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Jim W. Ko & Hon. Paul R. Michel

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TESTING THE LIMITS OF THE IP LEGAL REGIMES: THE UNIQUE CHALLENGES OF ARTIFICIAL INTELLIGENCE

Jim W. Ko & Hon. Paul R. Michel[†]

[†] Jim W. Ko is a Partner at Wood Phillips, headquartered in Chicago, and focuses his practice on providing counsel for all the ways that intellectual property and artificial intelligence issues can and will impact businesses. Jim previously served as Senior Program Attorney for The Sedona Conference for almost a decade, managing its patent litigation (WG9/10) and trade secret (WG12) working groups.

Hon. Paul R. Michel served on the U.S. Court of Appeals for the Federal Circuit for 22 years, starting in March 1988. From December 2004 until his retirement in May 2010, he was the court's Chief Judge and a member of the Judicial Conference of the United States and its seven-judge Executive Committee.

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I. INTRODUCTION*

The U.S. copyright law protects "original works of authorship," including literary works (which includes software source code), musical works, dramatic works, choreographic works, pictorial, graphic, and structural works, audiovisual works, sound recordings, and architectural works.[1] It protects any original work "fixed in any tangible medium of expression."[2] But copyright protections do not "extend to any idea."[3] They only cover the particular expression of work of authorship, not any inventive concepts or any other ideas underlying them. The latter is where we start venturing into the arena of patent law, which protects the ideas themselves if they are "new and useful" and are adequately disclosed and nonobvious.[4]

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* This article is intended to provide a framework for analysis for the IP issues to which the advent of generative AI gives rise, which the authors believe to be *sui generis* and at times slip through the cracks of the current IP law framework. It is intended to start a broader discussion, with the goal of developing an IP and AI law and policy that appropriately balances the rights and interests of the diverse stakeholders on these issues consistent with the underlying policy goals of the copyright, patent, trade secret, trademark, and other IP laws. The plan is to form one or more representative drafting teams to draft consensus, nonpartisan Sedona Conference commentaries on these issues. Should you have any comments on this paper and/or would be interested in participating in such a process, please reach out to comments@sedonaconference.org.

1. 17 U.S.C. § 102(a).

2. *Id*.

3. 17 U.S.C. § 102(b).

4. Patent law protects "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof," subject to certain limitations. 35 U.S.C. § 101.

Generative artificial intelligence (GenAI) in theory most directly implicates copyright and patent law for two main reasons:

- GenAI purportedly mimics or replicates critical functions of the human mind, including creative processes and problem solving. When a user of a GenAI tool inputs a "prompt" framing a creative goal or a technical problem to solve, the GenAI generates an output in response that might otherwise confer authorship or inventorship rights under our copyright and patent laws had it been generated by a human.
- Copyright and patent law both grant exclusive rights to the original works of authorship or inventions, including the right to exclude others from reproducing or using them. But if GenAI is used, in whole or in part, to create an otherwise copyrightable work or to conceive an otherwise patentable invention, should the owner or manager of the GenAI have the right to exclude others from copying or using such output? And if so, when? Without such exclusive rights, the potential value of the GenAI-assisted work of authorship or invention is reduced significantly, if not eliminated.

In contrast, neither trademark law (which protects against competitors unfairly using a company's brand to sell their goods or services) nor trade secret law (which protects against the misappropriation of any information of value, including technological processes or innovations, for which the owner takes "reasonable measures" to keep secret) are specifically directed at protecting any creative or inventive process or output.

Can the policy objectives behind the current intellectual property (IP) legal regimes be met when GenAI is implemented?[5] Or will new laws and regulations be necessary to bring patent, copyright, trade secret, and other IP law into the AI Age? This paper will explore the intersection of AI and IP law, in particular:

5. For a broader discussion of the intersection of AI and the law in general, *see* Hon. Xavier Rodriguez, *Artificial Intelligence (AI) and the Practice of Law*, 24 SEDONA CONF. J. 783 (2023), *available at* https://thesedonaconference.org/sites/default/files/announcements/Artificial-Intelligence-and-the-Practice-of-Law-Xavier-Rodriguez_1.pdf.

1. Should GenAI-assisted works of authorship or inventions (i.e., works of authorship or inventions created in whole or in part upon GenAI output that would be copyrightable or patentable were GenAI not involved)[6] [7] ever qualify for copyright or patent protections, and if so, when?

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6. "AI-assisted invention" is the term the USPTO has adopted to discuss this concept for patent applications. *See* U.S. Patent and Trademark Office, Inventorship Guidance for AI-Assisted Inventions, 89 Fed. Reg. 10043, 10045 (Feb. 13, 2024) [hereinafter *USPTO Feb. 2024 AI-Assisted Invention Guidance*], *available at* https://www.federalregister.gov/documents/2024/02/13/2024-02623/inventorship-guidance-for-ai-assisted-inventions. For the analogous concept in copyright applications, the USCO has instead adopted the verbiage "works containing material generated by artificial intelligence." *See* U.S. Copyright Office, Copyright Registration Guidance: Works Containing Materials Generated by Artificial Intelligence, 88 Fed. Reg. 16190, 16192 (Mar. 16, 2023) [hereinafter *USCO Mar. 2023 Guidance*], *available at* https://www.govinfo.gov/content/pkg/FR-2023-03-16/pdf/2023-05321.pdf.

Both terms apply to the identical concept—when AI is involved in some fashion in the creation of a work of authorship or the conception of an invention, what quality of human contribution is necessary to convey ownership rights under the copyright and patent law? The USCO's application of this concept is a bright-line rule precluding the direct output of GenAI from ever by itself being protectable by copyright. In contrast, the USPTO's application is more permissive allowing various limited exceptions whereby GenAI output *may* be or become protectable by patent. For discussion, *see infra* Sec. III.A.2. But they are discussing the same concept.

For purposes of economy and convenience, the authors of this article adopt the term "GenAI-assisted" to apply to this concept for both works of authorship and inventions throughout.

7. Under this definition, a given "GenAI-assisted" work of authorship can be either copyrightable or not copyrightable, and a given GenAI-assisted invention can be either patentable or not patentable. This paper's adoption of the term "*GenAI*-assisted" is used to focus on the use of the category of AI

2. Should GenAI-assisted software code qualify for protection by copyright or otherwise?
3. How will patent law be impacted by the use of GenAI to expand human capabilities and generate voluminous "art," and should it be amended?
4. Should the use of a "public" version of GenAI in a company's product development lifecycle presumptively constitute public disclosure invalidating patent or trade secret rights?
5. Should individuals have rights against the use of GenAI to create deepfakes appropriating their identities?
6. Are copyrighted works protected from being used in training GenAI models? If not, should the law be amended to extend such protections?

"that can create original content—such as text, images, video, audio or software code—in response to a user's prompt or request." *See What is Generative AI?*, IBM, *available at* https://www.ibm.com/topics/generative-ai.

No general predisposition for or against copyrightability or patentability with respect to the sufficiency (or lack thereof) of human contribution or otherwise should be ascribed to the adoption or application of this term.

For a discussion of the importance and the perils of terminology in this AI and IP law space, *see infra* Sec. II.A.

II. TO EFFECTIVELY REGULATE IP AND AI, WE MUST UNDERSTAND WHERE WE ARE AND HOW WE GOT HERE.

A. Terminology

In response to the already infamous *Mata v. Avianca* case,[8] in which some lawyers were sanctioned for filing a brief citing to several nonexistent GenAI "hallucinated" cases and quotations, several courts have issued prophylactic standing orders concerning the use of AI in court filings. One example states that if a litigant "has used artificial intelligence ('AI') in the preparation of any complaint, answer, motion, brief, or other paper, filed with the Court," then the litigant "MUST [] disclose that AI has been used in any way in the preparation of the filing."[9]

The wording of standing orders such as this is overly broad, as it compels disclosure of *all* AI tools, no matter how they are used to assist in the preparation of the court filing.[10] Many AI tools bear no risk of generating such hallucinations. For example, Grammarly is a popular AI tool that checks grammar and

8. Mata v. Avianca, Inc., 678 F.Supp.3d 443 (S.D.N.Y. 2023).

9. For the full text of this Standing Order, *see* https://www.paed.uscourts.gov/judges-info/senior-judges/michael-m-baylson. For a discussion of issues with this and other judicial standing orders regarding the use of AI in court filings, *see* NEW YORK STATE BAR ASSOCIATION, REPORT AND RECOMMENDATIONS OF THE NEW YORK STATE BAR ASSOCIATION TASK FORCE ON ARTIFICIAL INTELLIGENCE (Apr. 2024), at 51–52, *available at* https://fingfx.thomsonreuters.com/gfx/legaldocs/znpnkgbowvl/2024-April-Report-and-Recommendations-of-the-Task-Force-on-Artificial-Intelligence.pdf.

10. *See id.* (recommending the use of the term "generative AI" as opposed to "artificial intelligence" to avoid "sweep[ing]" [excess information] into a disclosure obligation," for example, "the usage of computer-assisted review to cull and make a production of ESI").

provides tips for writing clarity.[11] If used exclusively for such purposes, these AI drafting tools will not create fictional case law references.

Further specifying that only *generative* AI tools need be disclosed would be a significant step in the right direction,[12] so long as the term is properly defined.[13] But more precision would still be needed regarding the definition of any such disclosure requirement, in part because it is now commonplace for companies (including Grammarly itself)[14] to tout that they are introducing generative AI assistance into their software platforms.

The purpose and way that a given AI tool is used should be central to the contents of any such use-of-AI disclosure requirement for court filings. For example, the use of general GenAI drafting tools like Grammarly probably need not be disclosed for the vast majority of use cases.

A possible exception, though, might be in the specific context of drafting patent applications, where the turn of a phrase can dramatically impact the scope of a patent claim, a patent specification disclosure, etc. There are GenAI drafting tools already on the market that are specifically geared toward the patent drafting process, promising not just improved drafting clarity but also scope of patent coverage. Should they be disclosed? And what would the U.S. Patent and Trademark Office (USPTO) do with this information if they are?

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11. *See Responsible AI that ensures your writing and reputation shine*, GRAMMARLY, https://www.grammarly.com/ (last visited July 27, 2024).

12. See id.

13. For a working definition of the term "generative AI" as used in this paper, *see supra* notes 6 & 7.

14. *See, e.g.*, *Introducing generative AI assistance*, GRAMMARLY, https://support.grammarly.com/hc/en-us/articles/14528857014285-Introducing-generative-AI-assistance (last visited July 27, 2024).

Most challenging are those terms that may connote one thing but are used to mean something else. For example, the very concept of the term AI "hallucination," which has already entered the popular vernacular, is misleading. It is an anthropomorphism that "can obscure the reality that AI systems do not possess human-like thinking or understanding, which is crucial in recognizing the limitations and potential errors."[15]

Even the USPTO's innocuous sounding term "AI-assisted invention" defies simple definition. The definition provided by the USPTO from its February 2024 *Inventorship Guidance for AI-Assisted Inventions*, states in full:

> AI-assisted inventions are inventions created by natural persons using one or more AI systems. The AI system's contribution is not inventorship, even if the AI system's contributions were instrumental in the creation of the invention.[16]

At least as the USPTO uses the term, it is externally cabined because the USPTO's duty to disclose extends only to the degree an AI tool "is material to patentability."[17] As such, it is in effect limited to GenAI.

But the term "AI-*assisted*" as used by the USPTO parallels the commonly used phrase (at least in the IP world) of "AI tool." In a vacuum, this could connote the use of only nongenerative AI as a tool by a human "mastermind,"[18] thus supporting the

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15. *See AI Hallucinations* (last updated June 18, 2024), DEEPGRAM, https://deepgram.com/ai-glossary/ai-hallucinations.

16. *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10044, n.4 (citing *Thaler v. Vidal*, 43 F.4th 1207 (Fed. Cir. 2022)).

17. *See* 37 C.F.R. § 1.56.

18. The concept of a human "mastermind" using a technology as a tool to create a copyrightable work of authorship goes back in U.S. law at least as

human's inventorship status. The USPTO, however, actually uses these terms to cover both the use of nongenerative and generative AI.

In sum, the use of GenAI—under both the USPTO's application of its term "AI-assisted inventions" and this paper's application of the term "GenAI-assisted inventions" to apply the *Pannu* joint inventorship "significant contribution" standard as adopted by the USPTO[19]—somewhat counterintuitively may entail the contributions of the GenAI for a given invention:

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far as the seminal Supreme Court case *Burrow-Giles Lithographic Co.* v. *Sarony*, 111 U.S. 53 (1884). In *Sarony*, the Court upheld the power of Congress to extend copyright protections to photography, holding that a posed photograph was protectable under copyright law and enforceable in court. By posing his subject and "selecting and arranging the costume, draperies and other various accessories in said photograph, arranging the subject so as to present graceful outlines, arranging and disposing the light and shade, suggesting and evoking the desired expression, and from such disposition, arrangement, or representation," the Supreme Court affirmed that the photograph was the photographer's "original intellectual conception," and he was the photograph's "mastermind." *Id* at 55, 59 & 61. As such, the Court held that the photograph was copyright eligible.

The concept of a human mastermind similarly, if not equally, applies to the use of technology as a tool to conceive of a patentable invention.

19. The *Pannu* joint inventorship "significant contribution" standard was articulated in *Pannu* v. *Iolab Corp.*, 155 F.3d 1344, 1351 (Fed. Cir. 1998). As discussed below, however, it is unclear whether the USPTO's framework applying the standard to [Gen]AI-assisted inventorship determinations is proper, because the following should be treated as open questions:

1. Has the government articulated let alone established what present or imminent need exists regarding [Gen]AI-assisted inventions that might call for any change in established patent law or procedures in the first place? *See infra* Sec. II.B.1.

2. Was the USPTO legally authorized to publish its 2024 Guidance publications on [Gen]AI-assisted inventions to address any such problems or needs? *See infra* Sec. II.B.1.

- in some cases, rising to a level of conception out of the entire claimed invention that precludes human inventorship, but
- in other cases, allowing for human inventorship because even though the GenAI provides some degree of conception, it does *not* rise to a level that precludes human inventorship.[20]

Most AI-related terms defy any one- or two-sentence definition. They require a baseline understanding of underlying terms and concepts to understand and use properly.

This paper attempts to clearly define each AI term as it introduces them as necessary for the reader, but inevitably falls short given the range of technical knowledge and understanding of readers and the variability in how many of these terms are commonly used. A generally accepted and regularly updated glossary of terms for use in the legal context is sorely needed.[21] We cannot intelligently discuss let alone regulate these AI and IP legal issues if we are not talking about the same things.

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3. Did the USPTO properly apply patent law in establishing its framework for sufficiency-of-human-contribution determinations for [Gen]AI-assisted inventions in its 2024 Guidance publications? *See infra* Secs. II.B.2.

20. This logically follows from the USPTO's application of the *Pannu* factors, particularly *Pannu* factor 2. *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10047. *See infra* Sec. III.A.2.b.

21. The Sedona Conference, through its Technology Resource Panel, has regularly updated its *The Sedona Conference Glossary: eDiscovery and Digital Information Management*, with its most recent 5th Edition published in 2020, *available at* https://thesedonaconference.org/download-publication?fid=5376. The next edition of this Glossary will be updated to include AI-related terms and definitions.

B. The U.S. Copyright Office (USCO) and U.S. Patent and Trademark Office (USPTO) Guidance publications on AI are not binding for sufficiency-of-human-contribution determinations or any other de facto substantive rules.

In October 2023, President Biden issued an Executive Order on AI, which as directed to patent issues called upon the USPTO to publish guidance to patent examiners and applicants "addressing inventorship and the use of AI, including generative AI, in the inventive process, including illustrative examples in which AI systems play different roles in inventive processes and how, in each example, inventorship issues ought to be analyzed."[22] [23] The USPTO has responded by publishing its February 2024 *Inventorship Guidance for AI-Assisted Inventions*[24] and its April 2024 *Guidance on Use of Artificial Intelligence-Based Tools*.[25]

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22. Executive Order No. 14,110, 88 Fed. Reg. 25,191 (Oct. 30, 2023) [hereinafter *2023 Executive Order on AI*], at § 5.2(c)(i).

23. Regarding copyright issues, the USCO is not ordered under the Executive Order to take any direct action. Rather, the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office (USPTO Director) is ordered to consult with the USCO and "issue recommendations to the President on potential executive actions relating to copyright and AI . . . including the scope of protection for works produced using AI and the treatment of copyrighted works in AI training." *Id.* at § 5.2(c)(iii).

24. USPTO Feb. 2024 AI-Assisted Invention Guidance, supra note 6.

25. U.S. Patent and Trademark Office, Guidance on Use of Artificial Intelligence-Based Tools in Practice Before the United State Patent and Trademark Office, 89 Fed. Reg. 25609 (Apr. 11, 2024) [hereinafter *USPTO Apr. 2024 AI-Based Tools Guidance*], *available at* https://www.federalregister.gov/documents/2024/04/11/2024-07629/guidance-on-use-of-artificial-intelligence-based-tools-in-practice-before-the-united-states-patent.

1. The basis of and limitations on administrative agency rulemaking authority

It is important, however, to understand that any substantive rulemaking the USCO and USPTO have engaged in on copyright and patent legal issues through their recent AI Guidance publications simply does not have the force of law.

It should be treated as an open question whether there has been a properly established present need for such government regulatory action in the first place.

The entirety of the stated purpose of the Biden Administration's order to the USPTO to publish the above-referenced guidance is "[t]o promote innovation and clarify issues related to AI and inventorship."[26] There is nothing in the order articulating let alone establishing what present or imminent problem or need exists regarding AI and inventorship issues that might call for any change in established patent law or procedures.[27]

Nor did the USPTO sufficiently establish any such need before it started issuing any de facto substantive rules in its 2024

26. *2023 Executive Order on AI*, *supra* note 22, at § 5.2(c).

27. *See id*. at § 5.2.

Guidance publications on AI.[28] [29] The Supreme Court has noted in the past that executive agencies require "ample latitude to 'adopt their rules and policies to the demands of changing circumstances,'"[30] but the presumption is "against changes in

28. No such need is established by either the *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, or the predicate Request for Comment on Patenting Artificial Intelligence, 84 Fed. Reg. 44889 (Aug. 2019), *available at* https://www.federalregister.gov/documents/2019/08/27/2019-18443/request-for-comments-on-patenting-artificial-intelligence-inventions, that it references. Even assuming that "numerous commenters expressly agreed that the USPTO should provide guidance regarding inventorship and the patentability of AI-assisted inventions," *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10044, this cannot serve as the basis for authority for the USPTO to issue de facto substantive rules, particularly under the guise of a Guidance publication.

Such significant changes in patent law, procedure, and disclosure requirement require more notice—including detailed demonstration of need, proposed change, and possible implications—and request for comment than that provided by the USPTO. For full discussion, *see infra* Sec. III.D.

29. In contrast, the *USCO Mar. 2023 Guidance* articulates up front both a need (providing four paragraphs describing developments, based on which "the Office concludes that public guidance is needed on the registration of works containing AI-generated content") and the statutory basis of its authority. *See supra* note 6, at 16191.

30. Motor Vehicles Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co, 463 U.S. 29 (1983). For a comprehensive discussion on the law governing administrative agency policy change and the checking of unjustified inconsistency, *see* William W. Buzbee, *The Tethered President: Consistency and Contingency in Administrative Law*, 98 B.U. L. REV. 1357–442 (Oct. 2018). Such limitations on administrative agency authority have presumably only increased with the Supreme Court's recent ruling in *Loper Bright Enterprises v. Raimondo*, 603 U.S. __, 143 S.Ct. 2429 (2024) (overruling the principle of *Chevron* deference that had directed courts to defer to an agency's reasonable interpretation of an ambiguity in a law that the agency enforces).

current policy that are not justified by the rulemaking record."[31] Agencies must engage with the "facts and circumstances that underl[ay]" an earlier action.[32] "Unexplained inconsistency" is not allowed.[33]

Whether technology has progressed such that GenAI can autonomously replicate the human mind and thus necessitate a rewrite of patent law should not be just assumed, even if the President so declared. The Biden Administration may implicitly have assumed this in ordering the Director of the USPTO to "publish guidance to USPTO examiners and applicants addressing inventorship and the use of AI, including generative AI, in the inventive process, including illustrative examples in which AI systems play different roles in inventive processes and how, in each example, inventorship issues ought to be analyzed."[34]

The USPTO has expressly "recognize[d] there are divergent views on the level of contribution AI systems can make in the invention creation process,"[35] encompassing:

- a view where AI's contributions "would not rise to the level of joint inventorship, as the core inventive

31. *Id.* (quoting *In re* Permian Basin Area Rate Cases, 390 U.S. 747, 784 (1968)).

32. FCC v. Fox Television Stations, Inc., 556 U.S. 502, 516 (2009).

33. Encino Motorcars, LLC v. Navarro, 579 U.S. 211, 226 (2016) (quoting *National Cable & Telecommunications Association v. Brand X Internet Services*, 545 U.S. 967, 981 (2005)).

34. *2023 Executive Order on AI*, *supra* note 22, at § 5.2(c)(i).

35. USPTO Feb. 2024 AI-Assisted Invention Guidance, supra note 6, at 10047, n.30.

concepts and decisions remain within the purview of the human inventors,"[36] and

- a view where "AI is becoming powerful and creative enough to generate patentable contributions to inventions to which a human has arguably not made an inventive contribution but instead has directed the AI to endeavor towards the solution to a problem."[37]

Nevertheless, the USPTO has adopted the second view as necessary to the entire *Pannu* joint inventorship framework it sets up for sufficiency-of-human-contribution determinations for [Gen]AI-assisted inventions.[38] The USPTO has explicitly chosen sides and established a set of rules significantly changing long-standing patent law and procedure based on this choice, imposing new duties on private parties and disparately impacting different stakeholders in the patent system.

But before new duties and burdens not grounded in existing or any intervening change of law or legislated by Congress are imposed on private parties, the proponents of the new requirements must carry some burden of proof. Ipse dixit cannot suffice.

Even assuming an established need, for a federal agency to issue a "substantive" or "legislative-type" rule "affecting individual rights and obligations," the rule:

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36. *Id.* (citing *Response to the RFC from American Intellectual Property Law Association* at 3, *available at* www.regulations.gov/docket/PTO-P-2022-0045/comments).

37. *Id.* (citing *Response to the RFC from International Federation of Intellectual Property Attorneys (FICPI)* at 3, *available at* www.regulations.gov/docket/PTO-P-2022-0045/comments).

38. *See infra* Sec. III.A.2.b.

1. "must be the product of a congressional grant of legislative authority," and
2. must be "promulgated in conformity with any procedural requirements imposed by Congress."[39]

Specifically, the agency must issue its rules subject to the requirements of the Administrative Procedure Act (APA),[40] which protect against abuse of the agency's authority.[41]

Such agency compliance with the APA is almost always achieved through the established "informal rulemaking," i.e. "notice-and-comment rulemaking" procedure, which requires specific notice to the public before issuance.[42] This "ensures the appropriate level of the public's Constitutionally safeguarded due process rights to notice and an opportunity to be heard before their government can adopt binding rules that have the force and effect of law."[43]

Agencies can issue guidance or other policy statements without any such notice-and-comment process. But they can only do this under the APA's exemptions for the publication of

39. Chrysler Corp. v. Brown, 441 U.S. 281, 282 (1979); *see also* Paralyzed Veterans of Am. v. West, 138 F.3d 1434, 1436 (Fed. Cir. 1998).

40. *See, generally*, Administrative Procedure Act, ch. 324, 60 Stat. 237 (1946), repealed and replaced by Pub. L. No. 89–554 (codified as 5 U.S.C. §§ 551–59).

41. For a detailed discussion of the basis of and limitations on administrative rulemaking authority, *see* Andrew Dietrick & Jonathan Stroud, *Rules to Bind You: Problems with the USPTO's PTAB Rulemaking Procedures*, 51 N.M. L. Rev. 430, 433–36 (2021), *available at* https://digitalrepository.unm.edu/nmlr/vol51/iss2/6.

42. 5 U.S.C. § 553(b).

43. Dietrick, *supra* note 41, at 434, n.33.

"general statements of policy" and "interpretative rules" that do *not* constitute substantive rulemaking.[44]

2. Our Constitutional system of checks and balances at work

There has been in practice a longstanding conflict between the U.S. Federal Circuit Court of Appeals and the USPTO over the parameters of any substantive rulemaking authority the USPTO has over patent law issues. In 1996, the Federal Circuit noted in *Merck v. Kessler* that "the broadest of the PTO's rulemaking powers . . . authorizes the Commissioner to promulgate regulations directed only to "the conduct of proceedings in the [PTO]"; it does NOT grant the Commissioner the authority to issue substantive rules."[45] Congress subsequently granted the USPTO certain rulemaking authority in the 1999 American Inventors Protection Act[46] and the 2011 America Invents Act (AIA).[47] In particular, the AIA formed the Patent Trial and Appeal Board (PTAB), making it the primary adjudicative body for patent postissuance reviews,[48] and granted the USPTO the authority to promulgate "sweeping rules governing proceedings in the PTAB."[49]

The USPTO has been criticized by some for "routinely issu[ing] precedential rules and tak[ing] significant action with

44. 5 U.S.C. § 553(b)(A).

45. Merck & Co. v. Kessler, 80 F.3d 1543, 1549–50 (Fed. Cir. 1996).

46. American Inventors Protection Act, Pub. L. No. 106-113, § 311, 113 Stat. 1501A-552–67 (1999).

47. Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011).

48. *Id.* at 313–14.

49. Dietrick, *supra* note 41, at 439.

substantive effect, [but] calling them guidance, policy documents, or administrative rulings."[50]

In fairness, at least with respect to this tidal wave of technical AI and IP law issues, some may argue—the Supreme Court's recent ruling in *Loper Bright Enterprises v. Raimondo* notwithstanding[51]—that the USCO and USPTO do not have the luxury of waiting for complete guidance from Congress or the courts. Patent applications continue to roll in, and they will increasingly fall under the category of "GenAI-assisted inventions." The USCO and USPTO have a duty to process them and to inform and update applicants about the criteria they apply for registering copyrights or granting patents. Our government and society are trying to fly this GenAI plane as we are building it.

In its 2024 Guidance publications on AI, the USPTO includes the following disclaimer:

> This guidance does not constitute substantive rulemaking and does not have the force and effect of law. The guidance sets out agency policy with respect to the USPTO's interpretation of the inventorship requirements of the Patent Act in view of decisions by the Supreme Court of the United States (Supreme Court) and the United States Court of Appeals for the Federal Circuit (Federal Circuit).[52] [53]

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50. *Id.* at 431 (citing *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1316 (Fed. Cir. 2017) (invalidating a set of rules promulgated by the USPTO, finding that they were substantive rules only masked as procedural)).

51. *See supra* note 30.

52. See, e.g., USPTO Feb. 2024 AI-Assisted Invention Guidance, supra note 6, at 10045.

53. The *USCO March 2023 Guidance* does not include a similar disclaimer statement in the copyright context. *See supra* note 6. This may simply reflect

Having said this, the proper and transparent approach by the USPTO and the USCO would be to cite the statutory basis of their authorities and utilize the informal "notice-and-comment" rulemaking procedure prescribed by the APA. While distinguishing between what constitutes substantive rulemaking on the one hand and procedural or interpretative rulemaking on another can be a real challenge at the margins, there is no reasonable debate that the USCO and USPTO have tread significantly into the substantive rulemaking arena on these AI issues.[54] "[I]mproperly characterizing a rule regarding burdens of proof as 'procedural' does not excuse failure to comply with the Director's obligations under the APA."[55]

3. We need to foster and implement a consensus process for developing the law at the intersection of AI and IP and procedures for complying with and challenging it.

It is important for all concerned to recognize that while the USPTO and USCO are certainly key stakeholders in these AI & IP legal issues, they are not the only or even the primary ones. The USPTO and USCO have considerable expertise and bring important perspectives to these issues, but other stakeholders are equally if not more important and include vantage points from the business side and the enforcement side. While the USPTO and USCO have made a practice of soliciting input from the public on other issues, they had not sufficiently done so with

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a lack of historical tension on these administrative rulemaking authority issues to date, as the USCO has only prominently assumed a substantive rulemaking and quasi-judicial role with its March 2023 Guidance. *See infra* Sec. II.C.1.

54. For discussion, *see infra* Sec. III.A.2.

55. *Aqua Prods.*, 872 F.3d at 1320.

respect to the development of their Guidance publications on IP and AI law before issuing de facto substantive rules for [Gen]AI-assisted works of authorship and inventions. The public—namely the users of the IP system, comprising both patent owners and potential licensees or targets of enforcement actions—should drive the process of developing the AI and IP law, and not the two offices responsible primarily for the granting and issuing of patents and copyrights within it. In any event, both offices must stay within the limits of their regulatory authority as granted by Congress. They must also ensure that their regulations adhere to the decisions of the courts.

But for the U.S. to get ahead of these AI and IP legal issues and compete globally in this critical market, we need far more than to just have our branches of government check and balance each other to stay in their lanes. We need to harness the collective wisdom across our branches of government and society to manage the unique systemic challenges that GenAI is giving rise to. We need to move toward building a true "GenAI-assisted legal system and society" and away from one that is constantly reacting to these AI issues. We need to come together and foster and implement consensus processes for moving the law forward at the intersection of these AI and IP issues and also the procedures for complying with and challenging it, through the development of principles and best practice recommendations that if adopted in whole or in part would make for a better legal system.

C. The copyright and patent qualification determination "lifecycle" from USCO and USPTO examination through federal court litigation

The USCO has traditionally played a ministerial role in examining copyright applications, whereas the USPTO has played a more substantive quasi-judicial role. The USCO has refused to

register only about 4 percent of all copyright applications in recent years.[56] Calculating the USPTO refusal rate is more complicated, with different methodologies yielding different results,[57] but it appears to be no lower than around 30 percent and is probably significantly higher than that.[58]

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56. U.S. COPYRIGHT OFFICE, ANNUAL REPORT: FISCAL YEAR 2019 (4% of 516,713 claims received), at 38, *available at* https://www.copyright.gov/reports/annual/2019/ar2019.pdf; ANNUAL REPORT FISCAL YEAR 2020 (4.6% of 509,744 claims received), at 12, *available at* https://www.copyright.gov/reports/annual/2020/ar2020.pdf; ANNUAL REPORT FISCAL YEAR 2021 (4.3% of 403,593 claims received), at 10, *available at* https://www.copyright.gov/reports/annual/2021/ar2021.pdf; ANNUAL REPORT FISCAL YEAR 2022 (3.4% of 486,428 claims received), at 18, *available at* https://www.copyright.gov/reports/annual/2022/ar2022.pdf; ANNUAL REPORT FISCAL YEAR 2023 (<3% of 481,031 claims received), at 7, *available at* https://www.copyright.gov/reports/annual/2023/ar2023.pdf.

57. Calculating USPTO patent rejection rates is a challenge. Even though the scope of the underlying invention for a patent application is theoretically fixed, the scope of the patent application over the USPTO's examination process is anything but. Almost every patent application that ultimately issues has been rejected in whole or in part at least one time during the USPTO patent examination process, and it is not at all unusual for multiple rejections over multiple years. To overcome each rejection, the patent applicant revises the application, often significantly, amending some claims and dropping others entirely. Patent applicants often abandon their patent applications entirely after a USPTO rejection—primarily for business reasons and not necessarily due to concerns that a patent will not ultimately issue. Given all these variables, what counts as a rejection is subject to interpretation.

58. *See* Dennis Crouch, *USPTO Grant Rate 2021*, PATENTLYO (Apr. 5, 2021), https://patentlyo.com/patent/2021/04/uspto-grant-rate.html; *see also* Stephen Schreiner, *Recent Statistics Show PTAB Invalidation Rates Continue to Climb*, IP WATCHDOG (June 25, 2024) (finding that the USPTO's Patent and Trial Review Board's total invalidation rate where all challenged claims are found invalid is currently at 71% for the first two quarters of 2024), *available at* https://ipwatchdog.com/2024/06/25/recent-statistics-show-ptab-

This is a natural consequence of the differences between these two forms of intellectual property.

The quid pro quo of any patent system is to encourage public disclosure of inventions by granting successful applicants the exclusive right to practice their inventions for a period of time.[59] The bargained for exchange of the copyright system is far more specific and limited—it primarily protects against the copying for commercial purposes of a single original work of authorship for a period of time.[60]

What is the optimal balance of roles and responsibilities with respect to these copyright and patent qualification determinations for GenAI-assisted works of authorship or inventions between the USCO/USPTO and the federal courts?

1. The USCO's examination of copyright applications has been largely ministerial and recordkeeping.

Before the advent of GenAI, there was in effect a presumption of copyrightability. Any original work of authorship automatically gains copyright protections upon creation under state copyright laws, independent of any copyright registration.[61]

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invalidation-rates-continue-climb/id=178226/#:~:text=From%202015%20to%202019%2C%20the,daunting%20statistics%20for%20patent%20holders.

59. In the U.S., an issued patent's standard term "end[s] 20 years from the date on which the application for the patent was filed . . . ." 35 U.S.C. § 154.

60. In the U.S., "As a general rule, for works created after January 1, 1978, [U.S.] copyright protection lasts for the life of the author plus an additional 70 years." *How Long Does Copyright Protection Last?*, U.S. COPYRIGHT OFFICE, https://www.copyright.gov/help/faq/faq-duration.html#:~:text=The%20term%20of%20copyright%20for,plus%20an%20additional%2070%20years (last visited July 27, 2024).

61. "Copyright exists automatically in an original work of authorship once it is fixed, but a copyright owner can take steps to enhance the protections," namely through federal or state copyright registration. *What is Copyright?*,

Federal registration of a copyright with the U.S. Copyright Office is not a requirement but does provide added protections and benefits, including the ability to enforce the exclusive rights of copyright through litigation in federal court.[62] The USCO states that "it refuses only a minority of claims on the basis of copyrightability, because copyright law [] sets a very low threshold for what works are sufficiently original."[63] Unless outright copying is involved, the general presumption is that two independently generated works of authorship are as unique as the minds that created them.

With little substantive analysis or investigatory work traditionally done during the copyright application process, the USCO's role in copyright examinations has been primarily ministerial and recordkeeping.

2. The USPTO's examination of patent applications has been more substantive and quasi-judicial.

The USPTO's examination of patent applications has always been more substantive than that of the USCO. The USPTO requires the applicant to disclose "all information known [] to be material to patentability,"[64] including information relevant to the following analyses.

U.S. COPYRIGHT OFFICE, https://www.copyright.gov/what-is-copyright/ (last visited July 27, 2024).

62. *See Why Register When Protection is Automatic*, COPYRIGHT ALLIANCE, https://copyrightalliance.org/faqs/why-register-copyright/#:~:text=Bringing%20an%20Infringement%20Action%3A%20It,the%20infringement%20has%20already%20occurred (last visited July 27, 2024).

63. U.S. COPYRIGHT OFFICE, ANNUAL REPORT: FISCAL YEAR 2019, *supra* note 56, at 38.

64. 37 C.F.R. § 1.56.

a. USPTO examiners focus on assessing patent claim invalidity over the prior art under 35 U.S.C. §§ 102(a) and 103.

Unlike copyrights, there simply cannot be any such presumption of patentability for purported inventions. It is not only possible but commonplace for two or more people to independently develop the same inventive concept to solve a given problem. When that happens, the key question in the U.S. to determine priority rights used to be who conceived of the inventive concept first, under the long-existing "first-to-invent" system.[65] But in September 2012, with the passage of the AIA, the U.S. joined the rest of the world in moving to a "first-to-file" patent system.[66]

Such a "race-to-the-patent-office" system provides more certainty on these priority questions. But the faster applicant's patent application might still be rejected during examination, and any issued patent might even be invalidated after issuance—via either postgrant procedures before the PTAB or litigation before the federal courts—because:

- a third-party may have gotten there first with a single "anticipatory" printed publication (whether a previously issued patent or otherwise) under 35 U.S.C. § 102(a), or
- the invention might be ruled "obvious" over the combination of two or more existing pieces of prior art under 35 U.S.C. § 103.

The USPTO's examination of these issues is a far more labor-intensive process than that typically conducted by the USCO.

65. *See US Patent First to File: Everything You Need to Know*, UPCOUNSEL (updated Feb. 1, 2023), https://www.upcounsel.com/us-patent-first-to-file.

66. *Id*.

There are countless ways that a patent claim can be "read" on (i.e., have each and every element of the claim met by one or more pieces of prior art) and thus invalidated.

b. USPTO rejection rates applying a gating 35 U.S.C. § 101 subject-matter eligibility analysis increased significantly for software patents post-Alice (2014).

The USPTO also engages in an even more fundamental substantive analysis under 35 U.S.C. § 101 regarding subject-matter eligibility, i.e., whether the subject matter of the purported invention is categorically eligible for a patent in the first place.

The importance and number of rejections on these grounds, in particular in the business-method and software patent spaces, increased significantly after the Supreme Court's seminal *CLS Bank v. Alice* ruling in 2014.[67] Since *Alice*, both preliminary motions to dismiss and parallel PTAB proceedings to invalidate the patent on Section 101 grounds have become standard protocol for patent defendants.[68] *Alice* initiated an existential crisis for the software patenting industry that is still being worked through by the USPTO and the federal courts a decade later.

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67. Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208, 212 (2014) (invalidating patent claims for a computer-implemented, electronic escrow service because implementing claims on a computer was not enough to transform an abstract idea into patentable subject matter).

68. *See* The Sedona Conference, *Commentary on Patent Litigation Best Practices: Section 101 Motions on Patentable Subject Matter Chapter* (Sept. 2016 public comment version), *available at* https://thesedonaconference.org/publication/Commentary_on_Patent_Litigation_Best_Practices_Chapter_on_Section_101_Motions_on_Patentable_Subject_Matter.

Most AI inventions are computer-implemented through software.[69] *All* AI software inventions are vulnerable to the heightened vicissitudes of 35 U.S.C. § 101 challenges and determinations for software.[70]

The USPTO has provided voluminous guidance to its patent examiners on how to conduct a 35 U.S.C. § 101 analysis.[71] The main gating step in a Section 101 subject-matter eligibility analysis is determining whether the claimed subject matter falls within the "judicial exceptions," i.e., subject matters that the courts have found to be outside of the four statutory categories

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69. Frank Chau, et al., Intellectual Property Owners, AI Patenting Handbook, 19 (March 2024) [*hereinafter IPO AI Patenting Handbook*].

70. For discussion, *see infra* Sec. IV.E.

71. For the USPTO's compilation of its 35 U.S.C. § 101 guidance, including 46 illustrative hypothetical examples applying to guidance to certain fact-specific situations, *see* U.S. Patent and Trademark Office, Subject matter eligibility, *available at* https://www.uspto.gov/patents/laws/examination-policy/subject-matter-eligibility (noting the USPTO's most recent set of guidance issued in 2019 has been incorporated in the Ninth Edition of the Manual of Patent Examination Procedure (MPEP)). The USPTO's guidance on Section 101 and other patent law issues is generally based on a rich body of Supreme Court and Federal Circuit case law and can be more characterized as descriptive or interpretative, at least relative to the USPTO's 2024 AI Guidance publications. *See supra* Sec. II.B.1.

The USPTO has now published its 2024 Guidance Update on Patent Subject Matter Eligibility, Including on Artificial Intelligence, 89 Fed. Reg. 58128 (July 17, 2024) [hereinafter *USPTO July 2024 Sect. 101 Updated Guidance*], *available at* https://www.federalregister.gov/documents/2024/07/17/2024-15377/2024-guidance-update-on-patent-subject-matter-eligibility-including-on-artificial-intelligence. In conjunction with this updated guidance, the USPTO has published three more illustrative hypothetical examples (Examples 47-49) specific to some common AI issues. U.S. Patent and Trademark Office, July 2024 Subject Matter Eligibility Examples, *available at* https://www.uspto.gov/sites/default/files/documents/2024-AI-SMEUpdate Examples47-49.pdf.

of patent eligible inventions (consisting of a process, machine, manufacture, or composition of matter), because they have been identified as the "basic tools of scientific and technological work," and are thus excluded from patentability because "monopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it."[72] These judicial exceptions that are *not* patent eligible consist of:[73]

1. An "abstract idea," including:
    a. "mathematical concepts," such as mathematical relationships, mathematical formulas or equations, and mathematical calculations;[74]
    b. "certain methods of organizing human activity," such as economic principles or practices, commercial or legal interactions, and managing personal behavior, relationships, or interactions between people;[75] and
    c. "mental processes," i.e., concepts performed in the human mind, including observations, evaluations, judgments, and opinions;[76]

72. *Alice*, 573 U.S. at 216 (quoting Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 589 (2013) and Mayo Collaborative Servs. v. Prometheus Labs. Inc., 566 U.S. 66, 71 (2012)).

73. *See* U.S. Patent and Trademark Office, October 2019 Update: Subject Matter Eligibility, Fig. 2, at 11 (Step 2A, prong one) [hereinafter *USPTO Oct. 2019 Sect. 101 Updated Guidance*], *available at* https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf.

74. *Id.* at 3–4.

75. *Id.* at 4–6.

76. *Id.* at 7–9.

2. A "law of nature";[77] and
3. A "natural phenomenon."[78]

Most relevant to AI software patents is the "mental processes" analysis. Taking a known mental process that can be "performed in the human mind" (with or without "the aid of a pen and paper") and simply claiming it as being performed on a computer is not sufficient to make it patent eligible.[79] Also important is the "mathematical concepts" analysis. A mathematical algorithm is not patentable.[80]

But even if a claimed invention is deemed to fall under a judicial exception (like many AI software claimed inventions do as an "abstract idea"/"mental process"), it still may be patent eligible—at least in theory—so long as the claimed invention is integrated into a "practical application" of that abstract idea.[81]

The USPTO and the courts have long struggled to provide consistent guidance for when a judicial exception is or is not recited (Step 2A – prong 1) or when an application is "practical" enough to overcome when a judicial exception is found (Step 2A – prong 2). This is not at all surprising, because "all inventions 'at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas,'"[82] and thus could arguably be presumptively invalid under Step 2A – prong 1 of

77. *Id*. at 2.
78. *Id*.
79. *Id.* at 8–9.
80. *Id.* at 3–4.
81. *Id.* at 10–12 (Step 2A, prong two).
82. Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208, 217 (2014).

the USPTO's patent subject-matter eligibility analysis.[83] As the Supreme Court cautioned, "[W]e tread carefully in construing this exclusionary principle lest it swallow all of patent law."[84]

The USPTO's rejection rate on Section 101 grounds for AI patent applications has been historically on the order of 2-3 times higher than average: 77 percent of all office actions in the WG 2120 Technology Center (AI & Simulation/Modeling) from January to June 2024, compared to 24 percent over this same period for all patent applications across all technology centers.[85]

In the 2023 Executive Order on AI, the Biden Administration also ordered the USPTO to "issue additional guidance to USPTO patent examiners and applicants to address other considerations at the intersection of AI and IP, which could include, as the USPTO Director deems necessary, updated guidance on patent eligibility to address innovation in AI and critical and emerging technologies."[86] The USPTO has now complied, issuing in July 2024 its *Guidance Update on Patent Subject Matter Eligibility, Including on Artificial Intelligence*.[87]

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83. *USPTO July 2024 Sect. 101 Updated Guidance*, *supra* note 71, at 58134 (quoting Mayo Collaborative Servs. v. Prometheus Labs., Inc., 566 U.S. 66, 71 (2012)).

84. *Alice*, 573 U.S. at 217.

85. *See* Eli Mazour, *Section 101 Rejections Soar at USPTO; 77% of AI Tech Group's OAs Include 101 Rejections*, VOICE OF IP (June 18, 2024), *available at* https://www.voiceofip.com/p/breaking-section-101-rejections-soar. This data can be confirmed at the U.S. Patent Office's Open Data Portal (beta), *Agency Trends: Rejections in Office Actions for Patent Applications*, https://developer.uspto.gov/visualization/agency-trends-rejections-office-actions-patent-applications.

86. *2023 Executive Order on AI*, *supra* note 22, at § 5.2(c)(ii).

87. USPTO July 2024 Sect. 101 Updated Guidance, supra note 71.

Will this new Guidance provide the certainty necessary on these Section 101 patent subject-matter eligibility issues to support the development of the AI industry in the U.S.? Or will the ambiguity and inconsistency of the application of patent law for software inventions, including in AI, have a chilling effect on the level of investment that companies commit to developing a patent portfolio for their AI inventions and compromise the U.S.'s global competitiveness in this critical industry?[88]

c. USPTO examiners also assess any disqualifying actions by applicants, including any prefiling public disclosures under 35 U.S.C. § 102(a)–(b).

Another way to lose patent rights centers on any prefiling disclosures of an invention made by the applicant, typically for marketing or product development purposes. The general rule is that a patent applicant cannot publicly disclose its invention before filing the patent application.[89] In the U.S. (and a minority of other countries), however, a one-year grace period is statutorily mandated to give the applicant the opportunity to complete its invention or test the marketplace for its commercial embodiment before having to file for a patent application.[90]

Under 37 C.F.R. § 1.56, patent applicants have a duty to disclose all "information material to patentability,"[91] which includes any such disqualifying prefiling disclosures. As a

88. For full discussion, *see infra* Sec. IV.E.

89. 35 U.S.C. § 102(a) ("A person shall be entitled to a patent unless (1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention . . . .").

90. *See* 35 U.S.C. § 102(b).

91. For discussion regarding application of 37 C.F.R. § 1.56 to AI patent applications, *see infra* Sec. III.D.1.b.

practical matter, a USPTO examiner's determination on this issue is based only on the information disclosed and anything else the examiner happens to come across during the examination.

35 U.S.C. § 102(b) takes on new and unique significance in our incipient AI Age, when generative AI will be increasingly used as part of the product development lifecycle by companies and individuals, in potential violation of the catchall "otherwise [made] available to the public" bar under 35 U.S.C. § 102(b).[92]

3. Both the USCO and the USPTO leave final adjudication on all issues to the federal courts.

The USCO and USPTO provide in effect only a gatekeeping function on any copyrightability or patentability issues. They both ultimately grant all applications they cannot reject based on the information provided or found during examination.

As with all federal agencies and consistent with the separation of powers under the Constitution, the USCO and USPTO leave final adjudication of any disputes on substantive issues—typically arising only during litigation when a copyright or patent infringement defendant attempts to weaken the IP owner's case—to the federal courts.[93] The degree of rigor applied for the substantive assessment of these issues during their initial

92. For discussion, *see infra* Sec. V.

93. Congress, however, somewhat departed from this framework with the passage of the America Invents Act (AIA) effective 2012. The AIA established the USPTO Patent Trial and Appeal Board (PTAB), which comprised a new forum, new administrative judges, and new rules to resolve issues of patent validity outside of litigation in the federal courts. Since then, patent infringement defendants have been given two parallel avenues to invalidate asserted patents: one before the PTAB and one before the federal courts. Final adjudication of PTAB rulings, however, also remains under the authority of the Federal Circuit.

examinations is an implicit balancing of two competing interests: 1.) accuracy and certainty in the quality of any issued copyrights or patents; and 2.) speed and efficiency in the examination process.

For the most part, with a notable exception for prior art searches by the USPTO, both offices in effect conduct their examinations under the assumption that the applicant's disclosures are complete. They take on, at most, only a limited investigatory role regarding the sufficiency of any disclosures, implicitly leaving the resolution of any disputes on these issues to the federal courts.

D. From generative artificial intelligence (GenAI-)assisted to GenAI-created or GenAI-conceived works of authorship and inventions?

Copyright law and patent law have developed over centuries, adapting to new technologies and the occasional paradigm shift as they have arisen over time. GenAI, however, theoretically undercuts one of the core premises underlying both—the source of the act of any creation or conception. Before GenAI, the motive force was *always* human.

As noted by the court in *Thaler v. Perlmutter*:

> Copyright is designed to adapt with the times. Underlying that adaptability, however, has been a consistent understanding that human creativity is the sine qua non at the core of copyrightability, even as that human creativity is channeled through new tools or into new media.[94]

94. Thaler v. Perlmutter, 687 F. Supp. 3d 140, 146 (D.D.C. 2023).

All technological advancements in the past have readily (at least with the benefit of hindsight) slid into the category of a tool that could be used as a human being to create (e.g., the camera) or invent (e.g., the integrated circuit, which itself led to another "tool," the computer).

With GenAI, however, there may be a transition from GenAI-*assisted* written works of authorship and inventions to GenAI-*created* or -*conceived* ones, where the GenAI takes over more and more of the role of the mastermind, even though a human being may have set the GenAI on the original task that led to the finished products.

This may be more clearly the case with works of authorship. The USCO provides the following illustrative example and discussion:

> [I]f a user instructs a text generating technology to ''write a poem about copyright law in the style of William Shakespeare,'' she can expect the system to generate text that is recognizable as a poem, mentions copyright, and resembles Shakespeare's style. But the technology will decide the rhyming pattern, the words in each line, and the structure of the text. When an AI technology determines the expressive elements of its output, the generated material is not the product of human authorship.[95]

GenAI *may* also be increasingly taking on the role of the mastermind for the conception and reduction-to-practice of AI-assisted inventions. It should be noted, however, that neither Congress nor the courts have established to date that GenAI is

95. *USCO Mar. 2023 Guidance, supra* note 6, at 16192.

fundamentally different than any other technological development in this regard.[96]

If a generic human input like "Find me a substance that cures prostate cancer" were enough to elicit a cure from the GenAI output, then this would reflect both that the GenAI conceived the solution and that the human should not be able to patent it. That is not, however, what happens when GenAI is implemented in reality. There is typically an iterative GenAI-input/output process, with the human taking a GenAI output and further refining it with another GenAI input generating a new GenAI output, over and over again. At some point, such "prompt engineering" might suffice for the human to gain patent rights over that cure. But when? And how can this be established to the satisfaction of the USPTO?

In principle, any GenAI-*assisted* invention is patentable when the AI is used as a tool by a human mastermind, whereas any wholly GenAI-*conceived* invention should not be. But unless the law evolves to allow ownership of GenAI-assisted inventions to automatically confer to a human being or to preclude such human ownership in all cases, our government and society must:

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96. For example, in *Thaler v. Vidal*, 43 F.4th 1207 (Fed. Cir. 2022), the Federal Circuit only affirmed summary judgment by the lower court affirming the USPTO's denial of inventorship rights for an inventor who specifically disclaimed making any contribution to the conception of a claimed invention. The court did not make any finding as to whether the claimed invention was otherwise patentable, or whether the GenAI in question's contributions would otherwise qualify it for inventorship if made by a human. The court noted: "While we do not decide whether an AI system can form beliefs, nothing in our record shows that one can, as reflected in the fact that Thaler submitted the requisite statements himself, purportedly on [the GenAI's] behalf." *Id.* at 1211.

- develop standards and a process for determining when a GenAI-assisted invention crosses the line to becoming a GenAI-conceived invention, and
- develop a process for how to enforce these standards.

III. ISSUE NO. 1: CAN THE POLICY OBJECTIVES UNDERLYING THE COPYRIGHT AND PATENT LEGAL REGIMES BE ATTAINED WITH SUFFICIENCY-OF-HUMAN-CONTRIBUTION DETERMINATIONS FOR GENAI-ASSISTED WORKS OF AUTHORSHIP AND INVENTIONS?

Fundamental copyright and patent qualification issues arise when GenAI is used to assist in the creation of a work of authorship or the conception and/or reduction-to-practice of an invention.

When should GenAI output be protectable under copyright and patent law? Should one be able to secure IP rights by:

- Framing a technological problem as a single GenAI input and then patenting the GenAI output itself as an invention?
- Framing a creative goal as a single GenAI input and then copyrighting the GenAI output as a work of creative writing, music, art, etc.?
- Framing a software coding goal or architecture as a single GenAI input and then copyrighting the GenAI output?

Based at least on the recent guidance of the USCO and the USPTO, the answer is no for each question, as discussed in detail in this section.

This section will further examine fundamental copyright and patent law issues that arise for GenAI-assisted works of authorship and inventions. Notably, many of these issues are not specifically raised or addressed in the USCO and the USPTO's recent Guidance publications on AI. Rather, their guidance is built upon certain assumptions on these issues. The authors of this article respectfully submit that neither these assumptions

nor the guidance built upon them should be wholly accepted or rigidly implemented without closer examination.

The following should be treated as open questions:

1. Has an existing or imminent need regarding GenAI-assisted works of authorship or inventions that might call for any change in established law or procedures been established and clearly defined in the first place?[97]
2. Did the USCO and the USPTO issue de facto substantive rules in their recent Guidance publications on AI regarding sufficiency-of-human-contribution determinations for GenAI-assisted works of authorship or inventions, in violation of the Administrative Procedure Act? [98]

Regarding copyright law:

1. Is the USCO's bright-line stance against prompt engineering serving as the basis for copyrightability over GenAI output for GenAI-assisted works of authorship correct (i.e., will the federal courts apply it?)?[99]

Regarding patent law, *each* of the following should be treated as open questions regarding the USPTO's current guidance on AI:

1. Is the USPTO's *Pannu* joint inventorship framework[100] the correct foundation that should be applied for GenAI-assisted inventions under patent law (i.e.,

97. For discussion, *see supra* Sec. II.B.1.

98. For discussion, *see supra* Sec II.B.2.

99. For discussion, *see infra* Sec. III.B.1.

100. For discussion, *see infra* Sec. III.A.2.b.

will the federal courts apply it)?[101] Or is it predicated on the assumption that GenAI can autonomously replicate human conception in a way that may otherwise confer inventorship rights under patent law were it conceived by one or more humans—a presumption that actually has not been established by the courts or by Congress?

2. Did the USPTO properly apply other principles of patent law on top of its *Pannu* joint inventorship framework to develop its February 2024 Guidance's Five Guiding Principles for GenAI-assisted inventions?[102]
   a. In its April 2024 Guidance, did the USPTO effectively shift the burden of proof for patentability onto the patent applicant?
   b. Can the burden of proof for patentability be properly shifted to the patent applicant under patent law?
3. Can the USPTO's overall sufficiency-of-human-contribution determination framework for GenAI-assisted patent applications feasibly be carried out by patent examiners?[103] Or feasibly complied with by patent applicants?[104]
4. Will the resulting uncertainty for the patentability of all GenAI-assisted inventions—which may comprise most patent applications in the future—be harmful for the U.S. patent system and for U.S. innovation?

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101. For discussion, *see infra* Sec. III.B.2.a.

102. For discussion, *see infra* Sec. III.B.2.b.

103. For discussion, *see infra* Sec. III.C.2.

104. For discussion, *see infra* Sec. III.D.3.b.

A. The USCO's and the USPTO's current frameworks

1. Both preclude any work of authorship or invention that is wholly generated by AI.

A core legal principle in U.S. copyright law is that human authorship is required for copyright protections to be available.[105] In the context of generative AI, this means that "[i]f a work's traditional elements of authorship were produced by a machine, the work lacks human authorship and the [U.S. Copyright] Office will not register it."[106] This principle was reaffirmed by a federal district court in *Thaler v. Perlmutter* and is currently on appeal.[107] But *Thaler* only addressed copyrightability of a work that was wholly generated by generative AI.[108]

In turn, human inventorship is also a core requirement for patentability under the U.S. patent law. According to the Federal Circuit in *Thaler v. Vidal*, the Patent Act expressly provides that inventors are "individuals" and that the term "individuals"

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105. Burrow-Giles Lithographic Co. *v.* Sarony, 111 U.S. 53, 58 (1884) (describing a copyright as "the exclusive right of a man to the production of his own genius or intellect"); *cf.* Naruto *v.* Slater, 888 F.3d 418, 426 (9th Cir. 2018) (holding that a "monkey selfie" photograph was not copyrightable because it lacked the human authorship as required under copyright law).

106. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16192. The "traditional elements of authorship" are parenthetically defined to include "literary, artistic, or musical expression or elements of selection, arrangement, etc." *See id.*

107. Thaler v. Perlmutter, No. 22-CV-1564, 2023 WL 5333236 (D.D.C. Aug. 18, 2023), appeal docketed No. 23-5233 (D.C. Cir. Oct. 18, 2023), *see USCO Mar. 2023 Guidance*, *supra* note 6, at 16191.

108. *Thaler*, 2023 WL 5333236, at *7 (affirming the U.S. Copyright Office's rejection of a copyright application due to lack of any "creative contribution from a human actor" for a visual work that the applicant described as "autonomously created by a computer algorithm running on a machine").

means a human being.[109] "Congress has determined that only a natural person can be an inventor, so AI cannot be."[110]

According to the USPTO's February 2024 Guidance, "the use of an AI system by a natural person(s) does not preclude a natural person(s) from qualifying as an inventor (or joint inventors) if the natural person(s) significantly contributed to the claimed invention."[111] The USCO similarly affirmed that the use of an AI system by a person does not preclude copyrightability in its March 2023 Guidance.[112]

Consistent with the above, even when an AI system has contributed to a work of authorship or invention, both the USCO and the USPTO have issued guidance stating that:

- AI systems and other non-natural persons should not and cannot be listed as authors or inventors,[113] and
- no oath or declaration should be filed on behalf of any AI system.[114]

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109. Thaler v. Vidal, 43 F.4th 1207, 1211 (Fed. Cir. 2022).

110. *Id.* at 1213.

111. *USPTO Feb. 2024 AI-Assisted Invention Guidance*, *supra* note 6, at 10046.

112. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16192 ("In other cases [] a work containing AI-generated material will also contain sufficient human authorship to support a copyright claim.").

113. *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10046. But while the USCO does not require or allow AI to be a listed author on a copyright application, it does impose a new duty to disclose the inclusion of AI-generated content in a work submitted for registration. *See infra* Sec. III.D.1.a.

114. *Id.* at 10050.

2. When both humans and AI contribute

a. According to current USCO guidance, copyright protections are available only for the "human-authored aspects" of GenAI-assisted works of authorship.

If a work of authorship contains AI-generated material, the USCO considers "whether the AI contributions are the result of mechanical reproduction" or the result of an author's "own original mental conception, to which [the author] gave visible form."[115] When a user instructs a GenAI to write a poem, song, etc., "in the style of" X, according to the current USCO guidance, the output is not copyrightable because the expressive elements of the output are determined by the technology and not by a human.[116] "Copyright law's application in this area is limited, as it does not protect artistic style as a separate element of a work."[117]

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115. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16192.

116. *Id*.

117. Although the USCO "acknowledges the seriousness of [] concerns" held by artists "seeking protection against AI 'outputs that imitate the artistic style of a human creator,'" the USCO "does not recommend including style as protected subject matter under [the USCO's proposed] federal digital replica law at this time." U.S. COPYRIGHT OFFICE, COPYRIGHT AND ARTIFICIAL INTELLIGENCE, PART 1: DIGITAL REPLICAS (July 2024), at 53, 54 & 56 [hereinafter *USCO July 2024 Digital Replicas Report*], *available at* https://www.copyright.gov/ai/Copyright-and-Artificial-Intelligence-Part-1-Digital-Replicas-Report.pdf. For discussion of the "several sources of protection under existing laws that may be effective against unfair or deceptive copying of artistic style" as well as "the policy reasons not to extend property-like rights to style in itself," *see id.* at 53–56 ("Sec. III. Protection of Artistic Style").

For discussion of the USCO's recommendation to Congress to pass a new federal digital replica law, *see infra* note 283.

The USCO provides explicit guidance effectively precluding the possibility of a human drafting of a GenAI input (i.e., a prompt) conferring any ownership rights over the resultant GenAI output under copyright law, stating:

- "[W]hen an AI technology receives solely a prompt from a human and produces complex written, visual, or musical works in response, the 'traditional elements of authorship' are determined and executed by the technology—not the human user,"[118] and
- "While some prompts may be sufficiently creative to be protected by copyright, that does not mean that material generated from a copyrightable prompt is itself copyrightable."[119]

The USCO notes, however, that:

- a human "can select or arrange AI-generated material in a sufficiently creative way" to make the work copyrightable, and
- an artist "may modify material originally generated by AI technology to such a degree that the modifications meet the standard for copyright protection."[120]

Importantly, the USCO states that a copyright on a work of authorship that contains AI-generated material does not protect the entire work, but rather is limited only to the "human-authored aspects" of the work.[121] When a technology tool such as GenAI is used to create a work, "what matters is the extent to which the human had creative control over the work's

118. *Id*.

119. *Id.* at n.27.

120. *Id.* at 16192–93.

121. *Id.* at 16193.

expression and 'actually formed' the traditional elements of authorship."[122] Furthermore, the USCO requires the applicant to specifically disclaim the AI-generated material for a copyright to be registered.[123]

Distinguishing within a given work of authorship between what parts are AI-generated and what parts are human-authored is easier in some forms than others. Text typically is relatively straightforward (think redlines). Graphics and music are more complicated.

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By the end of the summer of 2024, the USCO is scheduled to issue the section of its forthcoming comprehensive copyright and AI law report on the copyrightability of works incorporating AI-generated material.[124] This section will "analyze U.S. law's human authorship requirement and its implementation by the Office in registration decisions, including how to determine when AI-generated material can embody human authorship; survey international practices; and assess the policy arguments with respect to copyright protection for AI-generated material."[125]

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122. *Id*.

123. *Id.* at 16192 ("When an AI technology determines the expressive elements of its output, the generated material is not the product of human authorship. As a result, that material is not protected by copyright and must be disclaimed in a registration application.").

124. Letter from Shira Perlmutter, Register of Copyrights, to Hon. Chris Coons, et al. (Feb. 23, 2024), at 5 [hereinafter *Feb. 2024 Ltr. from Shira Perlmutter*], *available at* https://copyright.gov/laws/hearings/USCO-Letter-on-AI-and-Copyright-Initiative-Update-Feb-23-2024.pdf?loclr=blogcop.

125. *Id*.

b. In its February 2024 Guidance, the USPTO extended the Pannu joint inventorship framework to AI-assisted inventions to create a "significant human contribution" requirement for inventorship.

The USPTO's guidance for inventions assisted by generative AI is more detailed. As announced in its February 2024 Guidance, the USPTO has adopted the existing joint inventorship framework from the Federal Circuit's opinion in *Pannu v. Iolab*[126] and applied it to this [Gen]AI-assisted inventions context, stating:

> The patent statutes require the naming of all inventors who contributed to at least one claim of a patent. The threshold question in determining the named inventor(s) is who contributed to the conception of the invention. In situations where a single person did not conceive the entire invention (*e.g.*, joint inventorship), courts have found that a person who shares in the conception of the invention is an inventor. In these situations, each named inventor in a patent application or patent, including an application or a patent for an AI-assisted invention, must have made a "significant contribution" to the claimed invention.[127]

In *Pannu*, the Federal Circuit held that in a joint inventorship dispute, to establish inventorship rights, each purported joint inventor must:

1. contribute in some significant manner to the conception or reduction to practice of the invention,

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126. *Pannu*, 155 F.3d at 1351.

127. *USPTO Feb. 2024 AI-Assisted Invention Guidance*, *supra* note 6, at 10047.

2. make a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention, and
3. do more than merely explain to the real inventors well-known concepts and/or the current state of the art.[128]

In its February 2024 Guidance, the USPTO published the following nonexhaustive list of principles to help inform the application of the *Pannu* factors in [Gen]AI-assisted inventions:

1. A natural person's use of an AI system in creating an AI-assisted invention does not negate the person's contributions as an inventor. The natural person can be listed as the inventor or joint inventor if the natural person contributes significantly to the AI-assisted invention.
2. Merely recognizing a problem or having a general goal or research plan to pursue does not rise to the level of conception. A natural person who only presents a problem to an AI system may not be a proper inventor or joint inventor of an invention identified from the output of the AI system. However, a significant contribution could be shown by the way the person constructs the prompt in view of a specific problem to elicit a particular solution from the AI system.
3. Reducing an invention to practice alone is not a significant contribution that rises to the level of inventorship. Therefore, a natural person who merely recognizes and appreciates the output of an AI system as an invention, particularly when the properties and

128. *Id*.

utility of the output are apparent to those of ordinary skill, is not necessarily an inventor. However, a person who takes the output of an AI system and makes a significant contribution to the output to create an invention may be a proper inventor. Alternatively, in certain situations, a person who conducts a successful experiment using the AI system's output could demonstrate that the person provided a significant contribution to the invention even if that person is unable to establish conception until the invention has been reduced to practice.

4. A natural person who develops an essential building block from which the claimed invention is derived may be considered to have provided a significant contribution to the conception of the claimed invention even though the person was not present for or a participant in each activity that led to the conception of the claimed invention. In some situations, the natural person(s) who designs, builds, or trains an AI system in view of a specific problem to elicit a particular solution could be an inventor, where the designing, building, or training of the AI system is a significant contribution to the invention created with the AI system.
5. Maintaining "intellectual domination" over an AI system does not, on its own, make a person an inventor of any inventions created through the use of the AI system. Therefore, a person simply owning or overseeing an AI system that is used in the creation of an invention, without providing a significant

> contribution to the conception of the invention, does not make that person an inventor.[129]

In conjunction with this Guidance, the USPTO published two illustrative examples of an inventorship analysis for [Gen]AI-assisted inventions applying these principles.[130]

The USPTO has further extended the logic of the above and imposed a requirement that the patent application should be rejected "for each claim for which an examiner or other USPTO employee determines from the file record or extrinsic evidence that at least one natural person, *i.e.*, one or more named inventors, did not significantly contribute."[131] This implicitly is to prevent a human inventor contributing only to one dependent claim in a patent application and coming out with patent rights over an entire set of claims, some of which may have been exclusively generated by GenAI.

c. What quality of prompt engineering is necessary to constitute a sufficient human contribution for copyrightability or patentability?

"Prompt engineering" is "the process of writing, refining and optimizing inputs to encourage generative AI systems to

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129. *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10048–49.

130. *See id.*, at 10045; Example 1: Transaxle for Remote Control Car, USPTO [hereinafter *USPTO Example 1*], *available at* https://www.uspto.gov/sites/default/files/documents/ai-inventorship-guidance-mechanical.pdf; and Example 2: Developing a Therapeutic Compound for Treating Cancer, USPTO [hereinafter *USPTO Example 2*], *available at* https://www.uspto.gov/sites/default/files/documents/ai-inventorship-guidance-chemical.pdf.

131. *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10048–49.

create specific, high-quality outputs."[132] As one provider of AI services describes:

> Prompt engineering is an iterative process. It's essential to experiment with different ideas and test the AI prompts to see the results. You may need multiple tries to optimize for accuracy and relevance. Continuous testing and iteration reduce the prompt size and help the model generate better output. There are no fixed rules for how the AI outputs information, so flexibility and adaptability are essential.[133]

Prompt engineering is an essential skill for leveraging the power of GenAI and may even become its own career field.[134]

Based on their respective AI Guidance publications to date, the USCO and the USPTO take vastly different approaches with respect to prompt engineering and whether it can suffice to support copyright or patent rights over the GenAI output therefrom.

i. Under the USCO's current guidance, no amount of prompt engineering can confer "human authorship" to any GenAI output.

The USCO's current guidance as of March 2023 strongly indicates that whatever level of human creativity may be

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132. *What is Prompt Engineering*, IBM, https://www.ibm.com/topics/prompt-engineering (last visited July 27, 2024).

133. *What is Prompt Engineering*, AMAZON, https://aws.amazon.com/what-is/prompt-engineering/#:~:text=Prompt%20engineering%20is%20an%20iterative,optimize%20for%20accuracy%20and%20relevance (last visited July 27, 2024).

134. Jack Kelly, *The Hot, New High-Paying Career Is An AI Prompt Engineer*, FORBES (Mar. 6, 2024), https://www.forbes.com/sites/jackkelly/2024/03/06/the-hot-new-high-paying-career-is-an-ai-prompt-engineer/.

expressed in developing a GenAI input confers no copyright protection rights to the GenAI output under copyright law. The USCO could not have been more definitive on this in stating:

> Based on the Office's understanding of the generative AI technologies currently available, users do not exercise ultimate creative control over how such systems interpret prompts and generate material.[135]

and

> Some [GenAI] technologies allow users to provide iterative 'feedback' by providing additional prompts to the machine. For example, the user may instruct the AI to revise the generated text to mention a topic or emphasize a particular point. While such instructions may give a user greater influence over the output, the AI technology is what determines how to implement those additional instructions.[136]

This reasoning is prominently reflected in the USCO's refusal in *Théâtre D'opéra Spatial* to register a piece of digital art created with the text-to-image GenAI tool Midjourney.[137] The copyright applicant explained he "input numerous revisions and text prompts at least 624 times to arrive at the initial version of the image."[138] The Review Board of the USCO found that the

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135. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16192.

136. *Id.* at n.30.

137. Letter from U.S. Copyright Office Review Board to Tamara S. Pester, Re: Second Request for Reconsideration for Refusal to Register Théâtre D'opéra Spatial (SR # 1-11743923581; Correspondence ID: 1-5T5320R) (Sept. 5, 2023), *available at* https://www.copyright.gov/rulings-filings/review-board/docs/Theatre-Dopera-Spatial.pdf.

138. *Id.* at 2. The USCO Review Board summarized the applicant's failed arguments regarding his creative process as follows:

work "contains more than a de minimis amount of content generated by artificial intelligence."[139] And because the applicant was "unwilling to disclaim the AI-generated material," the work "cannot be registered as submitted."[140]

As discussed above, the USCO will register a copyright only for any "human-authored aspects" of a GenAI-assisted work of authorship, consisting in effect of only revisions made by a human on top of an GenAI output.[141] For example, in February 2023, the USCO "concluded that a graphic novel comprised of human authored text combined with images generated by the

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> [The applicant] asserts a number of arguments in support of his claim. He argues that his use of Midjourney allows him to claim authorship of the image generated by the service because he provided "creative input" when he "entered a series of prompts, adjusted the scene, selected portions to focus on, and dictated the tone of the image." [He] created a text prompt that began with a "big picture description" that "focuse[d] on the overall subject of the piece." He then added a second "big picture description" to the prompt text "as a way of instructing the software that [the applicant] is combining two ideas." Next, he added "the overall image's genre and category," "certain professional artistic terms which direct the tone of the piece," "how lifelike [the applicant] wanted the piece to appear," a description of "how colors [should be] used," a description "to further define the composition," "terms about what style/era the artwork should depict," and "a writing technique that [the applicant] has established from extensive testing" that would make the image "pop." He then "append[ed the prompt] with various parameters which further instruct[ed] the software how to develop the image," resulting in a final text prompt that was "executed . . . into Midjourney to complete the process" and resulted in the creation of the Midjourney Image []. *Id.* at 6.

139. *Id*. at 1.

140. *Id*.

141. *See supra* Sec. III.A.2.a.

AI service Midjourney constituted a copyrightable work."[142] The USCO, however, held that "the individual images themselves could not be protected by copyright."[143] This was consistent with the USCO's position that prompt engineering cannot constitute a sufficient human contribution to convey ownership rights to the human prompter under copyright law.

ii. Under the USPTO's current guidance, prompt engineering apparently can, at least in theory, rise to the level of the "significant human contribution" required for patentability.

In contrast, according to the USPTO's current guidance, prompt engineering apparently *can* rise to the level of the "significant contribution" by a human required for patentability, at least in principle. This appears to be provided for in the USPTO's Guiding Principle 2 applying the *Pannu* joint inventorship factors to the sufficiency-of-human-contribution determination for [Gen]AI-assisted inventions, copied again below:

> 2. Merely recognizing a problem or having a general goal or research plan to pursue does not rise to the level of conception. A natural person who only presents a problem to an AI system may not be a proper inventor or joint inventor of an invention identified from the output of the AI system. *However, a significant contribution could be shown by the way the person*

142. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16191 & n.9 (discussing Letter from U.S. Copyright Office to Van Lindberg, Re: Zarya of the Dawn (VAu001480196) (Feb. 21, 2023), at 2, *available at* https://www.copyright.gov/docs/zarya-of-the-dawn.pdf).

143. *Id*.

> *constructs the prompt in view of a specific problem to elicit a particular solution from the AI system.*[144]

But remarkably, neither the term "prompt engineering" nor the concept of iterative prompt development is specifically discussed or even hinted at throughout the USPTO's February 2024 or April 2024 Guidance publications beyond the above. Nor do either of the two illustrative examples provided by the USPTO provide *any* examples of prompt construction by itself, let alone of any iterative prompt engineering, supporting inventorship and patentability.[145] Instead, the USPTO presents only examples directed at the far more straightforward analyses that inventive conception or experimentation done before the GenAI is involved or on top of GenAI output can support patentability.[146] And they discuss Guiding Principle 2 primarily in the negative

144. *USPTO Feb. 2024 AI-Assisted Invention Guidance*, *supra* note 6, at 10048–49 (emphasis added).

145. *See USPTO Examples 1 & 2*, *supra* note 130.

146. *See, e.g.*, *USPTO Example 1*, *supra* note 130, at 6 (analyzing the inventorship of a hypothetical Claim 3, finding inventorship because the inventors "made significant alterations to the alternative design as a direct result of their experimentation"); *see also, e.g.*, *USPTO Example 2*, *supra* note 130, at 5 (analyzing the inventorship of a hypothetical claim, stating: "While some of these contributions could be characterized as simply identifying a problem or reducing the output of DTIP to practice, Marisa and Naz made significant contributions to the conception of the invention. Namely, Marisa and Naz synthesized the drug compounds identified as candidates from the output of DTIP, characterized these drug compounds, and structurally modified the lead drug compound to create a novel therapeutic drug compound. Therefore, Marisa and Naz both significantly contributed to the conception of the claimed invention.").

to illustrate that the mere recognition of a problem does *not* rise to the level of conception.[147]

In contrast, in its April 2024 Guidance, the USPTO highlights as a specific example of insufficient human contribution to support patentability when "an AI system assists in the drafting of the patent application and introduces alternative embodiments which the inventor(s) did not conceive and [the] applicant seeks to patent."[148] But such prompt engineering *should*, at least arguably, suffice to constitute the requisite "significant human contribution" supporting patentability. If a patent applicant has claimed a patentable invention describing a particular embodiment, why is it inappropriate to prompt a GenAI to generate alternative (and at least arguably logically following from the invention) embodiments and claim they are also covered? Or if a patent applicant has claimed a genus claim, covering a range from X to Y, then why should it be inappropriate to prompt a GenAI tool to generate embodiments within that range to comply with the 35 U.S.C. § 112 enablement requirements as imposed by *Amgen v. Sanofi*?[149]

With the USPTO, however, taking the opposite position and the USPTO's Five Guiding Principles themselves collectively precluding several categories of prompts that might otherwise

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147. *USPTO Example 1*, *supra* note 130, at 3 (analyzing the inventorship of a hypothetical Claim 1, rejecting inventorship because the GenAI prompt the purported inventors constructed "is simply a restatement of [the] general problem" and thus they did not significantly contribute to the conception of the invention that was in fact generated by the AI).

148. See USPTO Apr. 2024 AI-Based Tools Guidance, supra note 25, at 25615.

149. 598 U.S. 594, 612 (2023). For a discussion of using GenAI in patent drafting to meet the *Amgen v. Sanofi* and the 35 U.S.C. § 112 enablement requirement and the risks of same posed by GenAI-assisted prior art generation, *see infra* Sec. V.B.

have supported patentability, it is difficult to conceive of an example where prompt engineering by itself would actually suffice in the eyes of the USPTO—particularly when the USPTO has not provided a single positive example affirming this principle to date.

B. Issue No. 1(a): Will the courts adopt the USCO's and the USPTO's frameworks for sufficiency-of-human-contribution determinations for GenAI-assisted works of authorship and inventions?

It should be treated as an open question whether the federal courts will adopt their sufficiency-of-human-contribution frameworks for GenAI-assisted works of authorship and inventions under the copyright and patent laws, as detailed in this section.

1. Can prompt engineering never confer rights to the resulting GenAI output under copyright law, as presumed by the USCO?

As noted above, the USCO's position against prompt engineering as potentially supporting copyrightability has not been affirmed in federal court to date.

Some may argue and the courts may hold that the USCO Review Board wrongly decided *Théâtre D'opéra Spatial* introduced above,[150] and that the 642 prompts that the applicant entered should be construed as entailing a level of creativity meeting the low bar that has been set for copyrightability in general. Under the Supreme Court's 19th century opinion in *Sarony* discussed above, a photograph can be copyrightable because the human photographer can act as the ultimate "mastermind" behind a

150. *See supra* Sec. III.A.2.c.i.

photograph by adjusting the composition beforehand to be captured by the camera.[151] Might a GenAI-assisted digital work of art also be copyrightable by the same reasoning, due to an iterative set of prompts created by a digital artist? Or a GenAI-assisted software program developed under the iterative prompting of a software programmer?

At least one other court outside the U.S. has applied such legal reasoning under its country's copyright laws. In *Li v. Liu*, a Chinese court found copyright infringement of an image created using Stable Diffusion, another text-to-image GenAI tool.[152] The court upheld the copyright in dispute, providing a meticulous account of the prompt engineering used by the author to create the image and a thorough legal analysis supporting its conclusion that the author used Stable Diffusion only as a tool to *assist* in creating the work.[153]

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151. *See supra* note 18.

152. Li v. Liu, Jing 0491 Min Chu No. 11279 (Beijing Internet Court A Nov. 27, 2023), *available at* https://english.bjinternetcourt.gov.cn/pdf/BeijingInternetCourtCivilJudgment112792023.pdf.

153. *Id.* at 12–13. The Chinese court's reasoning included:

> Generally speaking, when people use the Stable Diffusion model to generate pictures, the more different their needs are and the more specific the description of picture elements, layout, and composition is, the more personalized the picture will become. In this case, there are identifiable differences between the picture involved and the prior works. In terms of the generation process of the picture involved, the plaintiff did not draw the lines himself, or instruct the Stable Diffusion model everything on how to draw the lines and do the colors; the lines and colors that constitute the picture involved are basically done by the Stable Diffusion model, which is very different from the conventional way of people using brushes or software to draw pictures. However, the plaintiff used prompt words to work on the picture elements such as the character and how to present it, and set parameters to

work on the picture layout and composition, which reflects the plaintiff's choice and arrangement. The plaintiff input prompt words and set parameters and got the first picture; then he added some prompt words, modified the parameters, and finally got the picture involved. Such adjustment and modification also reflect the plaintiff's aesthetic choice and personal judgment. During the trial, the plaintiff generated different pictures by changing the prompt words or the parameters. One can infer that with this model, different people can generate different pictures by entering different prompt words and setting different parameters. Therefore, the picture involved is not a "mechanical intellectual achievement". Unless there is contrary evidence, it can be found that the picture involved is independently completed by the plaintiff and reflects the plaintiff's personalized expression. In summary, the picture involved meets the element of "originality". . . .

. . .The generative AI technology has changed the way people create. Just like many other technological advances in history, the process of technological development is the process of outsourcing human work to machines. Before the advent of cameras, people needed superb painting skills to reproduce an object perfectly; then the cameras made it easier to record the image of an object. Nowadays, the camera of smartphones is getting better and easier to use. However, as long as the photos taken with a smartphone reflect the photographer's original intellectual investment, they will constitute photographic works and are protected by the Copyright Law. The development of technologies and tools require less human investment, but the copyright system should remain in use in order to encourage the creation of works. Before the emergence of the AI model involved, people needed to spend time and energy learning how to paint, or to consign others to paint for them. In the second scenario, the painter will draw the lines and fill in the colors upon the client's request to complete a work of fine art. And the person who draws is normally considered a creator. This is similar to the use of AI models to generate pictures, but there is one major difference here: the creator has his own will and he will use some judgment when painting for the client. Currently, the generative AI model

2. Did the USPTO apply the law correctly in adopting and applying the *Pannu* joint inventorship analysis as its framework?

    a. Does the Pannu joint inventorship analysis seamlessly apply to the GenAI-assisted invention context under patent law, as presumed by the USPTO?

In *Pannu*, the Federal Circuit held that if there are two or more purported human contributors to an invention, each must make a "significant contribution" to be considered an inventor.

The USPTO explicitly notes that "[a]lthough the *Pannu* factors are generally applied to two or more people who create an invention (*i.e.*, joint inventors), it follows that a single person who uses an AI system to create an invention is also required to make a significant contribution to the invention, according to the *Pannu* factors, to be considered a proper inventor."[154]

It is entirely possible, however, that the federal courts will ultimately decline to adopt the USPTO's *Pannu* framework and instead provide a different test. As the USPTO explicitly notes,

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has no free will and is not a legal subject. Therefore, when people use an AI model to generate pictures, there is no question about who is the creator. In essence, it is a process of man using tools to create, that is, it is man who does intellectual investment throughout the creation process, the not AI model. The core purpose of the copyright system is to encourage creation. And creation and AI technology can only prosper by properly applying the copyright system and using the legal means to encourage more people to use the latest tools to create. Under such context, as long as the AI-generated images can reflect people's original intellectual investment, they should be recognized as works and protected by the Copyright Law.

154. *USPTO Feb. 2024 AI-Assisted Invention Guidance*, *supra* note 6, at 10048.

its Guidance publications "do[] not constitute substantive rule-making and do[] not have the force and effect of law."[155] It is the federal courts that have the authority to interpret the Patent Act and apply it to different and new situations, including the modern rise of generative AI. And Congress could step in at any time to define or change the standard through the passage of legislation.

For example, some may argue, and the courts may hold, that:

- The *Pannu* joint inventorship framework is inapposite because it was developed to address disputes between two or more human beings regarding their respective purported inventorship rights or lack thereof, not to determine when a human being has contributed to a GenAI-assisted invention enough to merit inventorship rights.[156] Instead, the key question under long-standing patent law should be whether the *human* inventor(s) conceived of every limitation in the claim(s) in comparison to the patent specification or other documented evidence, including by serving as the "mastermind" for any use of GenAI tool.
- The USPTO's application of the *Pannu* joint inventorship framework is predicated on the assumption that GenAI can *autonomously* replicate the human process of conception in a way that may otherwise confer

155. *See*, *e.g.*, *id*. at 10045.

156. As noted by one commentator, "[T]he USPTO's approach is not fully grounded in the law because it allows for patenting of an invention in a situation where no human or combination of humans fully conceived of and originated the invention. Rather, [the USPTO is] simply looking for at least one human who provided a significant contribution." Dennis Crouch, *Joint Inventorship: AI-Human Style*, PATENTLYO (Feb. 12, 2024), *available at* https://patentlyo.com/patent/2024/02/joint-inventorship-human.html.

inventorship rights under patent law if it were conceived by one or more humans. And the further assumption that adding such a "significant contribution" requirement is needed or else the USPTO would issue some patents that should not otherwise have issued. But neither assumption has been established by Congress or the courts.

- The *Pannu* "significant contribution" standard and the Five Guiding Principles presented by the USPTO to help inform its application is vague, exceedingly complicated, overly subject to interpretation by patent examiners,[157] and infeasible to comply with by patent applicants.[158] Such an ambiguous standard will be difficult if not impossible to apply consistently from case to case, examiner to examiner, or from USPTO technology center to technology center.
- The resulting uncertainty for the patentability of all GenAI-assisted inventions—which will comprise many if not most patent applications in the future—will be harmful for the U.S. patent system and U.S. innovation. The increased costs of prosecuting and litigating patents in terms of both money and time will discourage companies from applying for or enforcing patents in the first place, much like some would argue has already resulted from the rise of 35 U.S.C. § 101 patent subject-matter eligibility challenges since *Alice*.[159]

157. For discussion, *see infra* Sec. III.C.2.

158. For discussion, *see infra* Sec. III.D.3.b.

159. For discussion, *see infra* Sec. IV.E.

It is important to note that joint inventorship issues are rarely explored during current USPTO patent examination practice.[160] Distinguishing between who invented what portion of an invention has historically not been of primary importance during patent examination, with the USPTO focusing instead on the question of whether the claimed invention qualifies for a patent in the first place.

The USPTO implicitly accepts that there may be some individuals who effectively free ride and get improperly named as joint inventors on any given issued patent. Some may argue that the resolution of any joint inventorship issues can and should be generally deferred by the USPTO to the federal courts, given the elevated investigatory, fact-finding, and credibility-determination requirements necessary for any such analysis.

But with the rise of GenAI-assisted inventions, such "human-plus-AI" joint-inventorship issues take on a very different dimension. It is less than clear that applying a "human-only" joint-inventorship analysis—which requires very little contribution to be included as an inventor—to this distinct AI context makes sense. Human-inventorship issues are at the heart of whether there are one or more patentable claims for AI-assisted inventions in the first instance, and any rulemaking involving their determination requires close scrutiny and due process.

160. "Generally, the USPTO presumes those inventors named on the application data sheet [] or oath/declaration are the actual inventor or joint inventors of the application. However, examiners and other USPTO personnel should carefully evaluate the facts from the file record or other extrinsic evidence when making determinations on inventorship." *USPTO Feb. 2024 AI-Assisted Invention Guidance, supra* note 6, at 10048.

b. Did the USPTO appropriately apply principles of patent law in developing its Five Guiding Principles to apply the Pannu factors to GenAI-assisted inventions?

Nor should it be assumed that the courts will adopt the Five Guiding Principles the USPTO established to help inform the application of the *Pannu* joint inventorship factors to GenAI-assisted inventions.[161]

For example, some may argue that the phraseology of the USPTO's Guiding Principle 3 stating that "a natural person who merely recognizes and appreciates the output of an AI system as an invention . . . is not necessarily an inventor," improperly elevates "conception" to a requirement and demotes "reduction to practice" to insufficient to constitute a "significant" contribution by a human supporting patentability, effectively rewriting *Pannu* factor 1.[162] Such a change to the substantive patent law would fall outside of the USPTO's appropriate rulemaking authority and would be subject to future review by the courts and any future legislation by Congress.

And as discussed above, some would disagree with the USPTO's refusal to grant a patent when an applicant has "an AI system assist[] in the drafting of the patent application and

161. *See supra* Sec. III.B.2.b.

162. *See, e.g.*, American Bar Association, Intellectual Property Law Section, Letter to Under Secretary Vidal in response to Request for Comments: Inventorship Guidance for AI-Assisted Inventions (May 14, 2024), at 3 ("The Guidance reads out the "reduction to practice" from the first *Pannu* factor . . . ."), *available at* https://www.regulations.gov/comment/PTO-P-2023-0043-0051. The authors of this article cite to this Letter merely to provide one substantive critique raised by one organization in response to the USPTO's request for comment, without commenting on the merits.

introduce[] alternative embodiments which the inventor(s) did not conceive and [the] applicant seeks to patent."[163]

C. *Issue No. 1(b): Can the USCO's and the USPTO's frameworks for sufficiency-of-human-contribution determinations feasibly be applied . . . ?*

In contrast to most patent eligibility or qualification determinations by the USPTO pre-GenAI, the sufficiency-of-human-contribution determinations that the USCO and USPTO will have to make potentially for every copyright and in particular every patent application for GenAI-assisted works of authorship and inventions will require at least some degree of investigation, fact-finding, and even credibility determination.

How much of an investigatory role should the USCO and the USPTO take on with respect to this issue or in general as a matter of public policy?

1. . . . by USCO examiners?

Upon closer examination, implementing the USCO's framework of making copyright protections available only for the "human-authored aspects" of a GenAI-assisted work of authorship requires an examination process that is only marginally more substantive, if at all, than that to which the USCO is accustomed.

Based on the standard the USCO has adopted, examiners are not required to tease out of any purported work of authorship what part is attributable to human contribution from what part is attributable to GenAI contribution. As discussed above, the USCO's bright-line rule preempts any such requirement: *any*

163. For discussion, *see supra* Sec. III.A.2.c.ii.

GenAI output is simply not copyrightable according to the USCO.[164]

It is critical to note, however, that were the federal courts or Congress to require the USCO to change its current stance and instead allow copyrightability of the direct GenAI output resulting from prompt engineering in certain circumstances, then the situation would be completely different. Copyright examiners would be thrust into the position of making a challenging substantive determination to figure out from a given GenAI output what portion is attributable to the human contributor and whether that contribution suffices to support rights to that contributor under copyright law. That would raise serious questions as to whether the USCO and its examiners can feasibly make such determinations.

But applying the USCO's current standard, such a determination is fairly straightforward. If a copyright applicant specifically identifies and discloses "the inclusion of AI-generated content" in a work submitted for registration and the applicant's "human [] contributions to the work," as broadly required under the USCO's March 2023 Guidance,[165] then the USCO has the information it needs to make an informed copyright qualification determination.

> 2. . . . by USPTO examiners with respect to separating out human contributions from GenAI-assisted inventions . . .

Of the different avenues the USPTO has framed by which GenAI can be implicated in the GenAI-assisted inventive process, separating out the human contributions from the GenAI

164. For discussion, *see supra* Sec. III.A.2.c.i.

165. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16193.

contributions is relatively straightforward for most of them. For the examiner to evaluate whether there was a "significant contribution" by a human being from either designing, building, or training an AI system "in view of a specific problem to elicit a particular solution from the AI system" (USPTO Guiding Principle 4) or by modifying or conducting a successful experiment on the AI outputs (Guiding Principle 3),[166] all that may be needed is a sworn statement by the applicant along with any supporting evidence. In each of the above scenarios, the human being(s) may be presumptively acting as the "mastermind" to either create the specialized GenAI tool or to use the GenAI output as *part* of their inventive process.

However, for an applicant to establish the requisite "significant contribution [] by the way the person constructs the prompt in view of a specific problem to elicit a particular solution from the AI system" (Guiding Principle 2) is a far more challenging analysis. And one that remains completely undefined by the USPTO, as examined in detail below.

a. . . . even with complete GenAI-input/output records?

Trying to distill the human contributions from the GenAI contributions for inventive works is far more complicated than for works of authorship. Any sufficiency-of-human-contribution determination for GenAI-assisted inventions is inherently labor intensive and likely beyond the skill, training, and time made available for patent examiners, even if access to all material records is presumed.

There is no clear cut "before" and "after" that a patent applicant can provide for GenAI-assisted inventions in general,

166. For discussion, *see infra* Sec. III.A.2.b.

particularly those involving multiple GenAI-input/output sessions across multiple prompt engineers and over an extended period of time. The safest and perhaps only way for the applicant to ensure compliance may be to disclose a complete record of *all* relevant GenAI-input/output sessions. Such an approach may theoretically be the only way for the applicant to fully discharge its duty to disclose "all information material to patentability" under 37 C.F.R. § 1.56 in at least some cases.

But even if patent examiners receive such a fulsome disclosure from the applicants, they would likely not have the time or the means to review them fully and accurately. In many cases, the complete record of GenAI inputs/outputs likely would be too voluminous and complicated for examiners to effectively review.

Moreover, such a sufficiency-of-human-contribution analysis should in principle be done on a claim-by-claim basis, and this is in fact what the USPTO requires in its February 2024 Guidance.[167] Such a requirement, however, further compounds any issues of infeasibility for the patent examiner. Patent examiners are now required to parse out what contributions to the invention were made by the human inventor(s) for a GenAI-assisted invention to a far greater degree of specificity than has ever been expected of patent examiners for non-GenAI-assisted inventions.

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167. *USPTO Feb. 2024 AI-Assisted Invention Guidance*, *supra* note 6, at 10048 ("[A] rejection under 35 U.S.C. 101 and 115 should be made for each claim for which an examiner or other USPTO employee determines from the file record or extrinsic evidence that at least one natural person, *i.e.*, one or more named inventors, did not significantly contribute.").

b. . . . or particularly with limited access to the relevant GenAI-input/output records?

The likely presumption, though, is that USPTO examiners will *not* have access to all material GenAI inputs and outputs in many cases. Maybe most cases. Perhaps even in the vast majority of cases as GenAI becomes incorporated into more inventive processes for companies.

It may be practically unreasonable to expect patent applicants to identify, let alone disclose, all relevant repositories of GenAI inputs/outputs to any given inventive process. Not without extensive efforts. And not without potentially unduly impeding the product development lifecycle efforts themselves, whose primary purpose (for everyone except perhaps the company's IP counsel) is to develop actual products and services; not to file for patents. It is easy to establish corporate policies nominally requiring researchers and engineers to collect all material GenAI inputs and outputs. There may be practical limitations, however, to successfully implementing them.

The more of a quasi-judicial role patent examiners are expected to play with respect to sufficiency-of-human-contribution determinations, the more examiners will be required to conduct investigations with respect to any undisclosed material GenAI-input/output records. But fact-finding and credibility determinations are generally best left to the litigation process and the courts, and with good reason.

Unlike the USCO, the USPTO has considerable experience with conducting substantive analyses during examination, including the prior art invalidity analyses under 35 U.S.C. §§ 102 and 103 core to any patent examination and patent subject-matter eligibility analyses under 35 U.S.C. § 101.

But patent examiners have available to them, at least in theory, a significant amount of information relevant to each of

these analyses during the examination process, independent of any disclosures by the applicant. Prior art is largely publicly available, and examination time is primarily reserved for searching for and reviewing the relevant prior art. And as challenging and unpredictable as Section 101 subject-matter eligibility analyses are, so long as the applicant accurately captures the nature of the claimed invention, the examiner has all that is needed to conduct the analysis based primarily on the contents of the application itself and the guidance on Section 101 issues from the federal courts and the USPTO.

This is far from the case for any sufficiency-of-human-contribution determination for GenAI-assisted inventions. This inherently requires nonpublic, ephemeral records and information that are primarily if not exclusively within the control of the applicant.

D. Issue No. 1(c): Can the USCO's and USPTO's frameworks for sufficiency-of-human-contribution determinations feasibly be complied with by GenAI-assisted copyright and patent applicants?

Does the duty to disclose as currently framed by the USCO and the USPTO with respect to sufficiency-of-human-contribution determinations for AI-assisted copyright and patent applicants properly balance the examiners' need for information with what can be feasibly collected and disclosed by the applicants?

1. The USCO and the USPTO have taken contrasting approaches to the applicant's duty of disclosure for GenAI-assisted works of authorship or inventions.

The USCO and USPTO have taken vastly different procedural approaches to the specificity of guidance they provide

regarding required disclosures of the use of AI by copyright and patent applicants.

a. The USCO only requires disclosure of any inclusion of GenAI-generated content and a brief explanation of the human author's contributions.

The USCO has assumed more of a quasi-judicial role with respect to these GenAI-assisted issues than it has carried out in its copyright examination process historically. In its March 2023 guidance, the USCO explicitly requires:

- "a duty to disclose the inclusion of AI-generated content in a work submitted for registration," and
- "a brief explanation of the human author's contributions to the work."[168]

The USCO provides the following guidance for how to submit applications for works containing AI-generated material:

> For example, an applicant who incorporates AI-generated text into a larger textual work should claim the portions of the textual work that is human-authored. And an applicant who creatively arranges the human and non-human content within a work should fill out the "Author Created" field to claim: "Selection, coordination, and arrangement of [describe human-authored content] created by the author and [describe AI content] generated by artificial intelligence."[169]

168. *USCO Mar. 2023 Guidance*, *supra* note 6, at 16193.

169. *Id*.

b. The USPTO imposes a detailed duty of disclosure for GenAI-assisted inventions.

In contrast, the USPTO, through its February 2024 Guidance, explicitly initially *disclaimed* the need for any new or specific disclosure requirement for GenAI use in the inventive process.[170] Instead the USPTO highlighted only the existing "duty to disclose all known information that is material to patentability" under 37 C.F.R. § 1.56, noting in rather contradictory, bureaucratic fashion:

> At this time, to meet their duty of disclosure, applicants rarely need to submit information regarding inventorship. The USPTO does not believe this inventorship guidance will have a major impact on applicants' disclosure requirements. However, special care should be taken by those individuals subject to this duty to ensure all material information is submitted to the USPTO to avoid any potential negative consequences.[171]

The USPTO's Guidance further noted in continued bureaucratic fashion:

> Generally, the USPTO presumes those inventors named on the application data sheet or oath/declaration are the actual inventor or joint inventors of the application. However, examiners and other USPTO personnel should carefully evaluate the facts from the file record or other extrinsic evidence when making determinations on inventorship. When the facts or evidence indicates that the named inventor or joint inventors did

170. *USPTO Feb. 2024 AI-Assisted Invention Guidance*, *supra* note 6, at 10049.

171. *Id*.

> not contribute significantly to the claimed invention, *i.e.*, their contributions do not satisfy the *Pannu* factors for a particular claim, a rejection under 35 U.S.C. 101 [] is appropriate.[172]

But in its subsequent April 2024 Guidance, the USPTO quietly pivoted to providing meaningful guidance, giving actual examples of what use-of-AI information it would consider to be "material."

> i. Under its April 2024 Guidance, the USPTO now requires detailed disclosures down to the level of *specific* material [Gen]AI tools used.

The USPTO's April 2024 Guidance added to its duty of disclosure guidance for the first time the italicized language below:

> While there is no per se requirement to notify the USPTO when AI tools are used in the invention creation process or practicing before the USPTO, applicants and practitioners should be mindful of their duty of disclosure. *This is, if the use of an AI tool is material to*

172. *Id.* at 10048.

> *patentability as defined in 37 CFR 1.56(b),*[173] *the use of such AI tool must be disclosed to the USPTO.*[174]

The USPTO's clarification might seem minor or obvious, but it is anything but. It forecloses the use of any empty "the applicant used AI tools common to the practice"-type disclosure statements; instead, the applicant is required to specify each individual AI tool it used that was "material to patentability."

Furthermore, given the newness and inconsistency in use of terminology related to AI, additional guidance as to what constitutes an "AI tool" subject to mandatory disclosure—and potentially subsequent invalidation of any issued patent where there was a failure to disclose such AI tool during the

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173. 37 C.F.R. § 1.56(b) states:

> (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
>
> (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
>
> (2) It refutes, or is inconsistent with, a position the applicant takes in:
>
> (i) Opposing an argument of unpatentability relied on by the Office, or
>
> (ii) Asserting an argument of patentability.
>
> A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

174. *See USPTO Apr. 2024 AI-Based Tools Guidance*, *supra* note 25, at 25615 (emphasis added).

application process—is simply necessary.[175] What constitutes "material to patentability" in this context?

For example, as noted above, the use of GenAI drafting tools like Grammarly poses some interesting questions in the specific context of drafting patent applications, where the turn of a phrase can dramatically impact the scope of a patent claim.[176] Should disclosure of all such GenAI drafting tools, which have also been built into the latest versions of Microsoft Word and Google Docs, be disclosed? Should issued patents later be invalidated for any failure to do so? If there are multiple inventors, does each need to be surveyed on this specific issue and the specific GenAI drafting tools they use?

More specific guidance is needed as to what AI tools are and are not "material." And some form of safe harbor should be built in for certain good-faith technical failures to comply, to prevent these human inventorship issues for GenAI-assisted inventions from becoming even more of a trap for the unwary than they already promise to be.

ii. The USPTO's April 2024 Guidance disclosure requirement effectively shifts the burden of proof onto the applicant.

Compliance with the USPTO's April 2024 Guidance's new rule compelling the disclosure of all material AI tools used by the applicant logically will operate as an admission that any AI tool so disclosed was material to the conception and/or reduction-to-practice of the invention.

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175. For discussion of the importance of the definition of AI terms, *see supra* Sec. II.A.

176. For discussion, *see id*.

The USPTO's rule surreptitiously shifts the burden of proof for patentability onto the applicants. Instead of the USPTO and the patent examiner bearing the burden of proving applicants do not qualify for a patent—as has been the case for every issue of patentability in the history of USPTO patent examination—GenAI-assisted patent applicants thus effectively bear the burden of affirmatively proving they made a "significant contribution" to establish their inventorship rights. From any such disclosure of material AI tools used, the USPTO examiner would be able, if not compelled, to follow up and inquire about how the applicant used any given listed AI tool and what portion of the claimed invention was conceived by that AI tool.

And even if such follow-up does not happen during the examination process itself, the disclosure (or lack thereof) of the use of such AI tools is on record for any future litigation. This provides a spotlight during any future litigation on any record keeping (or lack thereof) the patent applicant maintained of the use of such AI tools during the invention process or disclosed (or not disclosed) during the application process.

iii. Under its April 2024 Guidance, the USPTO also requires detailed disclosures down to the level of *specific* [Gen]AI inputs/outputs.

Further evidencing the abrupt shift of the burden of proof imposed by the April 2024 Guidance described above, the Guidance immediately followed with another example requiring potentially expansive disclosures down to the GenAI input/output level:

> For example, as discussed in more detail in the Inventorship Guidance for AI-Assisted Inventions, material information could include evidence that a named inventor did not significantly contribute to the invention

> because the person's purported contributions were made by an AI system. This could occur where an AI system assists in the drafting of the patent application and introduces alternative embodiments which the inventor(s) did not conceive and [the] applicant seeks to patent. If there is a question as to whether there was at least one named inventor who significantly contributed to a claimed invention developed with the assistance of AI, information regarding the interaction with the AI system *(e.g., the inputs/outputs of the AI system)* could be material and, if so, should be submitted to the USPTO.[177]

Such a requirement may logically follow in at least some cases, from the duty to disclose "*all* known information that is material to patentability" under 37 C.F.R. § 1.56 (emphasis added). In particular, if the applicant claims that its prompt engineering was a primary basis supporting patentability (under the USPTO's Guiding Principle 2), then it is difficult to imagine how any meaningful sufficiency-of-human-contribution determination can be made without going down to the AI input/output level.

iv. The USPTO's April 2024 Guidance expands the duty to disclose "all information material to patentability" well beyond any prior application of the duty.

But the USPTO does not uphold or apply 37 C.F.R. § 1.56 to its fullest extent for every issue of patentability.

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177. *USPTO Apr. 2024 AI-Based Tools Guidance*, *supra* note 25, at 25615 (emphasis added).

Based on long-standing patent law judicial precedent and USPTO examination practice, all patent applicants have a duty to disclose to the USPTO only material information they are "*aware*" of.[178]

While Rule 1.56 "materiality" is not limited to prior art, prior art is in practice the primary focus of both the patent examiner and the patent applicant regarding the applicant's duty to disclose. The first thing that the patent office "encourages" applicants to carefully examine to discharge their duty of disclosure is "prior art cited in search reports of a foreign patent office in a counterpart application."[179] In addition to presumptively being more likely to be material, another underlying reason to focus on foreign counterpart application disclosures, etc., is because they are publicly available. Patent examiners are fully capable of finding such prior art themselves, but the USPTO appropriately puts the burden on applicants to organize this information for its examiners.

There is a further duty to disclose any other prior art the applicant is aware of, in its files or otherwise, that are material to patentability. But as a practical matter, patent examiners do not investigate whether an applicant has failed to disclose any such other prior art. Nevertheless, patent applicants are generally incentivized to search for and disclose all relevant prior art in their files, in part because of the possibility of being immediately caught red-handed if they somehow slip up on the above obligation.

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178. MPEP § 2001.06 (Sources of Information under 37 CFR 1.56) (R-07.2022) (citing Brasseler, U.S.A. I, L.P. v. Stryker Sales Corp., 267 F.3d 1370, 1383 (Fed. Cir. 2001).

179. MPEP § 2001 (Duty of Disclosure, Candor, and Good Faith (R-08.2017).

Patent applicants, however, have no duty to conduct any independent prior art search in conjunction with their application. As stated above, it is *not* the patent applicant's duty to prove that its application is patentable over the prior art; it is instead the patent examiner's burden to prove that the application is *not* patentable over the prior art. This makes sense for at least two reasons:

1. Requiring the patent applicant to prove its application is patentable would be akin to requiring the applicant to prove a negative.
2. All prior art is by definition publicly available and can theoretically be independently found by the patent examiner by conducting a prior art search during examination.

Unlike for the prior art qualification and patent subject-matter eligibility determinations discussed above,[180] however, "public use" (e.g., a prefiling prototype demonstration to solicit investment) and "on-sale bar" (i.e., a prefiling offer for sale of a product or service that embodies the invention) disqualification determinations under 35 U.S.C. § 102(a)(1) rely on information that was not necessarily made available to the general public. Public use or on-sale bar disclosures are often made confidentially. Any full analysis of such disqualifying behaviors by the patent applicant would require access to private recorded communications and information which for all intents and purposes is exclusively within the control of the applicant.

The likely presumption is that there are at least some cases where the USPTO grants patents that would not have been granted had applicants faithfully met their duty to disclose disqualifying public use or on-sale bar information during the

180. For discussion, *see supra* Sec. III.C.2.a–b.

patent application process. Nevertheless, as a practical matter, patent examiners are not expected to fully investigate these issues during examination or to police compliance with the duty of disclosure of all information material to them. These issues are tacitly left to the courts to be developed through discovery, as needed, during any future litigation.

Human-inventorship determinations for GenAI-assisted inventions are far closer to "public use" and "on sale bar" disqualification determinations and are far more removed from invalidity and Section 101 subject-matter eligibility analyses in this regard. The only information the patent examiner will have relevant to these issues is that which the patent applicant discloses.

It should be an open question whether a higher level of disclosure by applicants for sufficiency-of-human-contribution determinations should be required than for public use and on-sale bar determinations at the patent examination stage, or whether the patent system as a whole would benefit more from deferring more of that determination to any future litigation. Particularly where, as with this issue, the USPTO's expansive application of Rule 1.56 threatens to impose a potentially undue burden for at least some patent applicants[181] and compounds the already heightened uncertainty around patentability for GenAI-assisted inventions both during patent examination and during any enforcement actions taken in the future. This has serious potential implications on the level of investment that companies, in particular startups and small and medium enterprises, are willing to make in developing any patent portfolios, and on the health of our overall patent system and our entire economy.[182]

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181. For discussion, *see infra* Sec. III.D.3.b.

182. For discussion, *see infra* Sec. IV.E.

On the other hand, others may argue that such a disclosure requirement *can* be reasonably attainable for all companies and should be a necessary cost of business for a properly functioning patent system for the AI Age.

2. Can the burden of proof for patentability be properly shifted under patent law for any issue?

But it should be treated as an open question whether the burden of proof for patentability can under any circumstances—whether as a direct or indirect result of a USPTO's de facto substantive rulemaking or as a natural and unintentional result of a technological advancement that undercuts the very concept of human inventorship—be shifted under patent law.

The entire patent system is predicated upon the concept that the burden of proof is on the patent examiner to prove a lack of patentability, not on the applicant to prove patentability. This goes hand in hand with the duty of disclosure under 37 C.F.R. § 1.56 requiring the applicant to disclose "all information material to patentability."

Whether the required disclosure of inputs and outputs of the specifically identified GenAI system used should be maintained in the USPTO guidance or any later rulemaking should also be treated as an open question. Otherwise, the tension between the longstanding interpretation of the *limited* duties imposed under Rule 1.56 and the unprecedented and burdensome requirements of the USPTO's Guidance publications threatens to be untenable in practice for both patent examiners and applicants.

3. Can the duties of disclosure for GenAI-assisted works of authorship and inventions be feasibly complied with. . .

    a. . . . by copyright applicants?

There is no reason copyright applicants cannot comply with the USCO's duty-of-disclosure requirements for GenAI-assisted works of authorship if they maintain basic recordkeeping practices.

If the applicant records just the final GenAI output that it used as the basis for and edited or transformed to create the final work of authorship for which it seeks copyright registration, then it likely has most or all of the "before" information—the noncopyrightable GenAI-output that the applicant is obligated to specifically disclaim in its application—that it needs. And the final work of authorship that is the subject of the copyright application (the "after") can be compared with the AI-generated portion, with the applicant providing a narrative explanation as to what the human contributed and the creative thinking behind it.

The same works in reverse when the GenAI contribution is on the back end. If the applicant creates a traditional work of authorship and then uses GenAI editing tools to edit it, then the "before" and "after" records are just as easily identified, collected, and disclosed. All the applicant has to do is start with the final GenAI output for the work of authorship for which the applicant is applying for copyright protections and work backwards from there.

b. . . . by patent applicants for all information material to sufficiency-of-human-contribution determinations?

i. Documenting the relative contributions made to any inventive process is challenging and has not historically been required of the patent applicant.

There is nothing straightforward about most inventive processes. In many cases the owner does not know until after the fact (i.e., when the invention was "reduced to practice") when the inventive process began or ended, which individuals contributed, or which of the multiple pathways taken were fruitful and which were irrelevant. And there is even less of a clear connection between the inventive process, the ultimate claimed invention itself, and the text of the patent claims as originally drafted by the applicant's patent agent/attorney and then as ultimately revised to their final issued form.

Fortunately, for both patent applicant and patent examiner, there has historically been next to no call for the disclosure of any lab notebooks and the like for patent examination. That has been almost entirely the province of any future patent litigation, which is naturally limited only to already issued patents.

This is again all consistent with the patent applicant not bearing any burden of proof for patentability before the USPTO. It is further consistent with the separate fundamental patent law precept regarding 35 U.S.C. § 103 nonobviousness determinations stating that "[p]atentability shall not be negated by the manner in which the invention was made."

ii. Identifying and disclosing all material GenAI input/output records is uniquely challenging.

By extension, even the most diligent, rule-following patent applicant will struggle to comply with the USPTO's mandate to identify, collect, and disclose all GenAI input/output records material to a GenAI-assisted invention.

Determining on an individual basis which GenAI inputs/outputs are relevant to a sufficiency-of-human-contribution determination, let alone are material, is a complicated analysis. Prompt engineering is an iterative process potentially conducted across multiple sessions. There may not be a clear-cut single successful prompt engineering session; the claimed patent may well be the sum of multiple sessions. And there may have been other prompt engineering sessions carried out earlier and by multiple other people that were relevant to the ultimately successful prompt engineering sessions.

Should patent applicants be expected to secure legal counsel to interview every engineer, collect all relevant prompt engineering session GenAI-input/output records, analyze each for materiality, and then organize them for disclosure to the USPTO for each GenAI-assisted patent application? Is it reasonable to expect applicants to bear litigation-scale expenses up front during every patent application process to comply with such duties of disclosure as imposed by the USPTO? And at possible penalty of a finding of unenforceability due to inequitable conduct, sanctions, and even disbarment of the patent attorney or agent from the USPTO for any purported failures?

The USPTO's new and expansive application of the 37 C.F.R. § 1.56 duty of disclosure of "information material to patentability" impacts the individual rights and obligations of patent applicants to such a degree that it can only be reasonably

interpreted as a "substantive rule," requiring compliance with the APA before implementation.[183]

More guidance from the USPTO is required here. Even if provided, questions about the feasibility for companies to comply with any duty to disclose all material GenAI input/output records will likely remain.

E. We need a better system for making sufficiency-of-human-contribution determinations.

Litigating sufficiency-of-human-contribution issues in any future enforcement action will presumptively be extremely expensive for the same reasons as stated above. This is an extremely complicated and fact-intensive exercise. And it is less than clear how any such future litigation of this issue might be made more efficient from any quasi-judicial determination of the same made by the USPTO after the imposition of the duties of disclosure as described above.

All stakeholders in the patent system should be concerned that the policy objectives underlying the current copyright and patent legal regimes might not be attainable in the incipient AI Age. These sufficiency-of-human-contribution issues for GenAI-assisted works of authorship and inventions fall outside of the framework of current IP regimes. And continued attempts to squeeze them into the existing framework may expose and enlarge the cracks within it.

The IP legal system and society have an immediate need for representatives of all stakeholders on these issues to come together and develop policies and procedures for key AI & IP issues, including:

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183. *See supra* Sec. II.B.1.

- a clear sufficiency-of-human-contribution standard for establishing human inventorship for GenAI-assisted copyright and patent applications,
- a reasonable procedure for applicants to meet this standard, and
- a reasonable procedure for future defendants against enforcement actions based on any issued copyrights or patents to challenge whether this standard has been met.

We need consensus, nonpartisan principles and best practices for complying with these issues that, if adopted in whole or in part, would result in more effective and efficient resolution of any such human-inventorship disputes for GenAI-assisted inventions—which will soon comprise most all inventions and patent applications in the future.

SUMMARY OF KEY QUESTIONS

(1) Has an existing or imminent need regarding GenAI-assisted works of authorship or inventions that might call for any change in established patent law or procedures been established and clearly defined in the first place?

(2) Have the USCO and USPTO issued de facto substantive rules in their recent Guidance publications on AI regarding sufficiency-of-human-contribution determinations for GenAI-assisted works of authorship or inventions, in violation of the Administrative Procedure Act?

(3) Regarding copyright law, is the USCO's bright-line stance against prompt engineering serving as the basis for copyrightability over GenAI output for GenAI-assisted works of authorship correct (i.e., will the federal courts adopt it?)?

(4) Regarding patent law:

(a) Is the USPTO's Pannu joint inventorship framework the correct foundation that should be applied for sufficiency-of-human-contribution determinations for GenAI-assisted inventions (i.e., will the federal courts adopt it?)? Or is it predicated on the assumption that GenAI can autonomously replicate human conception in a way that may otherwise confer inventorship rights under patent law if it were conceived by one or more humans—a presumption that has not been established by the courts or by Congress to date?

(b) Did the USPTO properly apply other principles of patent law on top of its Pannu joint inventorship framework to develop its February 2024 Guidance's Five Guiding Principles for GenAI-assisted inventions?

(i) In its April 2024 Guidance, did the USPTO effectively shift the burden of proof for patentability onto the patent applicant?

(ii) Can the burden of proof for patentability be properly shifted to the patent applicant under patent law?

(c) Can the USPTO's overall sufficiency-of-human-contribution determination framework for GenAI-assisted patent applications feasibly be carried out by patent examiners? Or feasibly complied with by patent applicants?

(d) Will the resulting uncertainty for the patentability of all [Gen]AI-assisted inventions—which will comprise most patent applications in the foreseeable future—be harmful for the U.S. patent system and for U.S. innovation?

IV. ISSUE NO. 2: ARE GENAI-ASSISTED SOFTWARE CODING AND AI SOFTWARE INNOVATIONS AT RISK OF SLIPPING THROUGH THE CRACKS OF THE IP LEGAL REGIMES?

Software programs and innovations have historically posed unique challenges for any IP analysis, which are significantly compounded when GenAI-assisted software coding or AI/software innovations are at issue.

A. Software lies somewhere in between the existing IP legal regimes.

There are no less than eight categories of "works of authorship" defined in U.S. copyright law.[184] And one of these categories—literary works—itself spans various categories of works expressed in text, from poems to (apparently) computer programs and software code.[185]

Software has been described as having "a permanently unstable place in the country's IP system because every conception of its nature has failed to advance the commercial and personal needs of all the stakeholders involved."[186]

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184. *See* 17 U.S.C. § 102(a).

185. The copyrightability of software code was not established as of the passage of the Copyright Act of 1974. The Computer Software Copyright Act of 1980 subsequently amended the Copyright Act to include a definition for "computer programs," but without specifying where it fits within the eight categories of works of authorship enumerated in 17 U.S.C. § 102. Computer programs would appear to best fit under the category of "literary works." Pub. L. No. 96-517, 94 Stat. 3015, 3028 (1980). *See* Apple Comput., Inc. v. Franklin Comput. Corp., 714 F.2d 1240 (3d Cir. 1983) (interpreting 17 U.S.C. § 102(a) as classifying computer programs as "literary works" and holding that both the human-readable source code and the machine-readable object code forms of software are protectable by copyrights).

186. GERARDO CON DIAZ, SOFTWARE RIGHTS: HOW PATENT RIGHTS TRANSFORMED SOFTWARE DEVELOPMENT IN AMERICA 279 (Yale Univ. Press 2019).

Is software best understood as only the written code—a mere sequence of coded instructions (e.g., is the relationship between software programs and general-purpose computers analogous to that of piano rolls to automatic piano players, with neither patentable because neither fundamentally change the devices that run them?)?[187] This generally describes the view, championed by IBM back in the first decades of computing, that software should not be patentable.[188] And if so, is software best understood as the source code as written by the programmer or as translated into its machine-readable object code form and distributed on (and stolen from) floppy disks, CD-ROMs, and now by online download, or both? [189] Either way, if software is just written text, then protecting software by copyright law would make sense.[190]

Or is software best understood as a "machine control element" generated by the computer's processing of the object code that transforms a general-purpose computer into a new

187. *See id.* at 110–11.

188. IBM made the same argument with respect to the punched-card operated Jacquard looms of the nineteenth century, which inspired the creation of punched-card computers. According to IBM, an individual deck of punch cards providing step-by-step instructions for a particular fabric design may be copyrightable in the same way that a "gifted mathematician" can express "highly original computational methods in a series of digital computer program cards," but neither should be patentable. *Id.* at 111–12.

189. The answer under the current copyright law is that both source code and object code are protectable by copyright law. The USCO requires copyright applications to be submitted in the human-readable source code form. But the copyright protections extend to the translated machine-readable object code form in which the software program can be "sold" (or rather licensed) as well, which is deemed the same "expression" as the original source code form under copyright law.

190. *See* CON DIAZ, *supra* note 186, at 111–12.

specific device?[191] Should software be treated as "radically different from any other subject matter" ever to fall under the purview of copyright, because computer programs are not just written software coding text but also *simultaneously* are "machine-control elements," and thus should be patentable?[192]

If so, then patent protections are more applicable.

The first conception of software has primarily carried the day since the advent of the software industry in the 1960s and 70s.[193] These same issues, however, often resurface with new developments in technology and in IP law, most recently with the rise (and fall) of business-method patents leading up to the Supreme Court's seminal 2014 ruling in *Alice*.

Like business-method patents, artificial intelligence is also often computer-implemented, i.e., implemented in software. GenAI raises new aspects of the same fundamental issues on 35 U.S.C. § 101 patent subject-matter eligibility that have been argued time and again over the last century with respect to software patents. The authors of this article respectfully submit that a deeper understanding of these fundamental issues—some of which seem to have been lost over time—is important for the continuing principled development of the case law on software patents.

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191. *See id.* at 132–34.

192. *See id.* (describing the position of Robert O. Nimtz, who represented Bell Labs in the seminal U.S. Supreme Court software patenting case *Gottschalk v. Benson*, 409 U.S. 63 (1972)).

193. *See id.* at Chapter 6 (Remaking Software Copyright, 1974-1981), 122–38. IBM led the antisoftware patenting view, which was uniquely consistent with its own self-interests. IBM benefited from bundling its hardware and software in the early years of computing; any advent of software patents would have allowed its competitors an avenue for cutting into IBM's monopoly power. *Id.*

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Software has never fit well within the framework of the existing IP regimes. Patents? Maybe, but challenges against software as ineligible abstract ideas under 35 U.S.C. § 101 loom paralyzingly large.[194] Federal Circuit Judge William Bryson explained post-*Alice* that:

> [software] patents, although frequently dressed up in the argot of invention, simply describe a problem, announce purely functional steps that purport to solve the problem, and recite standard computer operations to perform some of those steps. The principal flaw in these patents is that they do not contain an "inventive concept" that solves practical problems and ensures that the patent is directed to something "significantly more than" the ineligible abstract idea itself. As such, they represent little more than functional descriptions of objectives, rather than inventive solutions. In addition, because they describe the claimed methods in functional terms, they preempt any subsequent specific solutions to the problem at issue. It is for those reasons that the Supreme Court has characterized such patents as claiming "abstract ideas" and has held that they are not directed to patentable subject matter.[195]

Trade secrets? As discussed below, trade secrets are simply inapplicable for "on-premises" software—the dominant means by which software was sold for the first four or five decades of the software industry's history—which is inherently public (i.e., *not* secret).

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194. For discussion, *see supra* Sec. II.C.2.b.

195. Loyalty Conversion Sys. Corp. v. American Airlines, Inc., 66 F.Supp.3d 829, 845 (E.D. Tex. 2014) (internal citations omitted).

Copyrights? Unlike all other copyrightable works of authorship, people want software not for its form of expression (which copyrights can protect), but for its function (which copyrights cannot protect).[196] Nobody buys software for the beauty and elegance of its software coding.

B. Software program source code and object code: why they are valuable, and how the IP regimes protect them.

There are a variety of reasons that software code is valuable and should be protected.

1. Object code is the form of software programs that is pirated.

Before the rise of the internet and cloud computing in the 21st century, computing primarily entailed local computer servers running locally installed software. The object code for such on-premises software is licensed by its owner to the customer to be installed and used on the customer's system. As such, the software is easily pirate-able. Copyright protections are the primary if not sole line of defense for owners against piracy of such software.

Asserting copyright protections and filing a copyright infringement suit, in particular after federal copyright registration, serves as an important deterrent to any wide-scale piracy in this model.[197] In this way, software has had more historically in common with (other) "literary works," with stopping

196. "A 'computer program' is a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." 17 U.S.C. § 101 (Definitions).

197. Copyright protections are generally a better deterrent to wide-scale software piracy than any existing patent protections, because enforcing copyrights is far simpler.

rampant piracy serving as the primary goal for both. The software industry hit the ground running with the threat of piracy from its inception in the 1970s.[198]

Registering with the U.S. Copyright Office any software that has significant commercial value worth protecting was a practical necessity under the on-premises software model. But as discussed in detail below, this is less and less the case with the rise of the software-as-a-service (SaaS) model.

2. Source code is the form of software programs that can be exploited.

Even though it is not typically for sale or made available to any end user, it is the source code, not the object code, form of software programs that are considered the crown jewels of any software company. Source code is human-readable, written in a computer programming language that programmers can read, understand, and modify. The source code is translated as necessary into machine-readable object code form that can be distributed to and installed on computer systems to run the program. Human programmers cannot read, understand, or modify such object code.

With access to the source code, programmers can potentially:

- identify and remove any antipiracy protections coded into the program in question,

198. *See* Bill Gates, *An Open Letter to Hobbyists*, Homebrew Computing Club Newsletter, Vol. 2, Iss. 1 (Feb. 3, 1976) (imploring the industry to stop sharing, free of charge, any programs they acquired or developed, including one of Microsoft's earliest programs), *available at* https://archive.org/details/hcc0201/Homebrew.Computer.Club.Volume.02.Issue.01.Len.Shustek/page/n1/mode/2up?view=theater.

- identify security vulnerabilities in the program, and exploit them by:
    - hacking into the system and accessing confidential business data, personal information, etc.,
    - inserting viruses, etc.,
- develop extensions or other software programs that can interface with the original program, e.g., through application programming interfaces (APIs),
- learn from the programming techniques used, and
- identify useful portions of program's source code and incorporate them into other programs.

Source code is readily protectable as a trade secret (whereas object code is not when it is openly distributed). While a software program's source code is also protectable by copyright, source code cannot be reverse-engineered from the object code form of the program that is distributed to the public under the on-premises software model, so source code can and is readily kept secret. And neither source code nor object code is distributed or made available to customers under the SaaS software model in the ordinary course.[199]

If the source code is made publicly available, however, as in the case of open-source software, it cannot be protected by trade secret; for the most part such software would only be protectable under copyright law.

199. For discussion, *see infra* Sec. IV.C.3.

C. *GenAI-assisted software coding is becoming standard practice, but its protectability under current copyright law is entirely uncertain.*

Many aspects of the job of software coding are tailor-made for GenAI applications. GenAI tools can mimic or replicate more and more of the abilities of human programmers. They can "provide increased efficiencies in ideation, debugging, testing, and optimizing, among other things, which decreases coding time, expense, and investment, while freeing human developers to focus on uniquely human and creative aspects of the coding design and creation process."[200]

Furthermore, in the vision of the AI Age, everyday individuals may even become their own app developer, building personal tools tailored to their own workflows and needs using GenAI software programming tools.

Despite its growing importance and the amount of time and expertise that can be entailed in developing it, it is simply not clear if and when GenAI-assisted software coding is protectable under current copyright law.

1. Will clear standards be set for identifying the "human-authored aspects" of GenAI-assisted works of authorship and protecting them under copyright law?

One thing that can generally be presumed about the protectability of AI-software coding is that if a coding goal is presented as a single AI input and the AI-generated software code output

200. Cisco Systems, Inc., *Copyrights, Generative AI, and the Tools of Human Ingenuity* (June 2024) at 2, (unpublished manuscript, presented at The Sedona Conference on AI and the Law, Part 2: AI and IP Law) (on file with authors).

is implemented into the software product in its entirety, then it is not copyrightable.[201]

But some may argue that copyright law protects or should be amended to protect GenAI-assisted software coding as the expressions of human authors as the "mastermind," in at least some cases, with copyrightability arising from, e.g.,

1. "human-made arrangements and modifications of materials generated by AI systems,"
2. "submitting a prompt that is independently copyrightable as a text-based work to a GenAI system to produce an output that is an independently copyrightable derivative work," or
3. "modifications made by a GenAI system of a human author's pre-existing copyrighted work."[202]

Based on the USCO's strict stance that only "human-authored aspects" of a GenAI-assisted work of authorship are copyrightable, copyright protections are available only for the portions of any GenAI-assisted software code that are human generated.

In practice, however, will owners be able to de facto enforce such copyright protections over the entirety of their software programs, including those portions that are AI-generated in some cases? Or will the pendulum swing the other way such that owners practically have no ability to protect any GenAI-assisted software programs, including even any human-authored aspects?

Should a duty be imposed requiring the owner to specify the precise code that was AI generated and to separately identify

201. *See supra* Sec. III.A.2.a.

202. *Cisco Systems*, *supra* note 200, at 6.

the "human-authored" code when registering for copyright with the USCO? The USCO's present guidance, issued in March 2023, goes a step toward this direction, but it is not yet clear how close or far.[203]

Until new legislation or court decisions from the federal appellate courts addressing these questions are issued, they will all be heavily litigated in any forthcoming copyright infringement suits where GenAI-assisted software code is in dispute. And if the courts ultimately do not adopt the USCO's strict stance, then complicated sufficiency-of-human-contribution determinations may become necessary in every copyright case, as it already will be in every GenAI-assisted patent case.

There will be considerable uncertainty in the marketplace while all of this gets worked out. If a company has no software patent coverage (as can generally be presumed due in large part to the extreme uncertainty of the patentability of software inventions and enforcement of software patents under patent law)[204] and it is ultimately determined the company also has no copyright protections over its GenAI-assisted software programs, then what can the company do to protect them? If, for example, a former employer or partner misappropriates a company's software program source code and publishes it, the company may have limited to no legal recourse against any member of the public who then downloads and uses it for any purpose.

203. For discussion, *see supra* Sec. III.A.2.a.

204. For discussion, *see supra* Sec. II.C.2.b.

2. Even if copyrightable, will the functional reverse-engineerability of GenAI-assisted software coding render software copyrighting obsolete?

The main reason a reputable company would want to have access to another company's source code is to be able to develop compatible extensions or other programs with the target software program. But should the company instead wish to directly compete with the other company and its software program in the market, then the rise of GenAI greatly facilitates the development of competing software programs.

"Clean-room design" is a functional reverse-engineering method that has been widely recognized and used as a means to avoid copyright infringement. A team examines the copyrighted software code in question and architects it. Then another team uses only the architecture provided and creates new software code to implement it. The copying of the functions of any target software program is entirely fair game and not protectable by copyright. And the particular protectable expression of the original software code in effect has been "laundered out," so to speak.

Historically, the primary disincentive against using this method has been how labor-intensive software coding has been. That cost, however, has already been and will continue to be reduced dramatically due to the rise of GenAI and its application to generating software code. The primary remaining constraints will be:

- Can GenAI replace human software coders in practice and still maintain the required level of performance? and
- Can GenAI-assisted software also avoid incorporating code that can be easily breached?

3. Most AI software is provided under the software-as-a-service (SAAS) model, which further reduces the utility of copyright protections.

Another reason copyright protections are less significant in the AI Age is that most modern AI services and software are and will be provided via software-as-a-service (SaaS).

Cloud computing has allowed for the growth of the SaaS model, where the program is run on the service provider's systems and the customer accesses the output of the software service via a web application over the cloud. No software is transferred for the core program provided as SaaS, so no copyright license is required. The customer does not have access to any software code to the core program that he or she could pirate. Instead, the customer only subscribes to the SaaS typically on a monthly or annual basis.

The efficacy of registering for copyright protection is thus further reduced in the SaaS context. The software for the web applications used to access the output of the SaaS may still be transferred (typically today by download), but such web apps are far less likely to be of stand-alone commercial value.

In the SaaS model, the core AI software program is never transferred in any form—either in object code form or in source code form. As such, straight up piracy of the SaaS software by the customer is impossible under the SaaS model, unlike for the on-premises software model of the recent past.

4. The risk of GenAI incorporating copyleft protected software code, potentially rendering GenAI-assisted software uncopyrightable

Using generative AI to generate software code gives rise to a unique copyright risk that all companies should be aware of.

The software community has a unique and proud tradition of crowdsourcing for open-source software: publicly available source code that anyone can inspect, modify, and incorporate into his or her own code. Each open-source software has its own licensing terms, with some named open-source licensing terms like Apache, MIT, BSD, and Unilicense well-known in the market. Contrary to popular misunderstanding, open-source software is not by definition "free." Instead, it can and often is incorporated into closed (i.e., proprietary) software, for commercial sale.

But one particular category of open-source software, cheekily named "copyleft" software, is an exception. Copyleft licensing terms are described as "viral," because they require all derivative works incorporating copyleft code to also be released under a copyleft license. One of the most commonly used copyleft licenses is the GNU General Public License.

This gives rise to a possible scenario where generative AI incorporates excerpts of copyleft open-source software in its training, only to have the software that it generates theoretically rendered unprotectable because of it. The enforceability of such viral copyleft provisions has not been fully tested in court in any context, let alone the GenAI context. So, it is difficult to confidently conduct any assessment of this risk, other than to know it is more than zero.

Companies wanting to directly mitigate such risk should take steps to prevent their GenAI from accessing any source code repositories that are protected by copyleft protections.

D. The "rise" of trade secrets to protect software in the AI Age?

Theft of any software provided under the SaaS model, which is likely used by most commercially valuable AI services software, is most likely to fall under the umbrella of trade secret

misappropriation, where the thief had access to the software either as an employee or a partner of the service provider's company.

Should the legally required "reasonable measures" to protect the secrecy of the AI software source code be properly maintained, then a trade secret misappropriation claim will be the main avenue for protecting the AI owner's rights—and it is a potent protection at that. Software source code lends itself exceptionally well to being protected as a trade secret because it is not made available to customers or to the public in the ordinary course. Companies typically take extensive measures to protect the source code of their core software programs.

At least some GenAI software—including that of large language models (LLMs)—has additional advantages with respect to trade secret protectability, including the use of proprietary data sets to train their AI models and the hyperparameters that data scientists manually set before training an AI model. Neither can be readily reverse-engineered. If, e.g., the reports that OpenAI has only about five patent applications are correct,[205] then we can presume that OpenAI believes it can protect its LLM technology through trade secrets.

This has serious implications for any efforts to regulate or audit any GenAI for validity, reliability, or bias by the government or any third party. The quid pro quo for patent protection is the public disclosure of the technology, which facilitates both understanding and regulation. The ability to protect any

205. *See IBM leads Google and Microsoft as race to next generation AI heats up*, IFI CLAIMS PATENT SERVS. (Feb. 6, 2023), *available at* https://www.ificlaims.com/news/view/pr-generative-ai.htm.

technology—including one as powerful and far-reaching as GenAI—as a trade secret limits any efforts to regulate it.[206]

But while the AI software provider's source code can generally be kept safe and any theft of it is protectable in court, the same threat of functional reverse-engineering by GenAI that can be implemented by competitors to evade copyright protections[207] can also be used to get around at least some trade secret protections. Trade secret law only protects innovations that cannot be independently reverse-engineered.

If a competitor successfully reverse-engineers a software program's functions without directly misappropriating any information from the owner through espionage, etc., then the owner has no trade secret or copyright claims against them. The last form of IP that would provide any recourse in this case would be from patent law, but only if the owner invested in and successfully obtained one or more patents to protect the innovations in the first place.

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206. *See, e.g.,* An Act Concerning Consumer Protections in Interactions with Artificial Intelligence Systems, Colo. Senate Bill 24-205 (May 17, 2024), *available at* https://leg.colorado.gov/sites/default/files/2024a_205_signed.pdf. As drafted, this Colorado AI Act appears to exclude any required disclosure by developers (which includes LLM providers) of *any* trade secrets. *See* Sec. 6-1-1702 (Developer duty to avoid algorithmic discrimination – required documentation), subsection (6) ("Nothing in subsections (2) to (5) of this section requires a developer to disclose a trade secret . . . ."). But any algorithmic discrimination is presumptively a product of the data sources upon which the GenAI model was trained and/or the GenAI model itself, both of which are trade secrets. And any internal effort to mitigate against algorithmic discrimination also likely itself constitutes a trade secret.

207. *See supra* Sec. IV.C.2.

E. To support the growth and protection of the AI industry in the U.S., clear and consistent guidance on 35 U.S.C. § 101 patent subject-matter eligibility for software/AI inventions is needed.

Patent protections are the gold standard for the protection of intellectual property, at least for the twenty-year period while they are effective in the U.S. And they will continue to be the gold standard in our incipient AI Age, but only to the extent they are obtainable and enforceable in the first place. When the USPTO issues a patent, the owner gains the right to exclude others from using the patented technology, even when independently developed. Any company that has potentially patentable software/AI technology and the budget for the patent prosecution process should explore the possibility of seeking patent protection for its own benefit or for that of any investors or future acquirors.

Nonetheless, anecdotally, the GenAI-focused startup companies and investors of today view patent protections as far more as "nice to have but really unnecessary" than the "must have" of technology startups of the past. Many are not even exploring the possibility of starting or developing a patent portfolio, due to the high costs and uncertainties of filing for patents and in particular of enforcing them.

This may simply be a rational market response to how the patent system has struggled in recent years—in general and in particular in the software industry—to fulfill its objective of "promot[ing] the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive rights to their respective writings and discoveries" as required by the U.S. Constitution.[208]

208. U.S. CONST., art. I, § 8, cl. 8. For discussion of the challenges of securing software patents, *see supra* Sec. II.C.2.b.

For many software/AI inventions, patent applicants bear a heightened burden to establish their invention is eligible for patent protection under 35 U.S.C. § 101 that is not borne by applicants for inventions in most other technologies.

1. The manufactured paradoxes of the software invention and now the AI invention

It is contrary to most of the fundamental precepts of inventions and patent law that a given software program when run on a general purpose computer to carry out a particular function is presumptively (however rebuttably) *not* patent eligible, whereas a special purpose computer hardwired to carry out that exact same function *is* presumptively patent eligible.[209] The opposite and far more rational principle equating both for purposes of patent eligibility was in fact expressly adopted by the Federal Circuit in *In re Alappat*, a case involving a method claim on applying a mathematical formula to smooth out the waveform of an oscilloscope (e.g., a heart monitor display) to provide a clearer picture.[210] The Federal Circuit expressly noted that

209. Dressing up a software patent in the guise of an equivalent hardware patent to evade the "mental steps doctrine," i.e., the "abstract ideas/mental processes" judicial exception, is a strategy going back at least to Bell Labs in its patent on Error Detecting and Correcting System, U.S. Patent No. 2,552,629 (1951). *See* CON DIAZ, *supra* note 186, at 20–23. Was this yet another example of evading § 101 or other patent law principles through gamesmanship by the applicant's patent attorneys, as appears to have a point of emphasis of recent Supreme Court patent law decisions? *See* Alice Corp. Pty. Ltd. V. CLS Bank Int'l, 573 U.S. 208, 226 (2014) ("This Court has long "warn[ed] . . . against" interpreting § 101 "in ways that make patent eligibility 'depend simply on the draftsman's art.'"). Or was it a necessary strategy to protect one's inventions as required by a patent system that has struggled to remain on principled grounds on these patent subject-matter eligibility issues for software inventions?

210. *In re* Alappat, 33 F.3d 1526, 1540 (Fed. Cir. 2008).

"certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application."[211] The court, however, held the method claim at issue "is not a disembodied mathematical concept which may be characterized as an 'abstract idea,' but rather a specific machine to produce a useful, concrete, and tangible result."[212]

And yet this paradoxical inconsistency is the logical result of the creation and application of "exceptions"—in particular for "abstract ideas"—that the Supreme Court identified in *Alice* as the "basic tools of scientific and technological work" and thus excluded from patentability.[213] The USPTO developed its framework for 35 U.S.C. § 101 patent subject-matter eligibility analyses for method claims in 2014,[214] based on its interpretation of U.S. Supreme Court and Federal Circuit case law, namely *Alice*[215] and its application of the Court's earlier ruling in *Mayo Collaborative Services v. Prometheus Laboratories*.[216]

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211. *Id.* at 1543.

212. *Id.* at 1544. *In re Alappat,* however, was abrogated along with *State Street Bank v. Signature Financial Group* in *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008) (*aff'd in relevant part by* Bilski v. Kappos, 561 U.S. 593 (2010)). In *State Street Bank,* the Federal Circuit declined to create a "business method patent exception" to 35 U.S.C. § 101 patent subject-matter eligibility. State Street Bank and Trust Co. v. Signature Fin. Grp., 149 F.3d 1368, 1375 (Fed. Cir. 1998). In *Bilski,* the Federal Circuit declined to adopt the "useful, concrete, and tangible" result inquiry from the *Alappat* and *State Street Bank* line of cases in its holding that a business-method patent was not eligible for patent protection under 35 U.S.C. § 101. *Bilski*, 545 F.3d at 949.

213. *Alice*, 573 U.S. at 216 (quoting Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 589 (2013).

214. USPTO July 2024 Sect. 101 Updated Guidance, supra note 71.

215. *Alice*, 573 U.S. at 208.

216. Mayo Collaborative Servs. v. Prometheus Labs. Inc., 566 U.S. 66 (2012).

Applying the USPTO's *Alice/Mayo* framework, any software program analysis that "can be done in the human mind" is presumptively (though rebuttably) *not* patentable. The Supreme Court explained the policy justification of this in *Alice* as follows: "[The] monopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it."[217] This all led to the Supreme Court's seminal holding in *Alice*—"the mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention."[218]

Necessity, however, is the mother of invention. Most inventions are conceived to replace any and all human efforts. When the human effort that is replaced is physical human labor, then that innovation is presumptively patent eligible. But when the human effort in question is "mental processes," the presumption is flipped under this "abstract idea" exception created and developed by the U.S. federal courts going back to the Supreme Court's seminal opinion in the telegraph patent case *O'Reilly v. Morse* in 1854.[219]

The invention and development of computers—from early computers hardwired for only specific calculations to the first general purpose computers that can be programmed with individual software to carry out a variety of functions replicating human mental processes—has brought about our modern

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217. *Alice*, 573 U.S. at 216 (quoting *Mayo* at 71).

218. *Id.* at 223.

219. *Id.* at 216 ("We have long held that [35 U.S.C. § 101] contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable. We have interpreted § 101 and its predecessors in light of this exception for more than 150 years.") (citing Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 589 (2013) and Bilski v. Kappos, 561 U.S. 593, 601–02 (2010)).

Information Age. And yet, software inventions are particularly vulnerable to this "abstract ideas"/"mental processes" judicial exception. Software programs running on a general purpose computer routinely execute mathematical calculations, classification schemes, etc., that can otherwise be carried out in the human mind.

Artificial intelligence, including GenAI, is a continuation of this same inexorable march of technological process. GenAI is designed to replicate more advanced functions of the human mind, including creative processes and problem solving, and carry them out better and faster than any human ever could alone. In theory, GenAI relies less and less on any direction by its human programmers. Instead, it can take in new data and autonomously "figure out" how to modify its own model to make better predictions. This is a higher-level mental process at the problem solving level, but the law does not distinguish this from lower-level computational mental processes. All mental processes are equally presumptively ineligible for patent protections under the current articulation of the USPTO's *Alice/Mayo* Section 101 framework, if they can be "practically done in the human mind" and/or "with the aid of a pen and paper."[220]

2. Steering the patent law into the Information and the AI Ages

The rapid pace of technological development into the Information and now AI Ages has outpaced the U.S. patent law's ability to protect it. The metaphor of the extensive efforts required for and slow responsiveness when turning an ocean liner is an apt one here, as the development of the law on patent subject-matter eligibility under 35 U.S.C. § 101 reflects. This is

220. *USPTO July 2024 Sect. 101 Updated Guidance*, *supra* note 71, at 58136.

particularly the case here where conflicting policy goals are implicated between such software patents and other method patents in other technological areas such as medical diagnostics and business methods. Both the federal court case law and the USPTO guidance on Section 101 patent subject-matter eligibility of all method claims—including those for software inventions—have vacillated between expansion and contraction, including over the last decade-plus since *Alice*.

a. The increased bias against the 35 U.S.C. § 101 patent subject- matter eligibility for software inventions from the Supreme Court in Alice (2014)

The Supreme Court's 2014 opinion in *Alice* constraining business-method patents was pivotal in pushing the pendulum back toward contraction. The *Alice* court adopted the two-step framework from *Mayo* for determining whether claims are directed to a patent-ineligible concept,[221] which the USPTO subsequently adopted in its Guidance publications.[222]

The Supreme Court's framework inherently disfavors software/AI inventions from patent eligibility because:

1. In Step 1 [i.e., Step 2A – prong 1 from the USPTO's framework[223]], it presumes that all claims directed to an abstract idea are presumptively not patent eligible. The Court further stated: "In any event, we need not labor to delimit the precise contours of the 'abstract ideas' category in this case."[224]

221. *Alice*, 573 U.S. at 208.

222. For discussion, *see infra* Sec. IV.E.2.b.

223. *Id*.

224. *Alice*, 573 U.S. at 221.

Given the breadth of the terms "directed to" and "abstract idea," the impact of this lack of definition is to make many software/AI claims presumptively *not* patent eligible.

2. In Step 2 [i.e., Step 2A – prong 2 from the USPTO's framework[225]], the Court examined whether "'additional [claim] elements [other than the abstract idea] transform the nature of the claim into a patent-eligible application."[226]

   The Court hinted at, but did not make explicit, a possible rule that a claim directed to an abstract idea might be transformed into a patent-eligible application if it "improve[s] the functioning of [a] computer itself" or if it "effect[s] an improvement in any other technology or technical field."[227]

   In the absence of the Court making this an explicit rule, the express holding of *Alice* that "method claims, which merely require generic computer implementation, fail to transform [] abstract idea[s] into a patent-eligible invention" casts a long shadow against any such transformation for software inventions.

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225. For discussion, *see infra* Sec. IV.E.2.b.

226. *Alice*, 573 U.S. at 217.

227. *Id.* at 225–26 ("Viewed as a whole, petitioner's method claims simply recite the concept of intermediated settlement as performed by a generic computer. The method claims do not, for example, purport to improve the functioning of the computer itself. Nor do they effect an improvement in any other technology or technical field. Instead, the claims at issue amount to 'nothing significantly more' than an instruction to apply the abstract idea of intermediated settlement using some unspecified, generic computer.").

b. The increased bias against the 35 U.S.C. § 101 patent subject-matter eligibility for software inventions from USPTO policy and procedure

In the immediate years after *Alice*, the USPTO issued a series of guidance and memoranda focused on individual Federal Circuit decisions applying the Supreme Court's *Alice/Mayo* test.[228] This approach proved "impractical" over time, as the "growing body of [Federal Circuit] precedent ha[d] become increasingly difficult for examiners to apply in a predictable manner, and concerns ha[d] been raised that different examiners within and between technology centers may reach inconsistent results."[229] This led to the USPTO issuing its *2019 Revised Patent Subject Matter Eligibility Guidance*, in which the USPTO "extract[ed] and synthesiz[ed] key concepts identified by the courts as abstract ideas."[230]

As noted above, in the 2023 Executive Order on AI, the Biden Administration ordered the USPTO to consider issuing updated guidance to USPTO patent examiners and applicants on patent eligibility to address innovation in AI and critical and emerging

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228. U.S. Patent and Trademark Office, 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50, 51 (Jan. 2019) [hereinafter *USPTO Jan. 2019 Revised Sect. 101 Guidance*], *available at* https://www.federalregister.gov/documents/2019/01/07/2018-28282/2019-revised-patent-subject-matter-eligibility-guidance#citation-5-p51.

229. *Id.* at 52.

230. *Id.* In this *Jan. 2019 Revised Sect. 101 Guidance*, the USPTO modified its original *Alice/Mayo* two-step framework to account for subsequent Supreme Court and Federal Circuit opinions holding that some patent claims were *not* "directed at" judicial exceptions even though they involved judicial exceptions. This gave rise to the convoluted "Step 2A – prong 1," "Step 2A – prong 2," and "Step 2B" nomenclature in the USPTO's Section 101 Guidance publications since then and referenced throughout this article.

technologies.[231] The USPTO has now complied, issuing in July 2024 its *Guidance Update on Patent Subject Matter Eligibility, Including on Artificial Intelligence*.[232]

In Section III of this July 2024 Guidance, the USPTO "provides an update on certain areas of the USPTO's subject-matter eligibility guidance that are particularly relevant to AI inventions, including: (1) whether a claim recites an abstract idea [Step 2A – prong 1]; and (2) whether a claim integrates a recited judicial exception into a practical application because the claimed invention improves the functioning of a computer or another technology or technical field [Step 2A – prong 2]."[233]

i. Does the claim "recite" an "abstract idea" (Step 2A – prong 1)?

Most software/AI claims "recite" an "abstract idea." As such, they are presumptively ineligible for patent protection under the framework provided by the USPTO for subject-matter eligibility determinations.

According to the USPTO's July 2024 updated guidance, patent examiners "must draw a distinction between a claim that 'recites' an abstract idea (and thus requires further eligibility analysis) and one that merely involves, or is based on, an abstract idea."[234] The USPTO's guidance for Step 2A – prong 1 consists primarily of providing three new illustrative hypothetical examples focused on AI[235] and additional examples from Federal Circuit cases "that do and do not recite an abstract idea,"

231. *See supra* Sec. II.C.2.b.

232. *USPTO July 2024 Sect. 101 Updated Guidance*, *supra* note 71.

233. *Id.* at 58131.

234. *Id.* at 58134.

235. *See USPTO July 2024 Sect. 101 Examples 47-49*, *supra* note 71.

organized by the USPTO's three groupings of abstract ideas (as originally presented in the USPTO's October 2019 Guidance[236]):

1. mathematical concepts,
2. certain methods of organizing human activity, and
3. mental processes.[237]

For the last "mental processes" grouping, the USPTO further organized its discussion of Federal Circuit cases into the following subtopics:

i. "A claim with limitation(s) that cannot practically be performed in the human mind does not recite a mental process."

ii. "A claim that requires a computer may still recite a mental process."

iii. "A claim that encompasses a human performing the step(s) mentally with the aid of a pen and paper recites a mental process."[238]

The primary if not exclusive avenue for software claims to pass Step 2A – prong 1 is if the claimed functions "cannot practically be performed in the human mind" and thus do not "recite" an "abstract idea"/"mental process." One example of this is presented in the USPTO's Section 101 Example 39 ("Method for Training a Neural Network for Facial Detection"), which expressly presents the training of a neural network—a framework of machine learning algorithms that work together to classify inputs based on a previous training process—as patent eligible.[239] The USPTO reasons that the hypothetical claim does not

236. *USPTO Oct. 2019 Sect. 101 Updated Guidance*, *supra* note 73.

237. *USPTO July 2024 Sect. 101 Updated Guidance*, *supra* note 71, at 58134.

238. *Id*.

239. *See USPTO Subject matter eligibility*, *supra* note 71, at 8–9.

recite any of the judicial exceptions under Step 2A – prong 1.[240] This is because the preprocessing claim element of "applying one or more transformations" including "mirroring, rotating, smoothing, or contrast reduction" to digital facial images "cannot be practically performed in the human mind."[241]

But for the many software/AI inventions whose claimed functions carry out a "mental process" that otherwise *can* be "performed by a human mind," the USPTO effectively presumes they are ineligible under Step 2A – prong 1. This may be rebuttable if the conditions under Step 2A – prong 2 or Step 2B are met as discussed in the next subsection. But it is still a de facto presumption of ineligibility for all such software claims.

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240. *Id*.

241. *Id.* One study has found that USPTO examiners have reportedly been disproportionately rejecting on Section 101 grounds claims directed to training AI models with a structure similar to the cited example. *See IPO AI Patenting Handbook*, *supra* note 69, at 36 (citing a study of 200 recent AI-based patent applications that were rejected under 35 U.S.C. § 101 for office actions issued between Jan. 1 to Sept. 30, 2023, of which 30 applications that include claims directed to training AI models were rejected).

How much of this high rejection rate for those software/AI patent applications is inherent to the differences in technologies? How much may be attributable to more software/AI patent applications whose claimed software functions *can* be "practically performed in the human mind" and thus *do* "recite" an "abstract idea"/"mental process," unlike the claim in Example 39? And how much is due to less principled reasons, such as inaccurate or unclear standards or guidance from the courts or the USPTO, or the failure of patent examiners to comply with its own standards and even illustrative examples?

ii. Is the claimed "abstract idea" integrated into a "practical application" of the judicial exception (Step 2A – prong 2)?

According to the USPTO's July 2024 updated guidance, if the patent examiner determines a claim recites a judicial exception in Step 2A – prong 1, the examiner then evaluates "whether the claim as a whole integrates the recited judicial exception into a practical application of the exception, and thus is not 'directed to' the judicial exception in [Step 2A – prong 2]."[242] Patent examiners evaluate this by:

1. "identifying whether there are any additional elements recited in the claim beyond the judicial exception(s)," and
2. "evaluating those additional elements individually and in combination to determine whether they integrate the exception into a practical application of that exception."[243]

The USPTO's updated guidance specifically notes that "[m]any claims to AI inventions are eligible as improvements to the functioning of a computer or improvements to another technology or technical field."[244] This has also been referred to as "the search for a technological solution to a technological problem."[245] The USPTO further notes that "[w]hile the courts have not provided an explicit test for how to evaluate the

242. *USPTO July 2024 Sect. 101 Updated Guidance*, *supra* note 71, at 58136.

243. *Id*.

244. *Id.* at 58136–37.

245. *Id*.

improvements consideration, they have instead illustrated how it is evaluated in numerous decisions.[246]

The USPTO guidance continues:

> A key point of distinction to be made for AI inventions is between a claim that reflects an improvement to a computer or other technology described in the specification (which is eligible) and a claim in which the additional elements amount to no more than (1) a recitation of the words "apply it" (or an equivalent) or are no more than instructions to implement a judicial exception on a computer, or (2) a general linking of the use of a judicial exception to a particular technological environment or field of use (which is ineligible).[247]

and

> An important consideration in determining whether a claim improves technology is the extent to which the claim covers a particular solution to a problem or a particular way to achieve a desired outcome, as opposed to merely claiming the idea of a solution or outcome.[248]

In conjunction with its *July 2024 Updated 101 Guidance*, the USPTO has published three new illustrative hypothetical examples (Examples 47-49), each of which includes a discussion of the "improvements to functioning of a computer or other technology" consideration.[249]

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246. *Id*. The USPTO Guidance directs examiners to MPEP sections 2106.04(d)(1) and 2106.05(a) for these decisions and a detailed explanation of how USPTO personnel should evaluate this consideration. *Id.*

247. *Id.* at 58137.

248. *Id*.

249. *USPTO July 2024 Sect. 101 Examples 47-49*, *supra* note 71.

Any increase in emphasis on this consideration by the courts and the USPTO should push the pendulum more toward the expansion of Section 101 patent subject-matter eligibility for software/AI inventions. But it is still built on the USPTO's *Alice/Mayo* framework, in which many software inventions are presumptively not patent eligible.

c. Should the USPTO continue to play a quasi-judicial role for Section 101 determinations for software and now AI inventions?

The USPTO has been at least in part laudably attempting to proactively address a significant gap in existing law and procedure with its regular guidance updates regarding 35 U.S.C. § 101 patent subject-matter eligibility, including its most recent July 2024 updated guidance on Section 101 and AI inventions. But the following should still be treated as open questions:

- Has the USPTO been exceeding its authority through issuing its Section 101 guidance updates?[250] Has the USPTO crossed the line from issuing "interpretations" of Supreme Court and Federal Circuit law to issuing "substantive rules," when, e.g.:
    - issuing its 2014 and January 2019 Guidance publications establishing its two-step *Alice/Mayo* framework (which in effect put a thumb on the scales against software and other method patents)?
    - issuing its October 2019 and July 2024 Guidance publications (which arguably

250. For analogous discussion in the sufficiency-of-human-contribution determination for AI-assisted inventions context, *see supra* Sec. II.B.1.

have pushed the pendulum in the direction of expanding software patent eligibility)?

These questions would be mooted if the federal courts or Congress would establish more explicit and comprehensive guidance addressing these Section 101 issues of law and procedure.

3. The broader implications of Section 101 patent subject-matter eligibility issues on the development of the AI industry in the U.S.

The ongoing uncertainty surrounding patent subject-matter eligibility for software/AI inventions has important implications for the U.S. economy. Historically, the patent system has provided an important avenue for smaller companies to compete with larger ones.

With the issuance of the USPTO's July 2024 updated guidance, will potential software/AI patent applicants have more confidence in their prospects for securing and being able to enforce patents on their inventions? As noted above, the USPTO's rejection rate on Section 101 grounds for AI patent applications has been historically on the order of 2-3 times higher than the average for all technologies, coming in at 77 percent for AI inventions in the first half of 2024.[251] This unequivocally discourages companies from investing in filing for patent applications in the AI space.

It is hard to say what percentage would be consistent with what one should reasonably expect in a properly functioning patent system in the AI space, but common sense dictates that it should be far closer to zero than to the recent Section 101 rejection rate of 77 percent. Even the average 24 percent Section 101

251. *See supra* Sec. II.C.2.b.

rejection rate across all technologies may be higher than it should be. Given the time, energy, and costs required to file a basic patent application, it is safe to say that the vast majority of potential patent applicants will not file if they believe there is over a 3-in-4 chance that their application would be rejected as entirely ineligible. In a healthy patent system, every applicant should have a high degree of confidence of whether their invention is patent eligible—i.e., whether the USPTO, after conducting a prior art search finds the patent application novel and non-obvious, would issue the patent. If it were truly an objective analysis based on publicly known and understood standards available to all for software/AI inventions, then there would be far more certainty than the current Section 101 rejection rate reflects.

Such a high rate of patent eligibility rejections at the patent application stage is further compounded by the fact that even if the applicant clears the eligibility bar and the novelty and other bars and secures an issued patent from the USPTO in the first place, all of these issues are reviewed again by the federal courts when the patent owner files any enforcement action, and subsequently at each level of judicial review.

Those who support a healthy and effective patent system should hope that the invalidation rate of patents on Section 101 grounds will decrease with the issuance of the USPTO's July 2024 updated guidance, as it did in the immediate years following the USPTO's 2019 Guidance.[252]

252. *See* Mazour, *supra* note 85 (noting that the issuance of the 2019 Revised Patent Subject Matter Eligibility Guidance led to a decrease in Section 101 rejections from 25 percent in 2018 to 15 percent in 2020; but also noting that Section 101 rejections have returned to pre-2019 Revised Patent Subject Matter Eligibility Guidance levels in the first half of 2024).

The higher the rate of Section 101 rejections for software/AI inventions—in particular at the patent application stage—the more this disproportionately favors the major large language model (LLM) providers like OpenAI and Google. They have the luxury of both:

- being generally able to rely on trade secrets to protect their intellectual property in the software/AI space[253] and
- having the resources to engage in speculative investments such as patenting in the AI space, as necessary.

A distribution of GenAI patents heavily skewed to a handful of major players further compounds anticompetitive concerns in the AI space, where these same players also have the unparalleled sets of proprietary data and access to computing power prerequisite to compete in the LLM and AI space.

4. We need an improved legal regime for making 35 U.S.C. § 101 patent subject-matter eligibility determinations for software inventions.

The federal courts and the USPTO should continue to work to ensure that patent subject-matter analyses are appropriately tailored for software/AI claimed inventions under 35 U.S.C. § 101, as necessary to support the development of a competitive AI industry—both within the U.S. and globally.

For a more principled, predictable, and effective patent system, including for Section 101 patent subject-matter eligibility determinations for software/AI inventions, the following should be treated as open questions:

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253. For discussion, *see supra* Sec. IV.D.

1. Should the federal courts and the USPTO continue to place an unfair presumption against the patent eligibility of many software/AI inventions?
    - As discussed above, the USPTO's *Alice*/*Mayo* two-step framework established in 2019 unfairly places a presumption against patent eligibility for software/AI inventions.
    - Would a more equitable framework entail:
        - a presumption that a software method claim *is* integrated into a practical application? And
        - the placement of the burden on the patent examiner to disprove such a presumption, as it is for almost all other technologies?
2. If, however, the two-step *Alice*/*Mayo* framework is maintained, should the federal courts and the USPTO reassess:
    a. the scope of the "abstract ideas" judicial exception [Step 2A – prong 1] and the procedures for determining when it applies?
        - Should the outer boundary of the "abstract ideas exception be restored to include only mathematical formulas, e.g., $E=mc^2$, as originally applied by the courts?
        - If not, should the boundary not be extended to cover all "mental processes" "that can practically done in the human mind" / "with a pen and paper?" Can there be a principled middle ground that both protects the "basic tools of scientific and technological work," but also

allows novel and nonobvious software inventions to be patent eligible?

b. the standards for the "integration into a practical application" exception to the judicial exception [Step 2A – prong 2] and the procedures for applying them?

- Can a clearer definition of what constitutes a "practical application" be developed?
    - And one that does not improperly import novelty concepts from other parts of the patent statute (namely 35 U.S.C. §§ 102 and 103) that should be entirely separate from any gating patent eligibility determination under 35 U.S.C. § 101?
    - When does an application cross the line from ineligible to eligible because it is sufficiently "practical?"
- For software inventions, the "improvements to functioning of a computer" consideration is of obvious importance.
    - The USPTO explicitly notes that "the courts have not provided an explicit test for how to evaluate the improvements consideration" and instead rely on the application of individual federal cases for their guidance.[254]

254. *Id*. The USPTO Guidance directs examiners to MPEP sections 2106.04(d)(1) and 2106.05(a) for these decisions and a detailed explanation of how USPTO personnel should evaluate this consideration. *Id.*

- Can the courts establish an objective legal test for this "improvements to functioning of a computer" consideration? Without this, will software/AI patent applicants continue to be subject to the de facto substantive rulemaking of the USPTO, individual USPTO technology centers, and even individual USPTO patent examiners?

The Supreme Court has denied dozens of petitions for certiorari on Section 101 issues seeking clarification on *Alice*'s "abstract-idea exception and the proper application" of the *Alice*/*Mayo* framework.[255] As such, the ongoing judicial and USPTO bias against the patent eligibility of many software inventions has and will continue to extend to many AI inventions as well.

Should it be determined that the required certainty and fairness is impossible under the current legal and regulatory (USPTO) regimes, then perhaps Congress should intervene.[256]

In the meantime, all stakeholders in the patent system should work together where possible to develop consensus, nonpartisan principles and best practice recommendations to help Congress, the federal courts, and the USPTO address these

255. Congressional Research Service, Patent-Eligible Subject Matter Reform: An Overview (Jan. 3, 2024), *available at* https://crsreports.congress.gov/product/pdf/IF/IF12563.

256. For example, in June 2023, Sen. Thomas Tillis introduced the Patent Eligibility Restoration Act of 2023, which if passed would eliminate all "judicial[ly created] exceptions" and replace them with a legislatively codified and more clearly and narrowly defined list of inventions that would not be eligible for patent protections. *See* https://www.congress.gov/bill/118th-congress/senate-bill/2140/text.

Section 101 patent subject-matter eligibility issues for software/AI inventions to move the law forward in a reasoned and just way and fulfill the patent system's objective of "promot[ing] the progress of science and useful arts" as required by the U.S. Constitution.[257]

SUMMARY OF KEY QUESTIONS

Should New Laws, Court Decisions, Or Regulations:

(1) Amend copyright law to more clearly protect GenAI-assisted software coding?

(2) Protect any GenAI-assisted software code from the loss of any copyright protections due to any incorporation of copyleft protected open-source software?

(3) Clarify and/or reassess the 35 U.S.C. § 101 patent eligibility requirements for software/AI inventions, including by:

(a) examining whether the courts and USPTO's Alice/Mayo two-step framework should be replaced as inherently biased against software inventions?

(b) if the Alice/Mayo two-step framework is maintained, . . .

(i) . . . redefining the scope of the "abstract ideas" judicial exception [Step 2A – prong 1] and the procedures for determining when it applies?

257. For discussion, *see infra* Sec. IX.

(ii) . . . redefining the standards for the "integration into a practical application" exception to the judicial exception [Step 2A – prong 2] and the procedures for applying them?

- ***Including with respect to the "improvements to functioning of a computer" consideration? Can the courts establish an objective legal test for this consideration to prevent de facto substantive rulemaking by the USPTO on this issue so central to the patent eligibility of software inventions?***

V. ISSUE NO. 3: HOW IS PATENT LAW IMPACTED BY THE USE OF GENAI TO EXPAND HUMAN CAPABILITIES AND ALSO GENERATE VOLUMINOUS "ART"?

In April 2024, the USPTO issued a Request for Comment concerning "the impact of the proliferation of Artificial Intelligence on prior art, the knowledge of a person having ordinary skill in the art, and determinations of patentability made in view of the foregoing."[258]

Absent careful adherence to the principles and case law that have defined the concept of the person having ordinary skill and the determination of what qualifies as prior art, resolution of these issues will inevitably operate to weaken the strength of patents overall—the only question is to what degree.[259]

A. The impact of GenAI on the foundational patent law concept of the person having ordinary skill in the art (PHOSITA)

Section 103 of the Patent Act defines the nonobviousness requirement to patentability as follows:

> A patent for a claimed invention may not be obtained . . . if the differences between the claimed

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258. *See* U.S. Patent and Trademark Office, Request for Comments Regarding the Impact of the Proliferation of Artificial Intelligence on Prior Art, the Knowledge of a Person Having Ordinary Skill in the Art, and Determinations of Patentability Made in View of the Foregoing, 89 Fed. Reg. 34217 (Apr. 30, 2024), *available at* https://www.federalregister.gov/documents/2024/04/30/2024-08969/request-for-comments-regarding-the-impact-of-the-proliferation-of-artificial-intelligence-on-prior.

259. In the view of one commentator, the sky is the limit. *See* Tim W. Dornis, *Artificial Intelligence & Innovation: The End of Patent Law as We Know it*, 23 YALE J.L. & TECH. 97 (Fall 2020) ("With the advent of artificial intelligence (AI), the end of patent law is near."), *available at* https://yjolt.org/sites/default/files/23_yale_j.l._tech._97_ai_patent_0.pdf.

> 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* to which the claimed invention pertains.[260]

"The person of ordinary skill [for purposes of determining obviousness] is a hypothetical person who is presumed to be aware of *all* the pertinent prior art."[261] This legal fiction has become at least theoretically closer with the "AI-fueled transformation of the once genuinely human PHOSITA into a cognitively augmented human-machine."[262] With GenAI, the PHOSITA can now directly access all of the information on the internet, with formidable obstacles of the past such as language barriers torn down by automatic and precise LLM translators. And the GenAI models can be trained to help (or self-?) identify, collect, organize, and analyze the most relevant prior art exponentially faster and better than any human ever could alone.

Remarkably, GenAI potentially may have an even greater impact on PHOSITA with respect to the elusive "motivation to combine" requirement for an invalidity-for-obviousness analysis under 35 U.S.C. § 103. It has been a longstanding requirement for an obviousness determination not only that two or more pieces of prior art must collectively read on every element of a patent claim, but that there must be some motivation to combine the prior art references and to expect the combination

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260. 35 U.S.C. § 103 (emphasis added).

261. Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc., 807 F.2d 955, 962 (Fed. Cir. 1986) (emphasis added).

262. Dornis, *supra* note 259, at 104.

will work as intended.[263] The evidentiary requirements for establishing the requisite motivation to combine have changed over time.

An important limitation preventing the use of Section 103 obviousness to invalidate all types of patents is the standard that only "analogous" prior art can be used. "A reference qualifies as prior art for an obviousness determination under § 103 only when it is analogous to the claimed invention."[264] "A person of ordinary skill in the art is also a person of ordinary creativity, not an automaton."[265] A prior art reference can prompt the PHOSITA whether it is from its "same field [of endeavor] or a different one."[266]

The USPTO has interpreted the federal court case law as requiring a flexible approach to both a motivation-to-combine determination and a determination of the scope of prior art and

263. *See* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 421 (2007) ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.").

264. *In re* Klein, 647 F.3d 1343, 1348 (Fed. Cir. 2011).

265. *KSR*, 550 U.S. at 421.

266. *Id*. at 417; *see also In re* Bigio, 381 F.3d 1320, 1325 (Fed. Cir. 2004) ("Two separate tests define the scope of analogous art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.")

whether it is analogous[267] but as still requiring "articulated reasoning and evidentiary support."[268]

GenAI is exceptional at accessing and making connections between knowledge across different fields of science and technology. By definition, the pre-GenAI PHOSITA was limited to having knowledge and the ability to make connections within its field of knowledge and those analogous to them. A PHOSITA powered by GenAI, however, can break free of both limitations to at least some degree. It remains to be seen to what that degree will be in the eyes of the courts. As one commentator eloquently describes:

> The future AI-supported inventor may be trapped in a nightmare that Judge Learned Hand described long ago: "[A]s the law stands, the inventor must accept the position of a mythically omniscient worker in his chosen field. As the arts proliferate with prodigious fecundity, his lot is an increasingly hard one."[269]

But returning to the principles that have been used to define the PHOSITA may help rein in reliance on GenAI in rejecting patent applications or invalidating issued ones. As Judge Giles Rich explained:

> [A] person of ordinary skill in the art is . . . presumed to be one who thinks along the line of conventional

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267. *See* U.S. Patent and Trademark Office, Updated Guidance for Making a Proper Determination of Obviousness, 89 Fed. Reg. 14449, 14450–52 (Feb. 27, 2024), *available at* https://www.federalregister.gov/documents/2024/02/27/2024-03967/updated-guidance-for-making-a-proper-determination-of-obviousness.

268. *Id.* at 14452.

269. Dornis, *supra* note 259, at 128 (citing *Merit Mfg. v. Hero Mfg.*, 185 F.2d 350, 352 (2d Cir. 1950)).

> wisdom in the art and is not one who undertakes to innovate, whether by patient, and often expensive, systematic research or by extraordinary insights, it makes no difference which."[270]

Applying this reasoning, a PHOSITA lacks innovative ingenuity, generally does not make connections between different fields, and does not draw innovative conclusions from any such "systematic research" GenAI might produce.

B. The use of GenAI as a permutation generator of "art"

The business model of creating computer-generated claims and publications through natural language processing algorithms for prior art and other patenting purposes has existed for at least a decade. Around 2014, a French company called Cloem reportedly started offering a service "us[ing] brute-force computing to mechanically compose text for thousands of patent claims covering potentially novel inventions and also to generate defensive publications to prevent others from obtaining patent protection in the same field."[271]

The libertarian organization All Prior Art uses GenAI to generate prior art "to democratize ideas, provide an impetus for change in the patent system, and to preempt patent trolls."[272]

Should such "art" as automatically generated by GenAI qualify as a prior art "printed publication" under 35 U.S.C. § 102(b)? This has not been tested in court and will likely depend on:

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270. Standard Oil Co. v. Am. Cyanamid Co., 774 F.2d 448, 454 (Fed. Cir. 1985).

271. Ben Hattenbach & Joshua Glucoft, *Patents in an Era of Infinite Monkeys and Artificial Intelligence*, 19 STAN. TECH. L. REV. 32 (2015), at 35.

272. ALL PRIOR ART, http://allpriorart. com/about (last visited July 27, 2024).

1. Whether the courts find the GenAI-produced "art" was "made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence[] can locate it" such that it was "publicly accessible?"[273]
2. Whether the courts find the GenAI-produced "art" fulfills the enablement requirement under 35 U.S.C. § 112?[274] Such an analysis would likely entail making new law establishing whether such Gen-AI produced "art" should benefit from the presumption that all prior art is enabled for purposes of an invalidity-for-anticipation analysis under 35 U.S.C. § 102.[275]
3. Whether the courts find that GenAI-produced "art" that has never been used or tried should not constitute prior art, because that would be contrary to the fundamental concept that prior art is the accumulation of real-world knowledge?
4. Whether the courts find the GenAI-produced "art" is analogous to patented technology in question, as

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273. Suffolk Techs., LLC v. AOL Inc., 752 F.3d 1358, 1364 (Fed. Cir. 2014). For discussion of the publicly-accessible determination, *see* Hattenbach, *supra* note 271, at 37–38.

274. For discussion of the enablement determination for prior art printed publications, *see* Hattenbach, *supra* note 271, at 38–39.

275. *See In re* Antor Media Corp., 689 F.3d 1282, 1289 (Fed. Cir. 2012) (holding that during patent prosecution, "an examiner is entitled to reject claims as anticipated by a prior art publication or patent without conducting an inquiry into whether or not that prior art reference is enabling," and "[a]s long as an examiner makes a proper prima facie case of anticipation by giving adequate notice under § 132, the burden shifts to the applicant to submit rebuttal evidence of nonenablement"). For discussion of the enablement determination for prior art printed publications, *see* Hattenbach, *supra* note 271, at 38–39.

> required for any invalidity-for-obviousness analysis under 35 U.S.C. § 103?[276]

Even if AI-generated "art" is categorically excluded from serving as printed publication prior art under 35 U.S.C. § 102(b), if it reads on every element of a given patent claim, some may argue that this itself serves as evidence of obviousness under 35 U.S.C. § 103.

There is an additional wrinkle that illustrates the unique problems that only arise with the sheer scale of volume that an arms race of automatic permutation generation might bring about. It is common for a patent application to have a broad "genus" claim that encompasses many "species" (i.e., embodiments) within it. In *Amgen v. Sanofi*, the Supreme Court concluded that the patentee's patent specification did not provide an enabling disclosure for the full scope of the claimed genus.[277] And "a prior art disclosure merely needs to describe *one* of the potentially millions of embodiments that falls within a genus claimed in a patent application to support a lack of novelty rejection."[278]

GenAI is a tailor-made tool for generating permutations of embodiments to cover the entire range of a genus claim. But the more permutations that a patent applicant has generated and discloses in its specification to mitigate an enablement rejection under *Amgen*, the more likely it is to have each and every claim

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276. For discussion of the analogous art/obviousness determination, *see supra* Sec. V.A; *see also* Hattenbach, *supra* note 271, at 39–43.

277. Amgen Inc. v. Sanofi, 598 U.S. 594, 613 (2023).

278. Lucas R. Yordy, *The Library of Babel for Prior Art: Using Artificial Intelligence to Mass Produce Prior Art in Patent Law*, 74 VAND. L. REV. 521 (2021), at 547 (emphasis added) (citing MPEP § 2131.02(I) (9th ed. Rev. 08.2017, Jan. 2017) (citing *In re Gosteli*, 872 F.2d 1008 (Fed. Cir. 1989)), *available at* https://scholarship.law.vanderbilt.edu/vlr/vol74/iss2/1.

read on by a random output of a GenAI permutation generator employed by a third party to create defensive prior art to invalidate this or an analogous technology's patent claims.

SUMMARY OF KEY QUESTIONS

Should new laws, court decisions, or regulations calibrate the degree to which innovations are patentable in the AI Age by:

- ***(1) Setting the degree to which the knowledge and skill of PHOSITA should expand due to its adoption of GenAI?***
- ***(2) Determining if and when GenAI-generated "art" should constitute a prior art printed publication, including with respect to:***
  - ***(a) the "publicly accessible" requirement?***
  - ***(b) the enablement requirement under 35 U.S.C. § 112?***
  - ***(c) any requirement that any "art" must have been actually used or tried to constitute prior art?***
  - ***(d) the "analogous prior art" requirement?***

VI. ISSUE NO. 4: SHOULD THE USE OF PUBLIC GENAI IN A COMPANY'S PRODUCT DEVELOPMENT LIFECYCLE PRESUMPTIVELY CONSTITUTE PUBLIC DISCLOSURE INVALIDATING PATENT OR DESTROYING TRADE SECRET RIGHTS?

A. The prohibition against public disclosures of inventions before filing a patent application or of trade secrets in general

The general rule under patent law is that a patent applicant cannot publicly disclose its invention before filing the patent application.[279] [280] The same logic applies for trade secrets but on a more permanent basis: the owner must take "reasonable measures" to protect the secrecy of the information in question on an ongoing basis in order to claim it as a trade secret.[281]

These prohibitions against public disclosure take on new and unique significance in our incipient AI Age, as generative AI is increasingly used as part of the product development lifecycle by companies and individuals. Many have observed that the use of a "public" GenAI such as a nonenterprise version of OpenAI's ChatGPT where all inputs and outputs are owned and used for model-training purposes by the LLM provider may presumptively be viewed as in violation. The

279. 35 U.S.C. § 102(a) ("A person shall be entitled to a patent unless (1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention . . . .").

280. In the U.S. (and a minority of other countries), however, a one-year grace period is statutorily mandated to give the applicant the opportunity to complete and/or assess the marketplace for their invention before having to file for a patent application. *See* 35 U.S.C. § 102(b).

281. *See* Defend Trade Secrets Act of 2016 (DTSA), 18 U.S.C. §§ 1831–39 (requiring trade secrets to be the subject of "reasonable measures" to maintain secrecy to be protectable).

commonsense way to mitigate this risk is to exclusively use enterprise versions of generative AI and ensure the contract precludes the LLM provider from saving or using any inputs/outputs to further train its GenAI models. That, however, is easier said than done in practice.

The implications of extending invalidating public disclosures to include GenAI inputs/outputs

According to a Salesforce November 2023 survey:

- 55 percent of all employees have used unapproved generative AI tools at work, and
- 40 percent of all workplace generative AI users have used banned tools at work.[282]

The temptation for software programmers to use GenAI to assist in their product development efforts is directly analogous to that for students to use GenAI to write their research papers. GenAI promises to help us to do many things better and far more efficiently. Particularly in the post-COVID workplace where working outside of the office on personal devices is now common practice, the temptation is compounded because the likelihood of getting caught by the employer is minimal when employees use their own personal computers or devices.

It is only when litigation ensues—in some cases well over a decade after the invention is fully conceived and the application is filed with and the patent is ultimately issued by the USPTO—that at least some instances of employees improperly using GenAI during the inventive process will be discovered. Any records of GenAI inputs/outputs that are part of the inventive process would be discoverable through the litigation process, as

282. *More than Half of Generative AI Adopters Use Unapproved Tools at Work*, SALESFORCE (Nov. 15, 2023), https://www.salesforce.com/news/stories/ai-at-work-research/.

would the private computer that the engineer used to make or access them.

Does it make sense as a matter of public policy to disqualify companies from securing or enforcing patents under these or other similar circumstances, in particular only years after the fact when litigation arises? Or to destroy companies' trade secret rights for the same reason?

For established companies, putting a new employment policy in place is one thing. Getting all employees to comply is another thing entirely. But at least major companies have more resources to take the requisite "reasonable measures" and set policies, run employee training programs, and monitor and enforce these policies.

Less-established companies, in particular startup companies, simply do not have such excess resources. And their core intellectual property is more likely to be their key to building their "competitive moat." Such uncertainty regarding the validity or enforceability of fundamental IP rights such as these, let alone for a reason as ancillary as this one, significantly lowers their potential value and the likelihood that any company will invest in them.

Furthermore, should companies and individuals be incentivized to set policies to destroy all records of GenAI inputs and outputs to mitigate the risk of them subsequently being used to invalidate patents and trade secrets years after the fact? In particular when the destruction of all such records greatly impairs if not precludes the possibility of accurately assessing human-inventorship issues that are arguably far more substantively important?

KEY QUESTION:

Should new laws, court decisions, or regulations exclude GenAI inputs/outputs from constituting public disclosures invalidating any patent or trade secret rights?

VII. ISSUE NO. 5: SHOULD INDIVIDUALS HAVE RIGHTS AGAINST THE USE OF GENAI TO CREATE DEEPFAKES APPROPRIATING THEIR IDENTITIES?

A. There is no comprehensive set of federal laws against deepfakes.

There is simply no argument for any right to:

- create deepfakes (i.e., an AI-generated video, audio, etc., capable of portraying someone doing something they did not do),
- distribute and pass them off as real, and
- disclaim liability for any harm suffered.

Certainly not without the victim's consent. And even more certainly when it involves digitally removing an individual's clothes and portraying the individual as committing sexual acts.

Even if "honestly presented" as fake, there should be the fundamental right and means to prevent one's likeness from such "nudification." And society has a significant interest in protecting against GenAI deepfakes being intentionally created and presented as real for the purpose of affecting political elections, etc., First Amendment concerns notwithstanding. But no such comprehensive protections are in place, at least under current law.

There is currently no federal law granting any "right of publicity" preventing the unauthorized commercial use of an individual's name, likeness, or other recognizable aspects of one's persona. The right of publicity is but a patchwork of state and common law.[283] Only about half of the U.S. states have any

283. For a survey of the relevant existing legal frameworks that "provide protection against the unauthorized use of aspects of an individual's persona," including state law (e.g., right of privacy; right of publicity; and state regulations of digital replicas), federal law (e.g., the Copyright Act; the

specific "right of publicity" law, with some states' laws being more established than others. People domiciled in the other states have little to any legal recourse if their identities are used without their authorization in any fashion and for any purpose.

There are, however, several pending Congressional bills directed toward these issues for the AI Age. For example:

- In January 2024, the No AI FRAUD Act was introduced that would establish intellectual property rights on individual's likeness and voice against AI-generated fakes and forgeries.[284]
- In July 2024, the NO FAKES Act was introduced that would create a new federal right "to protect the voice and visual likenesses of creators and individuals from the proliferation of digital replicas created without their consent," i.e., a "digital reproduction right."[285]

Federal Trade Commission Act; the Lanham Act; and the Communications Act), and private agreements, *see USCO July 2024 Digital Replicas Report*, *supra* note 117, at 8–22. The USCO expressly interprets the copyright law as not covering the right of publicity and most protections against unauthorized digital replicas, because "[c]opyright does not [] protect an individual's identity in itself, even when incorporated into a work of authorship." *Id.* at 17.

The USCO provides this survey to "review the protections available under current laws and the gaps in their capacity to respond to today's threats," and to recommend that Congress pass a federal law "assessing the need for federal protection specifically with respect to unauthorized digital replicas." *Id.* at 7. Such protection would be an important part of any broader right of publicity in the AI Age. *Id.*

284. *See* The No Artificial Intelligence Fake Replicas and Unauthorized Duplications Act of 2024, H.R. 6943, 118th Congress, § 3(b) (2024) [hereinafter *No AI FRAUD Act*], *available at* https://www.congress.gov/bill/118th-congress/house-bill/6943/text.

285. *See* The Nurture Originals, Foster Art, and Keep Entertainment Safe Act, at § 2(b) ("Digital Replication Right") & § 2(g) ("Rule of Construction")

- In January 2024, the DEFIANCE Act was introduced to provide a "civil action relating to disclosure of intimate images," including nonconsensual sexually-explicit 'deepfake' images and videos.[286]

B. *Should LLM providers bear liability for providing the tools for the generation of deepfakes?*

Should the LLM providers that provide the tools for the generation of deepfakes be liable for any harm that is caused when their customers generate deepfakes? And should LLM providers be able to immunize themselves against any such liability through their contracts?

The competing policy interests can be summarized as:

- the rights of individuals to protect themselves against deepfakes and hold those who support their creation accountable, versus
- the goal of supporting the U.S. GenAI industry to compete for preeminence in the global GenAI economy, including by limiting their regulatory obligations and legal liabilities.

KEY QUESTION:

Should Congress pass a federal "right of publicity" law preventing unauthorized use of an individual's name, likeness, or other recognizable aspects of one's persona for commercial, political, or pornographic purposes?

(2024) [hereinafter *NO FAKES Act*], *available at* https://www.coons.senate.gov/imo/media/doc/no_fakes_act_bill_text.pdf.

286. *See* The Disrupt Explicit Forged Images and Non-Consensual Edits Act of 2024, S. 3696, 118th Congress, §3 ("Civil Action Relating to Disclosure of Intimate Images") (2023–24), *available at* https://www.congress.gov/bill/118th-congress/senate-bill/3696/text.

VIII. ISSUE NO. 6: SHOULD WORKS OF AUTHORSHIP BE PROTECTED FROM UNAUTHORIZED USE FOR TRAINING GENAI MODELS?

A. Issue No. 6(a): Does existing copyright law limit the unauthorized use of works of authorship for training GenAI models?

In sum, for a copyright infringement claim, copyright owners must prove they own the copyrighted work, and that the defendant misappropriated their exclusive right to reproduce and distribute it and all derivative works based on it.[287] Derivative works must be "substantially similar" to the copyrighted work to be infringing.

Establishing the "substantially similar" requirement in generative AI cases is particularly challenging. This should not be a surprise. Unless a prompt specifically instructs AI to generate "an image similar to X," the output will not look like X. It is going to be a composite of numerous inputs, not appearing to be substantially similar to any of them.

"Substantial similarity" is even harder to establish with text, which is much easier to plagiarize without proper attribution. Replace a couple of choice words and play with the sentence structure, and you have "made" someone else's idea your own. This is not necessarily improper. In fact, it happens to at least some degree in most writing, particularly any sort of research paper.

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287. *See* 17 U.S.C. § 106 (Exclusive rights in copyrighted works); *How to Prove Copyright Infringement*, COPYRIGHT ALLIANCE, https://copyrightalliance.org/education/copyright-law-explained/copyright-infringement/how-to-prove-copyright-infringement/ (last visited July 27, 2024).

Generative AI is not conceptually doing anything different than anyone doing research and analysis. Or when a content creator is inspired by other musicians or artists. It just does it better than any human being could in several respects, including the volume of information it "considers" when generating its output.

As such, the numerous creator lawsuits asserting copyright infringement against GenAI providers for training their AI models on copyrighted works may face an uphill battle under existing copyright law. The first wave of substantive judicial rulings on these issues should come in over the next year or two.

In the meantime, by around September 2024, the USCO is scheduled to issue the section of its forthcoming comprehensive copyright and AI law report on the "legal implications of training AI models on copyrighted works"[288] as well as the allocation of potential liability for AI-generated outputs that may infringe.[289]

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288. For a list of 2024 GenAI copyright infringement cases, *see Feb. 2024 Ltr. from Shira Perlmutter*, *supra* note 124, at 6, n.20 (listing Concord Music Group, Inc. v. Anthropic PBC, 23-cv-01092 (M.D. Tenn.); Authors Guild v. OpenAI Inc., 23-cv-08292 (S.D.N.Y.) (consolidated with Alter v. OpenAI Inc., 23-cv-10211 (S.D.N.Y.), and Basbanes v. Microsoft Corporation, 24-cv-00084 (S.D.N.Y) for pretrial purposes); J.L. v. Alphabet Inc., 23cv-03440 (N.D. Cal.); Kadrey v. Meta Platforms, Inc., 23-cv-03417 (N.D. Cal.) (consolidated with Chabon v. Meta Platforms, Inc., 23-cv-04663 (N.D. Cal.), which was closed by the court upon consolidation); (Huckabee v. Meta Platforms, Inc., 23-cv-06663 (N.D. Cal.); Getty Images (US), Inc. v. Stability AI, Inc., 23cv-0135 (D. Del.); Andersen v. Stability AI Ltd., 23-cv-0201 (N.D. Cal.)).

289. *Feb. 2024 Ltr. from Shira Perlmutter*, *supra* note 124, at 6 (announcing planned publication date of the end of the 2023–24 fiscal year).

B. *Issue No. 6(b): Should AI providers be shielded from copyright and other liability to support the development of the AI industry in the U.S.?*

Section 230 of the Communications Decency Act of 1996 has long shielded internet platforms from liability for content created by users.[290] Title II (the "Online Copyright Infringement Liability Limitation Act") of the Digital Millenium Copyright Act of 1998 limits the liability of online service providers for copyright infringement.[291] Some credit such federal protections as being instrumental to the very success of the internet.

Will our government apply these same principles to protect GenAI LLM providers from liability for content generated using their platforms? Or should the rights of creators against the unauthorized use of their copyrighted works to train GenAI models, ultimately threatening their very livelihoods, be prioritized?[292]

Several governments around the world have created special text- and data-mining exceptions to copyright law to make it easier to collect and use information, including copyrighted works, for training AI.[293] They have done so presumably, at least

290. 47 U.S.C. § 230, *available at* https://www.law.cornell.edu/uscode/text/47/230.

291. 112 STAT. 2860, *available at* https://www.copyright.gov/legislation/dmca.pdf.

292. For a discussion of the applicability of Section 230 and other potential sources of secondary liability for technology providers in the AI context, *see USCO July 2024 Digital Replicas Report*, *supra* note 117, at 36–39.

293. For a discussion of these issues, *see* James Love, *We Need Smart Intellectual Property Laws for Artificial Intelligence*, SCI. AM. (Aug. 7, 2023), https://www.scientificamerican.com/article/we-need-smart-intellectual-property-laws-for-artificial-intelligence/.

in part, to help their AI industries compete in the global marketplace.

Depending on how one looks at it, this may create at the extremes either:

- a cautionary tale of a "race-to-the-bottom" situation that the U.S. must not fall into, or
- a clarion call that the U.S. government should not overregulate AI lest we unnecessarily put ourselves behind for global preeminence in this critical technology.[294]

Notably, both the No AI FRAUD Act and the NO FAKES ACT introduced in 2024 include a provision defining the bill to be "a law pertaining to intellectual property for the purposes of section 230(e)(2) of the Communications Act of 1934 (47 U.S.C. 230(e)(2))".[295] That provision carves out "intellectual property law" from Section 230 immunity for online service providers.[296]

SUMMARY OF KEY QUESTIONS

(1) Should new laws, court decisions, or regulations:

- ***Address the use of copyrighted works of authorship in training GenAI models, balancing:***
- ***the rights and interests of copyright holders? and***
- ***the need for AI models to be trained on voluminous data without excess obstacles? and***

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294. *Id*.

295. *No AI FRAUD Act, supra* note 284, at § 3(j); *NO FAKES Act, supra* note 285, at § 2(g).

296. 47 U.S.C. 230(e)(2) ("Nothing in this section shall be construed to limit or expand any law pertaining to intellectual property.").

(2) Address any liability LLM providers should bear with respect to the outputs from their LLMs, and whether they should be able to indemnify themselves from liability through contracting?

IX. CONCLUSION

Of the issues presented in this article, the only one that clearly calls for Congress to pass a new set of federal laws to regulate it is the topic of AI-generated deepfakes (Issue No. 5).

Congress might also intervene with passing new laws in respect to:

- the special substantive analytical and evidentiary issues regarding sufficiency-of-human-contributions determinations brought about by GenAI-assisted works of authorship and inventions (Issue No. 1),
- the need for clarity with respect to the patent subject-matter eligibility of AI/software patents (Issue No. 2),
- the use of GenAI to expand human capabilities and generate voluminous "art" (Issue No. 3),
- whether AI prompts/inputs should be excluded from constituting public disclosures invalidating any patent or trade secret rights (Issue No. 4), and
- whether the unauthorized use of copyrighted works to train AI should be regulated (Issue No. 6).

Regardless of any action taken by Congress, though, the federal courts will inevitably play the primary role in interpreting the copyright, patent, trade secret, and any other IP law on these issues. Concerns that these issues are too important and fast-moving to leave to the deliberative nature of the judiciary, while understandable, are simply beside the point. Challenging legal issues such as these are generally best resolved by the deliberative process and court decisions of our judiciary. And of course, interpreting the law on these issues as set forth by the Constitution and U.S. federal law as set forth by Congress is the exclusive mandate of the judiciary.

The best way to help both Congress and in particular the federal courts address these issues is for copyright, patent, trade secret, and other IP lawyers to develop consensus, nonpartisan principles and best practice recommendations for each, to be:

- used as a resource by our lawmakers and judiciary when passing laws or ruling on cases, and
- voluntarily adopted by companies and members of the legal profession, in whole or more likely in part, in the meantime.

Such recommendations should further help achieve the goal of protecting a company's GenAI-assisted intellectual property but without generating excess "business friction" impeding the company's product development efforts. In other words, they must be feasible.

Given the wide-ranging societal implications that the rise of GenAI threatens to bring about and the speed within which they are happening, there has perhaps never been a greater need and a more urgent time for the legal profession to step up and fill these needs than today.