

Optimising Intellectual Property in the Age of AI Creativity: Perspectives from the United States

David J Kappos and Kevin M Kuate Fodouop*

Artificial Intelligence (AI) is increasingly becoming a subject of, and contributor to, innovation across industries. These AI-related inventions raise important intellectual property (IP) law issues, most notably under copyright and patent law. Copyright law must grapple with the issue of “AI as author” and patent law faces the issue of “AI as inventor”. AI also raises novel challenges for patent law’s subject matter eligibility, non-obviousness and disclosure requirements. Additionally, AI implementers and other data owners should consider how IP can protect data – the fundamental ingredient of all AI systems. As AI continues to rapidly transform every industry and field of innovation, AI implementers and data owners should take proactive steps to stay ahead of the curve in adapting to corresponding changes in available IP protection for their AI and data assets. This article provides AI implementers with 10 practical steps to begin the process of optimising their AI-related IP.

I. INTRODUCTION

Artificial Intelligence (AI) is demonstrating the amazing capacity to imitate and in some cases even overtake human intelligence. A recent video by InWorld, a virtual reality company, features virtual characters whose nuanced conversations are entirely generated by AI in real-time.¹ Stretching even further into the realm of science fiction, a former Google engineer, Blake Lemoine, recently claimed that the AI he was working on, LaMDA, has become sentient and has the same legal rights as humans.² Lemoine even introduced LaMDA to a lawyer so LaMDA could obtain legal representation and defend its legal rights.³ Another domain in which machines increasingly imitate or surpass humans is creativity and inventiveness.

We have undeniably entered the age of AI creativity, and in many instances, the deployment of AI leads to improved outcomes without humans fully grasping why the AI arrived at that outcome. The ST5 spacecraft antenna developed at NASA provides a striking example: A supercomputer using an artificial evolution algorithm (which mimics biological evolution) designed a very tiny, highly unorthodox but highly promising communication antenna for the ST5 spacecraft. The antenna has an unusual organic-looking structure, one that expert antenna designers would likely not produce. But this unorthodox AI-generated design has significant benefits. It consumes less power and does not require a matching network or a phasing circuit, which removes two steps in the design and fabrication of the antenna.

Thanks to advances in AI creativity, AI is increasingly becoming a subject of, and contributor to, innovation. Between 2002 and 2020, AI-related patent applications increased by more than 150% in the United States (US), rising from 30,000 to more than 80,000 annually.⁴ AI is also spreading to more

* David J Kappos is a partner at Cravath, Swaine & Moore LLP and is the former Under Secretary of Commerce and Director of the United States Patent and Trademark Office. Kevin M Kuate Fodouop is a student at New York University School of Law and will graduate with his JD in 2023.

¹ See InWorld, *Brains for Virtual Characters* <<https://www.inworld.ai>> (displaying AI-animated characters reflecting on their place in the world and the relationship between humans and intelligent machines).

² See Steven Levy, “Blake Lemoine Says Google’s LaMDA AI Faces ‘Bigotry’”, *Wired*, 17 June 2022 <<https://www.wired.com/story/blake-lemoine-google-lamda-ai-bigotry>>.

³ See Colin Lodewick, “Google’s Suspended AI Engineer Corrects the Record: He Didn’t Hire an Attorney for the ‘Sentient’ Chatbot, He Just Made Introductions – The Bot Hired the Lawyer”, *Fortune*, 23 June 2022 <<https://fortune.com/2022/06/23/google-blake-lemoine-ai-lamda-wired-attorney>>.

⁴ Nicholas A Pairolero, *Artificial Intelligence (AI) Trends in U.S. Patents* (29 June 2022) USPTO 7 <<https://www.uspto.gov/sites/default/files/documents/Artificial-Intelligence-trends-in-U.S.-patents.pdf>>.



technology subclasses (as identified by the US Patents and Trademark Office (USPTO)): Patents having AI content appeared in 9% of USPTO's technology subclasses in 1976 and spread to more than 50% by 2020.⁵ Examples of the diverse fields in which AI creativity is playing a role, include patents issued in technology subclasses for the use of AI to analyse materials by determining chemical or physical properties and for the use of AI to improve how automobile components interact with drivers.⁶

These trends indicate that AI has permeated many – perhaps most – areas of technology. We are now living in an AI-enhanced world, where AI impacts our lives in many ways. And we are living in a data-dominated world, where every company is now a data company. Whether your end-product is shoes or toothpaste or AI capability, your business is now so dependent on data that you must think of it as a “data business”. The use of data today is analogous to the electrification of business that occurred 100 years ago, when businesses went from viewing electricity as a novelty, to becoming so dependent on it that virtually no business can operate without electricity today.

AI-related inventions raise some important intellectual property law issues, most notably under copyright and patent law. Copyright law must grapple with the issue of “AI as author”, now that AI systems are becoming creative enough to independently produce original works. Similarly, patent law faces the issue of “AI as inventor”, now that AI systems can design inventive solutions, such as optimised chip “floor planning” and hyper-efficient factories.⁷ AI also raises novel challenges for patent law's subject matter eligibility (some AI inventions may be ineligible as “abstract ideas”), non-obviousness (AI may render more innovations “obvious”) and disclosure (whether applicants must disclose training data and model parameters) requirements. Finally, AI implementers and other data owners should consider how IP can protect data – the fundamental ingredient of all AI systems.

As AI applications and issued patents continue to grow in numbers, important copyright and patent offices are starting to issue formal guidance on key issues. For example, the USPTO has recently provided hypothetical example AI claims, with determination of whether such claims would be eligible or ineligible for patenting as abstract ideas. One example describes a computer-implemented method of training a neural network for facial recognition.⁸ The USPTO finds this example claim to be patent eligible, as its limitations do not recite any mathematical formulas (although they are based on mathematical concepts) and do not recite a mental process (because the recited steps cannot be practically performed in the human mind).⁹ The USPTO also released a dataset allowing the public to scrutinise trends in AI-related patents – the “Artificial Intelligence Patent Dataset”.¹⁰ The dataset includes all US patents issued between 1976 and 2020 that contain one or more AI technology component recognised by the USPTO.¹¹ Fittingly, the USPTO itself used AI to generate this dataset.¹²

⁵ Pairolero, n 4, 9.

⁶ See USPTO Office of the Chief Economist, *Inventing AI: Tracing the Diffusion of Artificial Intelligence with U.S. Patents* (October 2020) USPTO 8–9 <<https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf>> (*Inventing AI*).

⁷ For example, Google and Nvidia have increased their AI efforts to design better chips through the use of AI. See Anna Goldie and Azalia Mirhoseini, “Chip Design with Deep Reinforcement Learning”, *Google AI Blog* (23 April 2020) <<https://ai.googleblog.com/2020/04/chip-design-with-deep-reinforcement.html>>; John Russell, “Nvidia R&D Chief on How AI Is Improving Chip Design”, *HPC Wire*, 18 April 2022 <<https://www.hpcwire.com/2022/04/18/nvidia-rd-chief-on-how-ai-is-improving-chip-design/>>. See also Ryan Abbott, “I Think, Therefore I Invent: Creative Computers and the Future of Patent Law” (2016) 57 BCL Rev 1079, 1087 (describing a “system to make factories more efficient” invented by the “Invention Machine” AI system, as well as other AI-generated inventions).

⁸ USPTO, *Subject Matter Eligibility Examples: Abstract Ideas, Example 39 – Method for Training a Neural Network for Facial Detection* (2019) <https://www.uspto.gov/sites/default/files/documents/101_examples_37to42_20190107.pdf>.

⁹ USPTO, n 8.

¹⁰ See USPTO, *Artificial Intelligence Patent Dataset* <<https://www.uspto.gov/ip-policy/economic-research/research-datasets/artificial-intelligence-patent-dataset>> (*AI Patent Dataset*).

¹¹ The USPTO recognises eight AI technology components: (1) machine learning, (2) natural language processing, (3) computer vision, (4) speech, (5) knowledge processing, (6) AI hardware, (7) evolutionary computation and (8) planning and control. See *Inventing AI*, n 6, 3–4.

¹² The USPTO used a machine learning model that analysed patent text and citations to identify AI contained in the technical and legal scope of patented inventions. See *AI Patent Dataset*, n 10. As part of the AI Patent Dataset, the USPTO released the training data on which it trained this machine learning model.

II. “AI AS AUTHOR” UNDER COPYRIGHT LAW

Under current US law, a work created without human involvement would not qualify for copyright protection, as “authorship” requires creation by a human being. However, the US Supreme Court has recognised that creative work can be copyrightable even if an author is assisted by a machine or tool, which could apply to AI-assisted creative work.¹³

The issue of AI authors raises the broader question of whether works not created by humans can be protected – such as works created by animals. Between 2011 and 2018, a selfie taken by a monkey, Naruto, sparked a debate (and a lawsuit) about whether the selfie was copyrightable. Ultimately, the 9th Circuit decided it was not eligible for copyright protection.¹⁴

III. “AI AS INVENTOR” UNDER PATENT LAW

A controversy has also arisen as to whether AI systems can qualify as “inventors” under patent law. Stephen Thaler, the owner of AI system DABUS, has filed cases to recognise DABUS as an “inventor” in the United States, the United Kingdom, Australia and South Africa.¹⁵ So far, Thaler’s efforts have failed everywhere but South Africa. Still, his legal actions and advocacy for AI “inventors” have led many legal practitioners and legal scholars to weigh in on the debate.¹⁶

The United States, like most other countries, has found that AI systems cannot qualify as “inventors” and that it will not find machine-created innovation to be patent eligible.¹⁷ Europe has also rejected AI as “inventor”, although the European Patent Office recently offered an alternative for patenting AI-generated inventions: The AI’s owner or user may qualify as “inventor”, even if the AI itself does not qualify.¹⁸ Still, cases of “AI as Inventor” may soon become more common. For example, Google and Nvidia are increasingly using AI to design computer chips.¹⁹ Their AI models optimise “floor planning”, that is, the placement of components on a chip.

While machine-created inventions are not eligible, applicants retain significant flexibility to patent such inventions, as the vast majority of AI innovation in the foreseeable future will be created through contributions from humans. Applicants can draft their applications and claims to avoid rejections on the basis that AI does not qualify as an inventor. First, applicants should emphasise human control and oversight over the inventive process. This can include disclosing and highlighting decisions made by a human, inputs selected by a human, outputs selected or curated by a human, adjustments made by a human, tuning conducted by a human. Second, applicants should disclose algorithms and data (including the AI’s training datasets) to support patent eligibility.²⁰

¹³ See, eg, *Burrow-Giles Lithographic Co v Sarony*, 111 US 53 (1884) (creation of photograph assisted by camera can be copyrighted).

¹⁴ *Naruto v Slater*, No 16-15469 (9th Cir, 2018).

¹⁵ See *Thaler v Vidal*, No 21-2347 (Fed Cir, 2022); *Thaler v Hirshfeld*, 558 F Supp 3d 238 (ED Va, 2021); *Stephen Thaler v Comptroller General of Patents Trade Marks and Designs* [2021] EWCA Civ 1374, *Commissioner of Patents v Thaler*, No VID 496 (2021). The South African Companies and Intellectual Property Commission awarded a patent naming DABUS as the inventor. See “DABUS Gets Its First Patent in South Africa under Formalities Examination”, *IP Watch Dog*, 29 July 2021 <<https://www.ipwatchdog.com/2021/07/29/dabus-gets-first-patent-south-africa-formalities-examination/id=136116>>.

¹⁶ See, eg, Abbott, n 7; Mimi S Ashfar, “Artificial Intelligence and Inventorship – Does the Patent Inventor Have to Be Human?” (2022) 13 *Hastings Sci Tech LJ* 55; Russ Pearlman, “Recognizing Artificial Intelligence (AI) as Authors and Inventors under U.S. Intellectual Property Law” (2018) 24(2) *Rich JL Tech* 1; Justin Dersh, “When Artificial Intelligence Invents: Recalculating the Patent Act for AI-generated Inventions” (2021) 73 *Rutgers UL Rev* 185.

¹⁷ *Thaler v Hirshfeld*, 558 F Supp 3d 238, 238 (ED Va, 2021).

¹⁸ See Ryan Davis, *EPO Board Says AI Can’t Be Inventor, But Offers Alternative* (6 July 2022) *Law360* <<https://www.law360.com/ip/articles/1508743/epo-board-says-ai-can-t-be-inventor-but-offers-alternative>>.

¹⁹ See Anna Goldie and Azalia Mirhoseini, “Chip Design with Deep Reinforcement Learning”, *Google AI Blog* (23 April 2020) <<https://ai.googleblog.com/2020/04/chip-design-with-deep-reinforcement.html>>; John Russell, “Nvidia R&D Chief on How AI Is Improving Chip Design”, *HPC Wire*, 18 April 2022 <<https://www.hpcwire.com/2022/04/18/nvidia-rd-chief-on-how-ai-is-improving-chip-design>>.

²⁰ See Part 5.

IV. AI SUBJECT MATTER ELIGIBILITY UNDER PATENT LAW

AI faces challenges on patent subject matter eligibility by virtue of being based on mathematical algorithms, computer programs and analysis of data. In the United States, subject matter eligibility is governed by 35 USC § 101, which refers to “new and useful process, machine, manufacture, or composition of matter”. In addition to these statutory requirements, the US Supreme Court has recognised implicit exceptions to subject matter eligibility for “laws of nature, natural phenomena, and abstract ideas”.²¹ The rationale for these exceptions is that monopolising such basic tools of scientific and technological development would stifle innovation.²² The United States has the most stringent subject matter eligibility requirements, notably compared to Europe.

For the last eight years, eligibility for software-related inventions, including those involving AI, has been determined under the *Alice/Mayo* test. Step 1 of this test asks whether the patent claim is directed to a patent-ineligible judicial exception (eg, an abstract idea). If it is, step 2 asks whether the elements of the claim amount to significantly more than the judicial exception.

Alice Corp Pty v CLS Bank Int'l (Alice) and its progeny have been very difficult for practitioners to deal with, and continue to cause substantial uncertainty on the question of eligibility – including for AI inventions. And lower court decisions on subject matter eligibility for AI patents have added to the confusion. In *PurePredictive Inc v H2O.AI Inc*, a US court held an AI model ineligible because the model did not make “a specific improvement on an existing computer-related technology”.²³ The court found the patent claims’ implementation of a computer process for testing and refining an algorithm to be a general abstract concept of predictive analytics.²⁴ In contrast, the court in *Finjan Inc v Blue Coat Systems Inc* found an AI model eligible because the model enabled the computer security system to do things it could not do before.²⁵ That AI model built a “security profile” of a downloaded program to perform a “behavior-based virus scan”.²⁶

Despite these uncertainties, patent applicants should follow the best practice of providing specificity in their patent claims, which will improve their prospects for having their AI-related inventions found eligible. The AI subject matter eligibility cases seem, at least in part, to turn on the specificity of the patent application in laying out the improvement to the system and the specific steps allowing the method to accomplish this improvement. Of course, the other side of this coin is that making claims more specific will tend to make them narrower, thus providing less robust patent protection.

USPTO guidelines have at least clarified the USPTO’s role in evaluating subject matter issues. In January 2019, the USPTO issued its “Revised Patent Subject Matter Eligibility Guidance”.²⁷ The Eligibility Guidance clarified that the second step of the *Alice/Mayo* test requires analysing (1) whether the claim recites a judicial exception and (2) whether a recited judicial exception is integrated into a practical application. From there, further analysis is necessary only if (1) the claim recites a judicial exception and (2) the claim fails to integrate the exception into a practical application. Empirically, the Eligibility Guidance reversed an upward trend in eligibility rejections. While the likelihood of rejection for patent-ineligible subject matter rose by 31% in the 18 months following *Alice*, the likelihood of rejection then decreased by 25% in the year following the Guidance’s issuance.²⁸

²¹ See *Mayo Collaborative Servs v Prometheus Lab’s Inc*, 566 US 66, 70 (2012), citing *Diamond v Diehr*, 450 US 175, 185 (1981).

²² See *Alice Corp Pty v CLS Bank Int’l*, 573 US 208 (2014), citing *Mayo Collaborative Servs v Prometheus Lab’s Inc*, 566 US 66, 77 (2012).

²³ *PurePredictive Inc v H2O.AI Inc*, No. 17-CV-03049-WHO, 2017 WL 3721480, 5 (ND Cal, 2017).

²⁴ *PurePredictive Inc v H2O.AI Inc*, No. 17-CV-03049-WHO, 2017 WL 3721480, 5 (ND Cal, 2017).

²⁵ *Finjan Inc v Blue Coat Sys Inc*, 879 F 3d 1299, 1306 (Fed Cir, 2018).

²⁶ *Finjan Inc v Blue Coat Sys Inc*, 879 F 3d 1299, 1306 (Fed Cir, 2018).

²⁷ See Patent and Trademark Office, *2019 Revised Patent Subject Matter Eligibility Guidance* (7 January 2019) Federal Register <<https://www.federalregister.gov/documents/2019/01/07/2018-28282/2019-revised-patent-subject-matter-eligibility-guidance>>.

²⁸ See USPTO, *Report to Congress, Patent Eligible Subject Matter: Public Views on the Current Jurisprudence in the United States* (June 2022) 12 <<https://www.uspto.gov/sites/default/files/documents/USPTO-SubjectMatterEligibility-PublicViews.pdf>> (USPTO Subject Matter Eligibility Report).

Unfortunately, the USPTO Eligibility Guidance and other USPTO initiatives have played no role in clarifying subject matter eligibility doctrine. The US courts have made a point of stating that they are not bound by, or even swayed by, the USPTO Eligibility Guidance. And it is clear that the Eligibility Guidance does not reconcile or square with all of the case law from US courts. As a result, many patents with questionable validity have been issued, and courts are struggling to apply the *Alice/Mayo* test in reviewing them. In fact, every branch of the US government, including all 12 judges sitting on the Court of Appeals for the Federal Circuit in 2021, have stated that the current eligibility law is confused and incapable of application. The USPTO has launched other initiatives on the issue of subject matter eligibility but has limited these contributions to requesting views from the public and summarising public comments.²⁹ In late July 2022, the USPTO announced that it would be re-evaluating the 2019 Eligibility Guidance, foreshadowing further changes aimed at grappling with US patent eligibility requirements.

The Supreme Court recently refused an opportunity to clarify subject matter eligibility doctrine by denying *certiorari* in the *Am Axle & Mfg v Neapco Holdings (American Axle)* case.³⁰ *American Axle* raised the issue of what standard determines whether a patent claim is “directed to” a patent-ineligible concept under step 1 of the *Alice/Mayo* test. The District Court held that the asserted claims “as a whole” are directed to a law of nature – “Hooke’s law” (although Hooke’s law was not mentioned in the claims or the specification), and merely instructed one to apply Hooke’s law to achieve the desired result of attenuating certain types of vibrations transmitted through a driveline propshaft. The Federal Circuit affirmed. Judge Moore dissented, asserting that (1) the majority created a new test, the “Nothing More” test (asking whether the claim clearly invokes a natural law, and nothing more, to accomplish a desired result), for when claims are directed to a natural law despite not reciting a natural law, (2) the majority did not consider the claimed invention as a whole by refusing to consider the unconventional elements of the claim and (3) the majority blended § 101 (subject matter eligibility) with § 112 (enablement) analysis by demanding that more detail be included in the claims to explain how the invention accomplishes its desired outcome. The Supreme Court’s *certiorari* rejection has spawned widespread disappointment, as there was a sense the stars had aligned with *American Axle*. There is now a strong sense that attention must turn fully towards a legislative solution.

A legislative amendment represents the best path forward to clarify US subject matter eligibility doctrine. Such legislation was recently introduced in the US Senate,³¹ and includes:

- (1) Clarifying that § 101 is limited to patent eligibility (it does not cover § 102 novelty or § 103 obviousness).
- (2) Codifying the exceptions for laws of nature, natural phenomena and abstract ideas (including mathematical formula, mental processes and unmodified genes), thereby abrogating all existing judicially created eligibility exceptions.
- (3) Clarifying that eligibility shall be determined by considering the claimed invention as a whole, without disregarding any claim element.
- (4) Clarifying that eligibility shall be determined solely under the requirements set out in § 101 and without consideration of the manner in which the claimed invention was made and the specific requirements of § 102, § 103 and § 112.

Item 3 addresses Judge Moore’s concern that the *American Axle* Federal Circuit majority did not consider the unconventional elements of the patent claims. Item 4 addresses Judge Moore’s concern that the *American Axle* majority blended the § 101 subject matter analysis with the § 112 enablement analysis.

²⁹ See *USPTO Subject Matter Eligibility Report*, n 28; USPTO, *Public Views on Artificial Intelligence and Intellectual Property Policy* (October 2020) <https://www.uspto.gov/sites/default/files/documents/USPTO_AI-Report_2020-10-07.pdf>.

³⁰ *Am Axle & Mfg v Neapco Holdings*, 977 F 3d 1379 (Fed Cir, 2020).

³¹ See Samantha Handler and Riddhi Setty, *New Patent Eligibility Bill Takes Aim at High Court Inaction (1)* (3 August 2022) Bloomberg Law <<https://news.bloomberglaw.com/ip-law/new-patent-eligibility-bill-takes-aim-at-high-court-inaction>>.

V. AI AND NON-OBVIOUSNESS UNDER PATENT LAW

AI raises additional AI patenting issues, such as rendering innovations “obvious” – essentially raising the bar on the inventive step, and requiring the disclosure of datasets to meet written description and enablement requirements.

As AI increases mankind’s ability to create, it may impact the legal concept of PHOSITA, the hypothetical “Person Having Ordinary Skill in the Art”. To be patentable, inventions must not be “obvious” under 35 USC § 103, which classifies an invention as obvious “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a Person Having Ordinary Skill in the Art (‘PHOSITA’) to which the claimed invention pertains”. This is an objective analysis, dependent on the field of invention. But as more fields embrace AI, the expectations for what a PHOSITA can achieve may increase.

Increased use of AI could make new developments “obvious to try”, rendering many such new developments unpatentable. Courts have classified developments created by choosing from a finite number of identified, predictable solutions, with a reasonable expectations of success, that is, developments that are “obvious to try”, as obvious (therefore unpatentable). Widespread use of AI may recalibrate our expectations for the inventive process. What if tasking an AI system with solving a problem comes with an expectation of finding a successful solution? What if the PHOSITA in many fields of invention is now expected to have access to powerful AI tools to help her research? In this case, we may have to redefine the PHOSITA to be “a person using an inventive machine”, or redefine the PHOSITA to be merely “an inventive machine”.³²

VI. AI AND DISCLOSURE UNDER PATENT LAW

AI’s requirement for and reliance on data raises significant enablement and written description challenges. In the United States, enablement and written description are governed by 35 USC § 112, which requires the specification to be clear enough to “enable any person skilled in the art” (PHOSITA) to make and use the invention, and to “contain a written description” of the patented invention. The test of enablement and written description turns on whether undue experimentation is necessary to practice the invention, and on whether it is set forth clearly enough to be understood.³³

In recent years, the Federal Circuit and Supreme Court have tightened interpretation of § 112 for both enablement and written description, especially in the software field. Regarding enablement, recent Federal Circuit cases have made broad genus claims more difficult to support and required more disclosure to support broader claims. Regarding written description, the *Nautilus Inc v Biosig Instruments Inc* Supreme Court decision required a patent’s specification to provide the PHOSITA with “reasonable certainty” about the scope of what the patentee is claiming.³⁴

In the AI area, these heightened enablement and written description requirements should induce applicants to disclose both algorithms and datasets. As the quality and commercial utility of an AI invention often depends heavily on the AI’s training dataset, AI inventions may not yield reproducible results if their accompanying data is not disclosed – increasing the risks of failing the enablement and/or written description requirements. The risks of failing to meet disclosure requirements is especially high for “blackbox AI”, which automatically creates highly complex predictive functions from data with little input from humans on how to combine data variables. Even AI designers (the PHOSITAs) cannot understand why these blackbox models arrive at a specific decision, which heightens disclosure challenges. In contrast, disclosure risks are lower for “explainable AI”, which proactively incorporates processes that allow humans to reconstruct and explain the path an AI took to make decisions. These models seek to use rules that humans can easily understand, which facilitates patent disclosure.

³² Ryan Abott, “Everything Is Obvious” (2018) 66 UCLA L Rev 2, 6.

³³ *Re Wands*, 858 F 2d 731, 737 (Fed Cir, 1988).

³⁴ *Nautilus Inc v Biosig Instruments Inc*, 572 US 898, 901 (2014).

USPTO guidance from 2020 helped to clarify enablement and written description requirements as applied to AI inventions. For enablement, examiners were instructed to consider (1) “how broad the claim is with respect to the disclosure” and (2) “whether one skilled in the art could make and use the entire scope of the claimed invention”.³⁵ Including working examples in the specification is a factor in favour of the USPTO finding enablement.³⁶ For written description, patent examiners are required to confirm that the specification “provide[s] a disclosure of the computer and algorithm in sufficient detail to demonstrate to one of ordinary skill in the art that the inventor possessed the invention including how to program the disclosed computer to perform the claimed function”.³⁷ Computer-implemented inventions can be disclosed and claimed in terms of functionality, but the applicant must describe the particular steps necessary to perform the claimed function.³⁸ Determining sufficiency of disclosure will also “require an inquiry into both the sufficiency of the disclosed hardware as well as the disclosed software due to the interrelationship and interdependence of computer hardware and software”.³⁹

VII. DATA CONSIDERATIONS FOR AI

Data plays a fundamental role in AI and raises the overlapping legal issues of (1) privacy and data protection, (2) IP rights and (3) data ethics. Privacy laws may dictate or restrict how AI implementers can use data. Notably, disclosing datasets to comply with patenting requirements (addressed above) may raise data privacy issues. Moreover, while, trade secrecy law protects proprietary data, data made available on “open source” terms may implicate aggressive sharing requirements under “Community Data License Agreements”, which may force data owners to “open” their proprietary data. To avoid these risks, AI implementers and data owners need to track where they source their data.⁴⁰ Adding to the complexity, data ethics is a growing field aimed at guiding companies on best practices regarding the ethical use of data. For example, the Data and Trust Alliance has launched an “algorithmic safety” initiative to mitigate bias in workforce decisions.⁴¹ For companies increasingly using AI to make hiring and promotion decisions, the initiative has developed criteria and education for HR teams to evaluate AI vendors on their ability to detect, mitigate and monitor unfair bias in their workforce decision algorithms.

Data owners and AI implementers have limited prospects to protect data through IP rights. Data is not eligible subject matter for patent protection. Nor is data eligible for copyright protection. Trade secrecy is the main route to protect data through IP rights, but trade secrets cannot consistently provide adequate protection. Indeed, data loses its trade secret protection upon disclosure, and even a compilation of data may be denied trade secret protection if the compilation includes publicly available data. Technical measures to prevent data scraping may also be ineffective. For example, in *HiQ Labs Inc v LinkedIn Corp*, the Ninth Circuit prohibited LinkedIn from denying access to publicly available data on LinkedIn profiles.⁴²

³⁵ USPTO, *Manual of Patent Examination Procedure* (June 2020) ¶2184.08 <<https://mpep.uspto.gov/RDMS/MPEP/e8r9#/e8r9/d0e215224.html>>.

³⁶ USPTO, n 35, ¶2184.08.

³⁷ USPTO, n 35, ¶2161.01 <<https://mpep.uspto.gov/RDMS/MPEP/e8r9#/e8r9/d0e213359.html>>.

³⁸ USPTO, n 35, ¶2161.01.

³⁹ USPTO, n 35, ¶2161.01.

⁴⁰ While remaining aware of these risks, AI implementers and other data owners may still want to consider leveraging open data initiatives to gain access to additional data.

⁴¹ See Data & Trust Alliance, *Algorithmic Safety: Mitigating Bias in Workforce Decisions* <<https://dataandtrustalliance.org/our-initiatives>>.

⁴² *HiQ Labs Inc v LinkedIn Corp*, 938 F 3d 985 (9th Cir, 2019); *cert granted, judgment vacated*, 141 S Ct 2752; 210 L Ed 2d 902 (2021). While the Ninth Circuit’s 2019 judgment was vacated by the Supreme Court in June 2021, in April 2022 the Ninth Circuit reaffirmed its original decision. See *HiQ Labs v LinkedIn Corp*, 31 F 4th 1180 (9th Cir, 2022).

VIII. CONCLUSION: PRACTICAL STEPS FOR OPTIMISING AI INTELLECTUAL PROPERTY

In conclusion, AI implementers can take some practical steps to optimise their AI-related intellectual property:

- (1) To patent AI-generated inventions, applicants should emphasise the human control and oversight over the inventive process.
- (2) To qualify AI inventions for § 101 subject matter eligibility, applicants should highlight the practical application and technical use of their inventions. This involves laying out in detail, as clearly as possible, (1) the improvement to the system enabled by the AI method and (2) the specific steps allowing the AI method to accomplish this improvement.
- (3) To satisfy non-obviousness requirements under § 103, applicants should highlight in the patent specification why the claimed invention would not be obvious to a PHOSITA using AI.
- (4) To satisfy enablement requirements under § 112, applicants should describe the problem to be solved in detail. They should provide (1) examples of specific models and training algorithms, (2) details of the training data, such as source (if known) and/or data preprocessing or data filtering steps and (3) the model's hyperparameters.
- (5) To satisfy written description requirements under § 112, applicants should write their specifications to include a discussion of how the software's functionality is achieved. They need to show they possess the software program, not just that they could theoretically write a program to achieve a certain function. If the invention involves a software/hardware interdependence, applicants should disclose both hardware and software components and how they relate.
- (6) Patent applicants should adapt their prosecution approach to each jurisdiction's specific requirements. The United States remain focused on subject matter eligibility. Europe is moving toward requiring disclosure of datasets.⁴³
- (7) To seek trade secrecy protection, data owners should take affirmative measures to keep their data secret, and they should document these measures as well as their compliance with them.
- (8) Data owners should be aware that their "anonymous" data may be de-anonymised (subjecting them to privacy laws) and should take steps to avoid de-anonymisation of data they disclose.
- (9) AI implementers should monitor legal and technical measures available to protect data (and how they are evaluated by courts) and evolving regulatory and liability regimes related to AI.
- (10) AI implementers should track where their AI systems source their code and data to avoid "opening" their proprietary algorithms and data under emerging open source licenses.

AI will continue to rapidly transform every industry and field of innovation. AI impacts more and more aspects of our lives. AI implementers and data owners should take proactive steps to stay ahead of the curve in adapting to corresponding changes in available intellectual property protection for their AI and data assets.

⁴³ In its T0161/18 decision from 2020, the EPO rejected a patent for lack of sufficiency because the application did not disclose any specific example of input data or a training dataset. See Ronny Amirsehi, *Examining EPO's Strict Approach to AI Patent Disclosure* (2 February 2021) Law360 <<https://www.law360.com/internationaltrade/articles/1348216/examining-epo-s-strict-approach-to-ai-patent-disclosure>>.

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