Copyright? Some Reflections' in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar 2022); Notice of Inquiry, 88 Fed. Reg. 59942 (Aug. 30, 2023).
[335] Melissa Heikkiläarchive, 'This Artist Is Dominating AI-Generated Art. And He's Not Happy about It.' (*MIT Technology Review*, 16 September 2022).
[336] Congressional Research Service, 'Generative Artificial Intelligence and Copyright Law' (29 September 2023) 4.

autonomous actions dictated by the AI system's neural networks or even the users.[337] In addition, it should be borne in mind that an AI system is usually developed by a team of individuals who are employees or contractors; the rights in their works tend to be owned by their employer or the contracting party. This would also go towards determining where liability would lie in the case of infringement.[338]

Another candidate for liability would be the owner of the AI system, since the owner derives financial benefit from the deployment of the system. Even if not directly liable, principles of secondary liability or vicarious liability may be argued. In terms of vicarious liability, an argument could be made under US copyright laws that the owner is vicariously liable for an autonomous AI system's copyright infringement when the owner possesses the right and ability to supervise the infringing conduct and has a financial interest in the infringement.[339] In Commonwealth jurisdictions such as the UK, Australia and Singapore, courts have held that the doctrine of vicarious liability is applicable to cases involving copyright infringement.[340] Further, in these jurisdictions, the concept of "authorising" infringement may also apply. However, a distinction is drawn between "authorising" infringement and providing technology that may be used to infringe (what is termed dual-use technology). "Authorising" copyright infringement would require more than simply offering the tool—it would require one to actually or purport to grant a third person the right to do the infringing act.[341] It is observed that AI models are being programmed to refuse to accept prompts requesting the generation of output that is similar to or a copy of an existing work.[342]

It is only in the US that the courts have started addressing these questions of liability in the numerous lawsuits that have been launched against the companies that own

[337] Kay Firth-Butterfield and Yoon Chae, 'Artificial Intelligence Collides with Patent Law' (*World Economic Forum Center for the Fourth Industrial Revolution*, April 2018); Enrico Bonadio, Plamen Dinev, and Luke McDonagh, 'Can Artificial Intelligence Infringe Copyright? Some Reflections' in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar 2022).

[338] Zach Naqvi, 'Artificial Intelligence, Copyright, and Copyright Infringement' (2020) 24 Marquette Intellectual Property Law Review.

[339] Zach Naqvi, 'Artificial Intelligence, Copyright, and Copyright Infringement' (2020) 24 Marquette Intellectual Property Law Review 30-33; Stephen Wolfson, 'Style, Copyright, and Generative AI Part 2: Vicarious Liability' (*Creative Commons*, 24 March 2023).

[340] See, for example: *Al-Hasani v Netter and anor* [2019] EWHC 640 in the UK; *Siemens Industry Software Inc v Inzigen Pte Ltd* [2023] SGHC 50 in Singapore; *Australasian Performing Right Association Ltd v Miles and ors* [1961] 3 FLR 146.

[341] See, for example: *CBS Songs Ltd v Amstrad Consumer Electronics plc* [1988] AC 1013 in the UK; *RecordTV Pte Ltd v Mediacorp Singapore Pte Ltd and ors* [2010] SGCA 43 [43] in Singapore; *Real Estate Tool Box Pty Ltd & Ors v Campaigntrack Pty Ltd & Anor* [2023] HCA 38 in Australia, which held that "indifference" will not constitute "authorisation".

[342] For instance, DALL·E 3 is designed to decline requests that ask for an image in the style of a living artist. See: OpenAI, 'DALL·E 3' (*OpenAI*), under "Creative Control".

and deploy the generative AI models in question. In the motion to dismiss in *Andersen v Stability AI* , the court directed the Plaintiffs to provide more facts that plausibly show how DeviantArt (one of the Defendants) could be liable for direct copyright infringement, when the Plaintiffs themselves had merely alleged that DeviantArt simply provided its customers access to Stable Diffusion as a library.[343] One of the claims raised in the suit against Stability AI was that the owners of the AI tools should be held vicariously liable for copyright infringement because their *users* could use the systems to create infringing works.

Perhaps, as with all IP infringement cases, the issue of liability is a fact-specific determination. As such, it remains to be seen whether this issue may be resolved by the courts, or whether legislative intervention is required.

[343] *Andersen v. Stability AI Ltd.*, 23-cv-00201-WHO, (N.D. Cal. Oct. 30, 2023) ('William H. Orrick United States District Judge Order on Motions to Dismiss and Strike')

Table 1: TDM Exceptions Across Jurisdictions

Countries	Legislation and effective date	Permitted uses	Types of Works	Non-commercial purpose	Commercial purpose	Opt-out /Contractual Restrictions	Other key conditions
UK	Section 29A of the Copyright, Designs and Patents Act 1988 1 June 2014	Copying for carrying out a computational analysis of anything recorded in the work for the sole purpose of research for a non-commercial purpose	All works	Yes	No	Not permitted	There must be lawful access to the works. The copy is accompanied by a sufficient acknowledgement (unless this would be impossible for reasons of practicality or otherwise).
Japan	Article 30-4 of the Copyright Act of Japan 1 January 2019	The "exploitation" of a work "regardless of the method used" where the use is not intended for the enjoyment of ideas or emotions expressed in a work and permitted purposes include	All works	Yes	Yes	Legislation is silent.	Permission of the copyright owner is required where such use would unreasonably prejudice the interests of the copyright owner considering the nature or purpose of the work or the circumstances of its exploitation.

		information analysis, use in the course of information processing by computer and any other use without any human perceptual recognition of the expression of the work.					
EU	Directive on Copyright in a Single Digital Market (2019/790/EU)	Art 3 – reproductions and extractions made by research organisations and cultural heritage institutions to carry out, for the purposes of scientific research, text and data mining of works or other subject matter to which they have lawful access.	All works	Yes	Yes, but subject to opt-out by rights-holders	Not permitted for TDM for "scientific purposes" but permitted for TDM commercial purposes.	Lawful access

		Art 4 – reproduction by any entity for any purpose but which may be overridden by restrictions imposed by rights-holders contractually or by technical means.					
Switzerland	Article 24d of the Copyright Act 1 April 2020	Reproduction due to the use of a technical process for scientific research. Retention of the copies for archiving and backup purposes	All works except computer programmes	Yes	Yes	Legislation is silent	There must be lawful access to the works.
Singapore	Sections 243 & 244 of the Copyright Act 2021	Copying (which includes storing or retaining) for the purposes of computation data analysis or preparing a	All works and recordings of protected performances	Yes	Yes	Not permitted	There must be lawful access to the works. No use of infringing works unless the use of infringing works is necessary for a

	21 November 2021	work for computational data analysis (“CDA”). CDA is defined to include “using a computer program to identify, extract and analyse information or data from the work or recording”. Communication to the public in limited circumstances. Supply of the copies made for the purpose of verifying the results of the user’s CDA, or for collaborative research or study relating to the user’s CDA.					prescribed analysis or the user did not know the works were infringing, or the copies were obtained from a flagrantly infringing online location and the user must not know (or reasonably have known) that.

Table 2: Lawsuits in the US and UK for copyright infringement against generative AI companies

Lawsuits initiated against generative AI developers in the US have increased in frequency.[344] The following provides an overview of the litigation landscape in the US and the UK.[345] In general, courts have found several of the complaints to be lacking in the specific, factual and technical details necessary to proceed beyond the pleadings stage, with several claims accordingly being dismissed. While the final outcomes of the claims that survived motions of dismissal remain pending, the treatment by the courts so far have added to the evolving conversation on whether generative AI systems indeed infringe copyright.

Location	Lawsuits for copyright infringement against generative AI companies
US	***Thomson Reuters Enterprise Centre GmbH v ROSS Intelligence Inc.***[346] Thomson Reuters is the owner of the renowned legal research platform Westlaw. The company contends that the defendant, an artificial intelligence startup, engaged in unauthorised copying of significant content from Westlaw to train its competing AI-powered legal research software. Amongst other copyright issues raised, the main argument of the defence is that of fair use; in particular, the transformative use of the case headnotes by conversion into numerical data used by a machine learning algorithm "to teach the artificial intelligence about legal language". A jury trial has been set for 2024.[347]

[344] TFL, 'From ChatGPT to Deepfake Apps: A Running List of AI Lawsuits' (*The Fashion Law*, 21 November 2023).
[345] The cases listed in this Table are not exhaustive of all the lawsuits initiated and pending in the US and the UK. As at the date of publication more lawsuits have been initiated in other creative sectors such as the music industry.
[346] District of Delaware, 'Thomson Reuters Enterprise Centre GmbH et al v. ROSS Intelligence Inc.' (*United States District Court*).
[347] Isaiah Poritz, 'Thomson Reuters Will Head to Trial in AI Model Copyright Battle' (*Bloomberg Law*, 27 September 2023).

	Andersen et al v Stability AI Ltd, et al[348] Three artists (the Plaintiffs) filed a class action on behalf of themselves and other artists against Stability AI, DeviantArt and Midjourney (the Defendants). The lawsuit challenges the Defendants' creation or use of Stable Diffusion, an AI software product, alleging that Stable Diffusion was "trained" on their copyrighted works to produce images "in the style" of particular artists. The Defendants fall into two groups: those involved in the scraping, copying and use of copyrighted works to train AI models (Stability AI), and those that integrated the Stable Diffusion programme into their own products but who played no part in the scraping, copying and use of the registered training images (DeviantArt and Midjourney). The Defendants each filed a motion to dismiss with a Federal Court Judge dismissing the copyright infringement claims against DeviantArt and Midjourney for insufficient details of how the Plaintiffs' images were stored and made use of, and instructing the Plaintiffs to amend their pleadings for greater clarity. Andersen's **direct** copyright claim against Stability AI was maintained as the judge found that sufficient evidence had been adduced at the pleadings stage (relying on Stability AI's alleged scraping, copying, and use of copyrighted images in creating Stable Diffusion), and the Defendants had the discovery stage to produce evidence to the contrary.[349]
	Doe v GitHub, Inc.[350] Several anonymous coders (the Plaintiffs) filed a class action complaint against GitHub, OpenAI, and Microsoft including allegations of violation of copyright management laws based on GitHub's purported use of licensed materials without attribution as required by the licence terms of the platform. The basis of the allegations is that Copilot and Codex (AI-based coding tools) were trained on the Plaintiffs' copyrighted computer code. The Plaintiffs did not assert any direct claims for copyright infringement. While most of their complaints were dismissed, the court did find that their allegations could plausibly give

[348] *Andersen v Stability AI Ltd.*, 23-cv-00201-WHO (N.D. Cal. Oct. 30, 2023).
[349] *Andersen v. Stability AI Ltd.*, 23-cv-00201-WHO, (N.D. Cal. Oct. 30, 2023) ('William H. Orrick United States District Judge Order on Motions to Dismiss and Strike')
[350] *Doe v GitHub, Inc.*, 4:22-cv-06823, (N.D. Cal.)

	rise to standing to pursue injunctive relief because the Plaintiffs adequately alleged a danger that their code could potentially be used by Copilot in violation of the licence. The court granted the Plaintiffs leave to re-plead all but two of their claims and the Plaintiffs filed an amended complaint in June 2023. GitHub subsequently filed a motion to dismiss the amended complaint as well. The court has not yet ruled on that motion.
	Tremblay v OpenAI, Inc.[351], ***Silverman v OpenAI, Inc.***[352] and ***Chabon v OpenAI, Inc***[353] (consolidated into ***In Re OpenAI ChatGPT Litigation*** via a pre-trial order[354]) ***Kadrey v Meta Platforms, Inc.***[355] These lawsuits by various authors (the Plaintiffs) are similarly premised on a host of claims including direct infringement, vicarious copyright infringement, violation of the Digital Millennium Copyright Act, unfair competition, negligence and unjust enrichment, alleging that the LLM systems of OpenAI and Meta (the Defendants) were trained using the Plaintiffs' copyright materials i.e., their books, without their consent, credit or compensation. They further allege that the outputs generated by these systems constitute infringing derivative works. These lawsuits are aimed at compensating authors for the value of their books added to the AI's training data. Both Defendants have each filed in September 2023 a motion to dismiss all claims except for the direct infringement claim which they will contest later as a matter of copyright law, citing fair use, and arguing that the outputs are not derivative works.[356] Meta's motion to dismiss was successful with the court ruling that AI generated output cannot be infringing derivative work. Leave was granted to the Plaintiffs to amend the claims with

[351] *Tremblay v. OpenAI, Inc.*, 3:23-cv-03223, (N.D. Cal.).
[352] *Silverman v. OpenAI, Inc.*, 3:23-cv-03416, (N.D. Cal.).
[353] *Chabon v. OpenAI, Inc.*, 3:23-cv-04625, (N.D. Cal.).
[354] TFL, 'From ChatGPT to Deepfake Apps: A Running List of AI Lawsuits' (*The Fashion Law*, 21 November 2023).
[355] *Kadrey v. Meta Platforms, Inc.*, 3:23-cv-03417, (N.D. Cal.).
[356] Ashley M. Robinson, 'From Punchlines to Plaintiffs: Meta Platforms and OpenAI File Motions to Dismiss Comedian Sarah Silverman's Copyright Infringement Case' (*The National Law Review*, 21 September 2023).

	evidence of any outputs being "substantially similar" to the Plaintiffs' works.[357]
	Getty Images (US), Inc. v Stability AI, Inc.[358] Getty filed suit against Stability AI asserting claims of copyright and trademark infringement. In terms of copyright infringement, the complaint asserts that Stability AI "scraped" Getty's website for images and data used in the training of its image-generating model, Stable Diffusion, with the aim of establishing a competing product or service. Getty has alleged that Stability AI reproduced Getty's copyrighted material in connection with the training of its Stable Diffusion model and that the model creates infringing derivative works as output. A basis for this claim is how the images generated by Stable Diffusion includes a modified version of Getty's watermark. Stability AI has moved to dismiss Getty's complaint on jurisdictional and substantive grounds or to transfer the case to the US District Court for the Northern District of California and the motion remains pending.[359]
	The New York Times Company v. Microsoft Corporation, et al[360] The New York Times has filed suit against Microsoft and Open AI for copyright infringement, claiming the two companies built their AI models by "copying and using millions" of the publication's articles which now "*directly compete*" with its content as a result, thereby free riding on the publication's massive investment in its journalism without permission or payment. The publication claims that the defendants' LLM models which power ChatGPT and Copilot can "generate output that recites Times content verbatim, closely summarizes it, and mimics its expressive style". Apart from claiming actual and statutory damages, the publication is also asking the court to prevent these AI companies from training their models using its content and to require the companies to remove its content from their

[357] Blake Brittain, 'US Judge Trims AI Copyright Lawsuit against Meta' (*Reuters*, 10 November 2023).
[358] Getty Images (US), Inc. v. Stability AI, Inc., 1:23-cv-00135, (D. Del.).
[359] Riddhi Setty, 'Stability AI Asks Court to Toss Getty Lawsuit or Transfer It' (*Bloomberg Law*, 4 May 2023).
[360] The New York Times Company v. Microsoft Corporation, 1:23-cv-11195, (S.D.N.Y.).

	datasets. The lawsuit appears to have been filed following failed negotiations.
UK	***Getty Images (US), Inc & Ors v Stability AI Ltd***[361] This lawsuit runs parallel to that in the US with the same claims and allegations. Getty has requested an injunction from the UK's High Court to prevent UK users from accessing Stable Diffusion in the UK. Stability AI applied unsuccessfully for summary judgment on the grounds that Getty Images have no real prospect of succeeding on their claims. One point of contention was whether the training and development of Stable Diffusion occurred within the UK because if the alleged infringement actions took place in the US, the UK courts would have no jurisdiction. The court found that upon going through some of the evidence presented, there were "sufficient unanswered questions and inconsistencies" for the claim to proceed to trial.[362]

[361] Sam Tobin, 'Getty Asks London Court to Stop UK Sales of Stability AI System' (*Reuters*, 2 June 2023).
[362] *Getty Images (US) Inc & Ors v Stability AI Ltd* [2023] EWHC 3090 (Ch).

Conclusion

Even as policymakers continue to grapple with the issues concerning AI and IP, AI development has continued at a rapid pace. In view of the rate of development, stakeholders such as businesses have already embarked on offering various solutions to rights-holders and customers. In the realm of AI and copyright, these range from declaring that generative AI tools use only licensed content for training,[363] to offering IP indemnities to customers of paid services in specified (and sometimes limited) circumstances.[364] Technological solutions are also being offered to creators to stop their content from being used to train AI without their consent, ranging from simple means such as html tags to the more extreme option of data poisoning.[365]

Whether these measures are permitted by law, how they will play out in practice, and the impact on the resulting quality and scope of AI development, remain to be seen.

When we were looking at the material that existed, we recognised that starting points were often different; this was only to be expected as the responses were still very much domestically situated despite the global significance of the issues.

Since then, there have been growing calls at various fora for a more cohesive and consistent approach to address the legal challenges posed by a rapidly developing technology that transcends national boundaries.[366] Commentators from legal practice, business and academia have variously suggested that international harmonisation (to the extent possible) can foster a predictable legal environment, reducing uncertainties

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[363] Adobe's generative AI powered image maker tool, Firefly, has declared it only uses Adobe Stock images, openly licensed content and out of copyright images to avoid potential copyright infringement, and offers an IP indemnity in its user agreement. See: Jon Gold, 'Adobe Offers Copyright Indemnification for Firefly AI-Based Image App Users' (*Computerworld*, 8 June 2023).

[364] OpenAI just launched Copyright Shield, a programme to pay the legal costs incurred by customers who use the "generally available" features of OpenAI's developer platform and ChatGPT Enterprise, the business tier of its AI-powered ChatGPT chatbot, in the event that the customer face lawsuits over IP claims against work generated by these tools. See: Emilia David, 'Google Promises to Take the Legal Heat in Users' AI Copyright Lawsuits' (*The Verge*, 13 October 2023).

[365] For a fuller discussion of these business and technological solutions and challenges, see, for example: Cheryl Seah, 'Generative AI' (*The Singapore Law Gazette*, 15 November 2023).

[366] The fora include the WIPO Conversation on Intellectual Property and Frontier Technologies. At the sixth session for example, it was reported that all the speakers emphasised the need for "more transparency and explainability of AI systems to address issues of patentability, fairness and accountability", and called for "global harmonization and more clarity in patent application requirements for all types of AI inventions". See: 'WIPO Conversation on Intellectual Property (IP) and Frontier Technologies: Summary of the Sixth Session' (WIPO, 29 November 2023) [34].

across jurisdictions, facilitating cross-border collaborations and innovation, and ensuring a level playing field for businesses operating in multiple jurisdictions.

In the authors' view, such efforts can start with the promotion of knowledge sharing and best practices amongst stakeholders to learn from one another, ahead of the development of more efficient and effective legal frameworks, guidelines and practices.

We stand on the cusp of a transformative technology that is set to shape our lives in time to come. At this juncture, there are many questions but no easy answers. It therefore behooves policymakers to engage with the full range of domestic and international stakeholders in open and constant dialogue, to understand this fast-evolving technology and its applications in all fields, and to ensure that potential solutions (whether legislative changes, codes of practice or guidelines) adequately take into account the diverse interests and market realities. This will enhance the prospects of uncovering where the balance may best be struck—for one, for rights-holders to receive equitable treatment for their inventions and creations, even as we promote the continued innovation of AI tools that could enhance our lives in the future.

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