

THE NON-OBVIOUS RAZOR & GENERATIVE AI

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This Article examines the challenges and prospects of crowd-sourcing generative artificial intelligence (“GenAI”) systems in patent law as human and machine creativity become seamless. As GenAI technologies like GPT-4 become ubiquitous, AI-generated solutions will be less innovative and will complicate tenets about patentability. An evolution of patent law’s non-obviousness standard provides an elegant solution—borrowing from philosophy, a “razor”—to address the impact of advanced artificial intelligence (“AI”) on the innovation process. This Article’s thesis is distinct from the United States Patent and Trademark Office’s (“USPTO”) emphasis on whether or not AI systems can be inventors, because it assumes that human and artificial creativity will become indistinguishable. This Article focuses on a reevaluation of utility patent law’s non-obviousness standard in light of the steady societal shift toward broad information and technological empowerment. By exploring GenAI’s role in augmenting creativity and its implications for the standard of “ordinary creativity,” this Article suggests factors for a revised patentability examination methodology.

This reevaluation seeks to balance AI’s rapid advances with patent law’s goals to promote progress. There is precedent for the non-obviousness standard to absorb advancements in artificial intelligence that rely on crowd-sourced information. GenAI challenges traditional notions of invention and creativity. The legal

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construct against which “non-obviousness” is determined—the ordinary creativity of the “person of ordinary skill in the art” (“PHOSITA”)—should be recalibrated to account for GenAI and to encourage innovation while protecting public access to tools of creativity.

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I. INTRODUCTION

The consistent theme with artificial intelligence (“AI”) is that what dazzles us now will bore us soon.¹ GPT-4 may be wondrous in 2024: it helps us construct a multitude of curiosities, such as a drink attachment for our push lawnmower to keep a coffee cup counterbalanced while navigating the unique terrains of our backyards. However, in 2026, querying ChatGPT or any number of generative AI (“GenAI”) systems for customized solutions may be as yawn-inducing as multiplying numbers on a calculator. The threat of patent infringement lawsuits and cease-and-desist letters arising from creations easily made from GenAI would chill the public use of these tools, as such results are opposed to the constitutional imperative to promote progress in the useful arts.

We have been living in a time of abundant and easily accessible data. The internet facilitated the democratization of information generation and dissemination: it ushered in the metamodernist era.² This era is characterized by an arguable flattening of platforms for the presentation, evaluation, and evolution of ideas. Human brilliance and machine extrapolations now interact, raising profound questions about the boundaries of human ingenuity—and thus about patent law’s purpose and policies.³ In considering the legal implications of these technological advancements, particularly in the realm of patent law, it is crucial to recognize this societal shift. The average person today is far more technologically empowered than ever before, even if she does not consider herself a technologist.

¹ See Rockwell Anyoha, *The History of Artificial Intelligence*, SCIENCE IN THE NEWS, HARVARD KENNETH C. GRIFFIN GRADUATE SCH. ARTS & SCIENCES: BLOG (Aug. 28, 2017), <https://sitn.hms.harvard.edu/flash/2017/history-artificial-intelligence/> [https://perma.cc/ZJJ5-F5NV].

² See Luke Turner, *Metamodernism: A Brief Introduction*, NOTES ON METAMODERNISM (Jan. 12, 2015), <https://www.metamodernism.com/2015/01/12/metamodernism-a-brief-introduction/> [https://perma.cc/8WM3-2YW7].

³ See, e.g., U.S. GOV’T ACCOUNTABILITY OFF., GAO-22-106118, SCIENCE & TECHNOLOGY SPOTLIGHT: BRAIN-COMPUTER INTERFACES (2022).

It is time to revisit the distinction between discovery and invention when ideas can breed *in silico*.

In this artificial intelligence boom,⁴ GenAI systems are mushrooming in their power and utility, and even the brand names of such models indicate that they are modeling humans while augmenting their capabilities. GenAI are machine learning-employing systems that are “1) ‘generative’—they generate text, images, or other sequences of information based on some input prompt,” and incorporate “2) ‘foundational models’—machine learning models trained on large datasets comprising diverse origins and content, discerning patterns of the collective crowd-sourced data, and can be adapted to a wide range of tasks.”⁵ Primary examples of GenAI at the moment of drafting this Article are as follows: ChatGPT (a large language model that has a remarkable range of fluency in conversations with a user), Copilot (helps with software engineering assistance), Adept (helps with task automation), and DALL-E (helps generate high-quality artwork).⁶ Increasingly, productivity tech behemoths like Microsoft, Google, Autodesk Fusion, and Adobe are absorbing GenAI as features in their dominant applications.⁷ Despite their radical complexity, GenAI systems are quickly becoming as commonplace as microcomputers in appliances or search boxes on webpages.

Often, these models are trained⁸ using crowdsourced data. In this context, “crowdsourcing” refers to the practice of gathering massive amounts of training data from publicly facing sources, such as

⁴ See Anyoha, *supra* note 1.

⁵ Saffron Huang & Divya Siddarth, *Generative AI and the Digital Commons 1* (Mar. 20, 2023) (unpublished manuscript) (on file with arXiv).

⁶ See Justin D. Weisz et al., *Toward General Design Principles for Generative AI Applications 2* (Jan. 13, 2023) (unpublished manuscript) (on file with arXiv).

⁷ See Hugh Langley, *Generative AI is Transforming Businesses Everywhere. Big Tech Will Still Be Crowned the Winner*, BUS. INSIDER: TRANSFORMING BUS. (Dec. 8, 2023, 11:12 AM), <https://www.businessinsider.com/generative-ai-reliant-on-big-tech-2023-12> [<https://perma.cc/2KAB-2AL8>].

⁸ In the field of machine learning, “training” refers to the process of refining a machine-learned model’s parameters to produce more accurate outputs. See *Training ML Models*, AMAZON WEB SERVS. (Mar. 26, 2024, 9:04 AM), <https://docs.aws.amazon.com/machine-learning/latest/dg/training-ml-models.html> [<https://perma.cc/S3BN-HUVU>].

internet pages, public databases, works in the public domain, and so on.⁹ Crowdsourcing is a highly effective way to train a machine-learned model. It allows model developers to quickly and inexpensively gather a relatively diverse corpus of data, including both high-quality entries and low-quality entries alike.¹⁰ This data can be (arguably) more robust than generally smaller, non-crowdsourced datasets by potentially mitigating internal biases of the trainers, and including considerable amounts of otherwise underrepresented data points.¹¹ While the individual contribution from each data item is negligible in the training process, in the aggregate, it is often the choice of training data that separates a good model from a great model.¹² In this light, the contribution of the public domain to these models cannot be ignored. This is true even in proprietary models trained on a private dataset, as the public domain has undoubtedly contributed to the development of these models and their predecessors.

This paradigm shift is exemplified by the scenario of biomedical researchers employing GenAI to tackle a longstanding protein folding challenge.¹³ The GenAI's output solution, derived from a mélange of public data and algorithmic prowess, confuses the tenets of patentability. On one hand, the solution may be novel and provide a benefit to society, but on the other hand, the solution was arrived at relatively easily¹⁴ with the use of a tool that is readily available

⁹ See Clive Reffell, *Why Is Crowdsourcing Vital to Make AI Smarter?*, CROWD SOURCING WEEK (Mar. 28, 2023), <https://crowdsourcingweek.com/blog/crowdsourcing-makes-ai-smarter/> [<https://perma.cc/6XZ5-FBRY>].

¹⁰ *Id.*

¹¹ *Id.*

¹² This paradigm is referred to somewhat crudely in the field as “garbage in, garbage out.” See Ron Ozminkowski, *Garbage In, Garbage Out*, TOWARDS DATA SCI. (Nov. 13, 2021), <https://towardsdatascience.com/garbage-in-garbage-out-721b5b299bc1> [<https://perma.cc/SP8D-UM6C>].

¹³ This is not so hypothetical. See Alex Zhavoronkov et al., *Deep Learning Enables Rapid Identification of Potent DDR1 Kinase Inhibitors*, 37 NATURE BIOTECHNOLOGY 1038, 1038–40 (2019) (explaining that a generative AI model known as GENTRL was used to discover potent inhibitors of discoidin domain receptor 1 (DDR1), a kinase target implicated in fibrosis and other diseases, in a mere three weeks).

¹⁴ In related efforts, a DeepMind AI termed AlphaFold successfully predicted three-dimensional protein structures of nearly 200 million proteins—nearly every

and accessible to anyone with baseline knowledge in the field of proteomics research and development.¹⁵ Moreover, the tool uses algorithms based on public data. The award of a utility patent to this particular team of researchers means they have an effective monopoly for twenty years. This monopoly not only covers this particular invention, but also makes it so that this team can chill the development of an adjacent and derivative development through the doctrine of equivalents.¹⁶ This scenario is the prototypical example that prompts us to question whether the fruits of such AI-assisted labor justify the societal costs of a patent monopoly.

However, the attention of the United States Patent and Trademark Office (“USPTO”) is elsewhere. The current discourse on AI and the innovation process is dominated by the question of whether an entity devoid of human consciousness can truly be an inventor or a creator for intellectual property rights to attach. In February 2023, the USPTO published a Federal Register Notice on the AI inventorship issue,¹⁷ and in the spring of 2023, the USPTO held two listening sessions about the matter.¹⁸ In April 2023, the Supreme Court denied certiorari review of *Thaler v. Vidal*,¹⁹

known protein—over six years. See Tanya Lewis, *One of the Biggest Problems in Biology Has Finally Been Solved*, SCI. AM. (Oct. 31, 2022), <https://www.scientificamerican.com/article/one-of-the-biggest-problems-in-biology-has-finally-been-solved/> [<https://perma.cc/B4BL-SKQS>]. This AI easily surpassed human efforts in a field that has been researched since at least the 1960s. *Id.*

¹⁵ For a discussion of a specialized obviousness standard for AI systems used in pharmaceutical research and development cycles, see Daniele Fabris, *From the PHOSITA to the MOSITA: Will “Secondary Considerations” Save Pharmaceutical Patents from Artificial Intelligence?*, 51 IIC-INT’L REV. INTELL. PROP. & COMPETITION L. 685 (2020).

¹⁶ The doctrine of equivalents is an infringement doctrine intended to broaden the reach of patents to cover minor, inconsequential variations in inventions. Under the doctrine, infringement may be found even when an accused process or product does not literally infringe on each and every claimed limitation. See *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40–41 (1997).

¹⁷ See U.S. PAT. & TRADEMARK OFF., 2023 PATENT PUBLIC ADVISORY COMMITTEE ANNUAL REPORT (2023).

¹⁸ *Id.*

¹⁹ *Thaler v. Vidal*, 43 F.4th 1207 (Fed. Cir. 2022), *cert. denied*, 143 S. Ct. 1783 (2023) (affirming that the Patent Act requires an “inventor” to be a natural person).

solidifying the Court of Appeals for the Federal Circuit’s (“CAFC”) affirmance of the USPTO’s decision that an inventor must be human.²⁰ In October 2023, the Biden Administration released Executive Order 14,110 for the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence.²¹ This Order requires the Director of the USPTO to publish guidance to the patent examiners addressing the AI inventorship issue.²² In February 2024, the Director responded with an examination procedure that placed emphasis on the “duty of candor and good faith” of a patent applicant, and required applicants to disclose if AI substantially contributed to a claimed invention in the patent application.²³

While the USPTO wishes to continue its plan that relies on patent applicants being willing to disclose otherwise-unavailable information against the applicant’s interests, this Article proposes that a more effective and constitutionally informed analysis comes from analyzing the impact of GenAI under utility patent law’s *non-obviousness* standard. To borrow from philosophy, this standard can be used as a razor; that is, a principle used to avoid unnecessary actions, like determining how much of an invention was created by human ingenuity or machine ingenuity.²⁴ It is the non-obviousness standard that begs the question of whether GenAI is a tool within the ambit of general ordinary creativity, much like a calculator or optimizer of sorts, that leads to an obvious invention. The USPTO has the authority and capacity to be the first guard for ensuring patents are granted on truly non-obvious inventions. As the reality

²⁰ *Id.* at 1209. See Patent Act, 35 U.S.C. § 100(f) (defining “inventor”).

²¹ Exec. Order No. 14,110, 88 Fed. Reg. 75191 (Nov. 1, 2023).

²² *Id.* at 75197.

²³ Notice, Inventorship Guidance for AI-Assisted Inventions, 89 Fed. Reg. 10043, 10049 (Feb. 13, 2024).

²⁴ A philosophical “razor” is a paradigm, principle, or “rule of thumb” that “allows for elimination (the ‘shaving off’) of [near but] unlikely explanations for a phenomenon. [It] is not an unbreakable law or rule . . . but is right more often than not.” *What Is a Philosophical Razor?*, ROTARY HAWTHORN, <https://hawthornrotary.org.au/stories/what-is-a-philosophical-razor> [https://perma.cc/W2KF-JR5M] (last visited Mar. 26, 2024) (describing examples of razors including, most famously, Occam’s Razor (the simplest explanation is usually the right one) and Hitchen’s Razor (what can be asserted without evidence can be dismissed without evidence)).

of rapid technological evolution and ubiquity continues to unfold, this standard of patentability is the logical locus for addressing technological advancement. Remaining ensnared in a debate over the nature of the inventor is a waste. The prospect of AI systems being interwoven with human intellect—perhaps even implanted to enhance cognitive and creative capacities²⁵—makes it likely that becoming wedded to any definition of “human ingenuity” is bound to be short-sighted. To a high degree, patent law should be future-proof, ready to accommodate a seamless blend of collective human and artificial ingenuity. It would be an ironic shortcoming if patent law was ill-prepared for a future where the border between collective human thought and machine calculations is seamless.²⁶

This Article thus proposes a reevaluation of the legal construct used in the non-obviousness determination: “the person of ordinary skill in the art” (“PHOSITA”) standard.²⁷ This legal construct is a hypothetical person who has evolved over time and is due to evolve again in light of this AI boom. The creativity manifested by the current wave of GenAI systems results from both publicly accessible and open source data, algorithms, and human prompts. This creativity results from neither totally autonomous machine imagination, nor completely exclusive data, nor purely human-generated imagination.

²⁵ The scholar Dina Stoev observed:

We should pay serious attention to the change in culture, marked by the interactive nature of internet and electronics. This process has been given many names—the electronic age, the digital age, the information age and so on, and because of that a term like “metamodernity” might seem unnecessary. Nevertheless, the need for examining movement through era, and vice versa, has been clearly shown by a model of interconnectedness in the last century and a half. It seems prudent not to dismantle it, especially in a time when era and movement are even more inextricably linked. The other main reason for considering metamodernity is that modernity had a powerful catalyst—the printing press, and metamodernity has the exact same order of catalyst, only more advanced—the internet. In a sense, this new age is as much modernity as the one before; it is just a transcendent version of it.

Dina Stoev, *Metamodernism or Metamodernity*, ARTS, Sept. 2022, at 11.

²⁶ See Muireann Quigley & Semande Ayihongbe, *Everyday Cyborgs: On Integrated Persons and Integrated Goods*, 26 MED L. REV. 276 (2018).

²⁷ 35 U.S.C. § 103.

This Article offers a guide to a reevaluation of the PHOSITA standard, proposing a recognition of the fluid integration of GenAI tools into the innovation process. It argues for a recalibrated baseline that embraces the likely convergence of collective human and machine intelligence, aligning with a perspective that eschews a dichotomy between human and technological creativity. While the Article observes the USPTO’s position that not all inventions resulting from AI in the innovation process are unpatentable, it diverges from the USPTO’s approach because the non-obviousness standard is the durable locus in patent law for addressing GenAI as a tool for innovation. An approach using this standard—namely, its PHOSITA baseline—that is aware of both the public domain contributions and the ubiquitous human-computer interactions would preserve the flexibility to address the unique challenges of specific industries and technologies.

By re-evaluating the standard of ordinary skill to include the ubiquitous crowd-source-based GenAI tools of our digital age, there is hope to preserve the integrity of the public domain and public access to the tools of invention, while also fostering an environment that encourages risk-taking and innovation. This Article will argue its thesis in four main parts: (I) the Constitution’s “Promote Progress” mandate and its relationship to patentability standards, (II) the evolution of human-computer interactions coinciding to the progression of the non-obviousness standard, (III) GenAI as a problem-solving tool and the public domain issues underlying it, and (IV) policy considerations and proposed solutions for absorbing GenAI into the non-obviousness standard.

II. THE CONSTITUTIONAL MANDATE TO “PROMOTE PROGRESS” AND PATENTABILITY STANDARDS

A. Promoting Progress: The Constitutional Balance

In drafting the United States (“U.S.”) Constitution, the Framers battled over how the federal government could incentivize innovation in science (copyrightable subject matter) and the useful arts (patentable subject matter) by providing exclusive “property” rights to authors and inventors while preserving a robust public

domain and free market competition.²⁸ Article I, § 8, cl. 8 of the U.S. Constitution (known as the “IP Clause”) reflects a compromise supporting this balance, mandating that Congress design legislation that grants exclusive rights to authors and inventors for “limited times” with the specific purpose of “promoting science and the useful arts.”²⁹ The Framers envisioned progress in the patent space

²⁸ See Dotan Oliar, *Making Sense of the Intellectual Property Clause: Promotion of Progress as a Limitation on Congress’s Intellectual Property Power*, 94 GEO. L.J. 1771, 1804–05 (2006) (discussing IP Clause debates between Thomas Jefferson and James Madison about potential monopolies and noting Jefferson as being a little more anti-monopolistic).

²⁹ See U.S. CONST. art. 1, § 8, cl. 8 (“[Congress has the power] [t]o promote the Progress of Science [i.e. copyright] and the Useful Arts [i.e. patents], by securing for limited Times to Authors and Inventors the exclusive right to their respective Writings and Discoveries.”); see also Anyoha, *supra* note 1 (arguing that the IP Clause struck a middle ground between the Jefferson and Madison positions); *Graham v. John Deere Co.*, 383 U.S. 1, 5–9 (1996) (discussing the patent right as originating from the Constitutional mandate to “promote the progress of the useful arts” and further noting that Congress should not attempt to enlarge this monopoly on patent property rights without considering the “innovation, advancement or social benefits gained”). While some argue the superfluous nature of the “progress” clause without citations for this view, arguably the better scholarly view, supported by case law, is that the “progress provision is an independent restriction [on Congress].” Jeanne C. Fromer, *The Intellectual Property Clauses External Limitations*, 61 DUKE L.J. 1329, 1339 (2012). For authors discussing the non-binding progress clause preamble view, see, e.g., *id.* Fromer credits Melville Nimmer and David Nimmer for the non-binding view, but distinguishes that the other, more persuasive view from the historical, structural, and policy position is that “the progress provision is an independent restriction.” *Id.* at 1339–40. Oliar echoes Fromer’s position, persuasively arguing that the non-binding precedent view is incorrect since it fails to give meaning to the first “empowerment” portion of the IP clause and goes against the natural textual reading and ends-means relationship between providing exclusive rights (the means) to promote the end result of promoting progress. Oliar, *supra* note 27, at 1810–18. The Oliar and Fromer views are consistent with leading Supreme Court cases. See e.g., *Graham*, 383 U.S. at 6 (explaining that the “promote progress” clause is both a grant of power and a limitation, stating, “[i]nnovation, advancement and things which by constitutional command must ‘promote the Progress of . . . useful Arts.’ This is the standard expressed in the Constitution and cannot be ignored.”); *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013) (suggesting that patents “exist to promote creation”); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012) (declining patents directed to

from the perspective of incentivizing inventions that would spur economic growth in the U.S. and lessen the fledgling country's technological dependence on Europe.³⁰ Over time, courts have distinguished that the “progress” limitation requires providing rights that not only spur innovation and economic growth but also increase the overall knowledge base for the benefit of society as a whole.³¹

In *Graham v. John Deere*,³² the Supreme Court clarified that the IP Clause is both a “grant of power and limitation.”³³ The Court opined that Congress cannot ignore the IP Clause when drafting copyright or patent legislation since it is the expressed benchmark for promulgating these exclusive rights for limited times.³⁴ As such, Congress cannot expand the patent monopoly without considering the “innovation, advancement or social benefits gained thereby.”³⁵ With this language, the Court sent a clear message to Congress that all federal intellectual property protection covered by the IP Clause must balance the competing interests of promoting innovation against public access and enriching the public domain.³⁶ The

certain fields of knowledge where “monopolization . . . through the grant of a patent might tend to impede innovation more than it would tend to promote it”).

³⁰ See Margaret Chon, *Postmodern “Progress”: Reconsidering the Copyright and Patent Power*, 43 DEPAUL L. REV. 97, 99–120 (1993) (noting how eighteenth-century Americans resented our socioeconomic and cultural dependency on Europe and explaining that, because the U.S. was a “net-importer” of ideas and technology, the concept of promoting progress in the useful Arts and Science would elevate the U.S. from a lesser-developed country to one of “improved global socioeconomic status”).

³¹ See *Graham*, 383 U.S. at 5–6 (discussing the patent right and noting that Congress should not attempt to enlarge this monopoly without considering the “innovation and advancement or social benefit gained”).

³² *Graham v. John Deere Co.*, 383 U.S. 1 (1996).

³³ *Id.* at 5–6.

³⁴ See *id.*

³⁵ *Id.* at 6.

³⁶ See *Pfaff v. Wells Elecs.*, 525 U.S. 55, 64 (1998) (“[T]he patent system represents a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology in return for an exclusive monopoly for a limited time.”); *Bonito Boats Inc. v. Thundercraft Boats Inc.*, 489 U.S. 141, 146 (1989) (“Congress may not create patent monopolies of unlimited duration, nor may it ‘authorize the issuance of patents that remove existent knowledge from the public domain, or to restrict free access to materials already available.’” (citing *Graham*, 383 U.S. at 6)).

patentability standards in utility patent law emphasize this bargain; the award of an enforceable twenty-year monopoly is to coax the “know-how” of inventions into the public sphere that would not otherwise be there.³⁷

With the advent of GenAI, jurists are tasked with reconsidering what it means to “promote progress” in the face of a drastic paradigm shift. GenAI systems undoubtedly hold the potential to significantly promote the quality of life and proliferation of inventions on an untold scale. Advances in technology can be produced with the same human effort as a simple internet search.³⁸ Such progress should seemingly be incentivized by the same presumably beneficial monopoly the Founders recognized centuries ago. After all, if every invention from a GenAI system immediately entered the public domain, such a system would be worthless to developers and investors, at least under a classical view of intellectual property incentives. Funding and operation of these systems would all but cease, and society would presumably suffer from the loss of potential invention output. Yet the other extreme is equally unsatisfactory. Should developers obtain ownership rights in the inventions their systems output indiscriminately, progress would be defeated by monopolization and profiteering on drastic scales. This result is even more unsavory when substantial public data is used to develop and train these models.³⁹

Fortunately, neither of these extremes may come to pass. Unlike in copyright law, where there appears to be no grounds for protecting

³⁷ See DONALD CHISUM, 1 CHISUM ON PATENTS § 2 (2024); CHISUM, *supra*, § 7.01 (2024) (“Full disclosure of the invention and the manner of making and using it on issuance of the patent immediately increases the storehouse of public information available for further research and innovation and assures that the invention will be freely available to all once the statutory period of monopoly expires.”).

³⁸ See generally *What is Generative AI*, NVIDIA, <https://www.nvidia.com/en-us/glossary/generative-ai/> [<https://perma.cc/YD6B-B6K9>] (last visited Mar. 26, 2024) (describing the scope and use of generative artificial intelligence).

³⁹ Edd Gent, *Public AI Training Datasets Are Rife With Licensing Errors*, IEEE SPECTRUM (Nov. 8, 2023), <https://spectrum.ieee.org/data-ai> [<https://perma.cc/C56S-2XVC>].

so-called “emergent works,”⁴⁰ the USPTO has recognized that some inventions produced, at least in part, by GenAI may nonetheless be patentable if a human inventor makes a significant contribution to the invention.⁴¹ The constitutional mandate to “promote progress” would be far better served, however, by using the equally-familiar non-obviousness standard to evaluate whether an invention has benefited the public enough to justify a limited monopoly. This standard better balances the competing interests between bringing inventions into the world—recognizing that AI-generated inventions are a beneficial inevitability—and protecting the public domain against the equally inevitable influx of mundane AI “inventions” comprising nothing more than an amalgam of known technology. Furthermore, this solution is aligned with the plain text of 35 U.S.C. § 103 (“Section 103”),⁴² which states that “[p]atentability shall not be negated by the manner in which the invention was made.”⁴³

B. The Existing Solution: Non-Obviousness

1. Non-Obviousness Generally

“Non-obviousness” is one of four requirements for the grant of a utility patent in the United States.⁴⁴ The three others are “patent eligible subject matter” (whether the invention is within the realm

⁴⁰ Matt Blaszczyk, *Impossibility of Emergent Works’ Protection in the US and the EU Copyright Law*, 25 N.C. J.L. & TECH 1, 2 (2023).

⁴¹ See *AI-Related Resources*, U.S. PAT. & TRADEMARK OFF., <https://www.uspto.gov/initiatives/artificial-intelligence/artificial-intelligence-resources> [<https://perma.cc/U4YB-WSPK>] (last visited Mar. 26, 2024).

⁴² Section 103 of the Patent Act, 35 U.S.C. § 103, codifies the non-obviousness requirement. The 2013 revisions to the Patent Act under the America Invents Act (“AIA”) effectively preserved pre-AIA 35 U.S.C. § 103(a) as simply 35 U.S.C. § 103. For brevity, both are referred to as “Section 103” throughout, with the intended meaning of whichever standard is applicable at the relevant timeframe.

⁴³ 35 U.S.C. § 103. Although this clause was first introduced to delegitimize the “flash of genius” test by the 1952 revision to the Patent Act, the broad language of the clause suggests that Congress sought to protect against similarly prejudicial bars to patentability.

⁴⁴ 35 U.S.C. § 101.

of knowledge that should be kept open and for the public),⁴⁵ “novelty” (whether the invention is new),⁴⁶ and “enablement” (described in the proposed patent adequately enough for the public to practice its invention).⁴⁷ These requirements reflect the goal of a flourishing public domain. Enabled inventions that are adequately described become instructions to the public for how to create and innovate from the invention once it is able. Allowing patents for only inventions not within the public domain reflects that the public has a positive right to some bodies of knowledge.⁴⁸ As the late patent scholar John Barton expertly summarized, the novelty and non-obviousness principles collectively “ensure that the patent monopoly is available only for genuinely inventive inventions. The novelty standard asks whether the purported invention has been previously described or practiced; thus, it seeks to determine whether the invention is already within the existing state of the art.”⁴⁹ The non-obviousness standard slightly broadens this inquiry, asking whether the purported invention is obvious in view of the existing state of the art.

While the early iterations of the Patent Act codified the subject matter, novelty, and written description requirements for patentability, the 1952 Patent Act⁵⁰ was the first patent statute to codify the common law requirement of non-obviousness. Under the current Patent Act, non-obviousness must be evaluated using prior

⁴⁵ For an in-depth look at patent eligible subject matter, the authors suggest reviewing 1 CHISUM ON PATENTS § 1, which provides an in-depth review of the changing eligibility standards over time. This is a standard that has similarly encountered issues with technological developments, in the field of computing technologies (*CLS Bank Int’l v. Alice Corp. Pty. Ltd.*, 717 F.3d 1269 (Fed. Cir. 2013)) and genomics (*Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576 (2013)), among others.

⁴⁶ 35 U.S.C § 102.

⁴⁷ § 112(a).

⁴⁸ John H. Barton, *Non-Obviousness*, 43 IDEA: J.L. & TECH. 475, 476 (2003).

⁴⁹ *Id.*

⁵⁰ Patent Act of 1952, Pub. L. No. 82-593, 66 Stat. 792 (codified at 35 U.S.C. §§ 1–293).

art⁵¹ that existed prior to the applicant's filing date. In particular, Section 103 provides:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in [35 U.S.C. § 102], if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.⁵²

An invention that would have been obvious to a person of ordinary skill at the relevant time is not patentable.⁵³ A patent examiner at the USPTO is tasked with setting forth a *prima facie* case of obviousness to reject a patent application claiming an obvious invention.⁵⁴ A *prima facie* case of obviousness is typically established with reference to patents, printed publications, or other printed forms of prior art.⁵⁵ Occasionally, an examiner may take "official notice" of "common knowledge" in the art.⁵⁶ The *prima facie* case of obviousness may be rebutted with evidence of "secondary considerations," such as "commercial success, long felt but unsolved needs, [and] failure of others,"⁵⁷ evidence of unexpected results,⁵⁸ inoperability of prior art references,⁵⁹ skepticism of experts,⁶⁰ or copying.⁶¹

⁵¹ Prior art, loosely, is the sum of knowledge in the public domain for a given art or field. More particularly, material is prior art if it is "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." 35 U.S.C. § 102.

⁵² 35 U.S.C. § 103.

⁵³ *See id*; *see also* 35 U.S.C. § 103(a) (pre-AIA).

⁵⁴ U.S. PAT. & TRADEMARK OFF., MANUAL OF PATENT EXAMINING PROCEDURE § 2142 (9th ed. Rev. 7, July 2022).

⁵⁵ *Id.*

⁵⁶ *Id.* § 2144.03.

⁵⁷ *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

⁵⁸ *United States v. Adams*, 383 U.S. 39, 51 (1966).

⁵⁹ U.S. PAT. & TRADEMARK OFF., *supra* note 54, § 716.07.

⁶⁰ *Id.* § 716.05.

⁶¹ *Id.* § 716.06.

2. *The Person Having Ordinary Reading Comprehension: The PHOSITA of the 20th Century*

Initially, courts struggled with the proper test for determining the prima facie case of obviousness. Following the 1952 revisions to the Patent Act, the Fifth Circuit held in *Jeoffroy Manufacturing, Inc. v. Graham*⁶² that a combination of prior art was patentable when it produced an “old result in a cheaper and otherwise more advantageous way.”⁶³ Then, in 1964, the Eighth Circuit overturned an issued patent for failing to produce a “new result.”⁶⁴ This result-oriented approach to proving non-obviousness was short-lived, and the Supreme Court set forth a new standard upon review of the Eighth Circuit’s case. This landmark case, *Graham vs. John Deere*, set forth a new and enduring standard for evaluating non-obviousness.⁶⁵ The revised standard tasks an examiner (or reviewing court) with (a) determining the scope and content of the prior art; (b) ascertaining the differences between the claimed invention and the prior art; and (c) resolving the level of ordinary skill in the pertinent art.⁶⁶

The *Graham* framework for non-obviousness marked a return to the touchstone of the ordinary skill in the art, and, by extension, the person having it. The level of ordinary skill in the art is not an exact framework, yet *Graham*’s schema was the only point of reference for the following ten years.⁶⁷ Nearly ten years later, the U.S. Court of Claims finally instituted some consistency in this analysis, promulgating a non-exhaustive list of factors for resolving the level

⁶² *Jeoffroy Mfg., Inc. v. Graham*, 219 F.2d 511 (5th Cir. 1955), *cert. denied*, 350 U.S. 826 (1955).

⁶³ *Id.*

⁶⁴ *John Deere Co. of Kansas City v. Graham*, 333 F.2d 529 (8th Cir. 1964).

⁶⁵ *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

⁶⁶ *Id.* at 17.

⁶⁷ *Jacobson Bros., Inc. v. U.S.*, 512 F.2d 1065, 185 U.S.P.Q. 168 (Ct. Cl. 1975). Despite ultimately setting out the now-commonplace list of factors essential to the analysis of the level of ordinary skill in the art, it is not clear the *Jacobson* Court intended them to be treated as such. The Court notes that “[a] finite quantitative definition of this ordinarily skilled person is difficult at best,” characterizing its factors as those which “will oftentimes aid in developing a picture of what is the level of skill of the ordinary person in an art.” *Id.* at 1070–71, 185 U.S.P.Q. at 528.

of ordinary skill in *Jacobson Brothers, Inc. v. United States*.⁶⁸ This list included (1) “types of problems encountered in the art;” (2) “the various prior art approaches employed;” (3) “rapidity with which innovations are made;” (4) “sophistication of the technology; and” (5) “educational background of those actively working in the field.”⁶⁹ Each of these factors speaks to the skills and expertise of an average worker in the specific field of the invention.

After *Graham*, it was solidly decided that the result produced by a combination of two prior art references—whether new, more efficient, or not—was not the touchstone of non-obviousness. Rather, it was the differences between the claimed invention and the prior art, and whether the ordinary skill in the art was enough to bridge that difference.⁷⁰ What remained problematic after *Graham*, however, was how to illustrate that ordinary skill when combining more than one prior art reference to establish the prima facie case of non-obviousness. To provide a workable standard for patent examiners, the Federal Circuit—now the mandatory court for patent infringement and patent prosecution appeals—adopted the more patent-friendly and judicially-friendly Teaching, Suggestion and Motivation test (“TSM test”) for establishing obviousness.⁷¹

Underscoring that courts kept the construct of the PHOSITA strictly tied to explicit teachings in the prior art, many courts rigidly applied the TSM test to assess whether an invention was obvious. In how this test was often applied, an invention would be considered obvious only if some motivation or suggestion to combine the prior art teachings “could be found explicitly in the prior art itself, the

⁶⁸ *Jacobson Bros., Inc. v. U.S.*, 512 F.2d 1065, 185 U.S.P.Q. 168 (Ct. Cl. 1975).

⁶⁹ *Id.* at 1071, 185 U.S.P.Q. at 528.

⁷⁰ *Graham*, 383 U.S. at 17.

⁷¹ While the TSM test is a judicial creation without a definite point of origin, it appears to have developed practically out of general interpretation principles slowly adopted by the various courts. *See, e.g.*, *Application of Bergel*, 292 F.2d 955, 956–57 (1961). By 1978, the test was formally referred to as the “teaching, suggestion, or motivation test” as in *Orthopedic Equip. Co., Inc. v. U.S.*, 702 F.2d 1005, 1012, 217 USPQ 193, 199 (1983); *cf. In re Samour*, 571 F.2d 559, 563 (1978) (describing that the test is based on “the principle frequently applied against section 103 rejections, namely: that the teachings of references can be combined only if there is some suggestion or incentive to do so”).

nature of the problem, or the knowledge of the PHOSITA.”⁷² As a result of this test, the PHOSITA was not expected to make inferences of his own; rather, he “was a schlub: someone with access to all the relevant information, but with no way to integrate it.”⁷³ The Court of Customs and Patent Appeals (“CCPA”) in *In re Winslow*⁷⁴ vividly illustrated this scene of the PHOSITA “working in his shop with the prior art references—which he is presumed to know—hanging on the walls around him.”⁷⁵

3. *KSR and the Ordinarily Creative PHOSITA*

Although a judicially convenient standard, the TSM test placed a significant search burden on examiners and failed to adequately safeguard the public domain against trivial patents on basic innovations.⁷⁶ Seeking to refocus the hijacked patent space, the Supreme Court restored a working human brain to the PHOSITA in the landmark 2007 case *KSR v. Teleflex*.⁷⁷ In *KSR*, the Court held that an explicit teaching, suggestion, or motivation was not the sole touchstone for determining obviousness.⁷⁸ Instead, the Court reasoned that “[t]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published

⁷² Brenda M. Simon, *The Implications of Technological Advancement for Obviousness*, 19 MICH. TELECOMM. & TECH. L. REV. 101, 110 (2013) (citing *Al-Site Corp. v. VSI Int’l Inc.*, 174 F.3d 1308, 1323-24 (Fed. Cir. 1999)).

⁷³ *Id.* at 109.

⁷⁴ *In re Winslow*, 365 F.2d 1017 (C.C.P.A. 1966).

⁷⁵ *Id.* at 1020.

⁷⁶ Barton observes that,

If these patents [evaluated pre-*KSR*] are non-obvious to the person of reasonable skill in the art, that person simply isn’t very bright. The specific precepts, defined by the CAFC and its predecessors, permit the patenting of extremely trivial innovations. The MPEP’s demand that there be suggestions in the prior art as a prerequisite to combine references converts non-obviousness to something near novelty. Thus, non-obviousness is ultimately predicated on whether there is an adequate body of literature that is accessible to patent examiners to render a determination of patentability.

Barton, *supra* note 48, at 482–83.

⁷⁷ *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007).

⁷⁸ *Id.* at 401–02.

articles and the explicit content of issued patents.”⁷⁹ This reasoning was founded in part by the realistic notion that “[i]n many fields there may be little discussion of obvious techniques or combinations, and market demand, rather than scientific literature, may often drive design trends.”⁸⁰ Without overturning the TSM test, the Court lectured that the TSM test was only one of several approaches for demonstrating obviousness.⁸¹ The *KSR* decision intentionally avoided setting out another rigidly-interpretable test, instead mandating that courts “take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”⁸²

The Court also opportunistically reemphasized in *KSR* that patents are granted to promote innovation and progress that otherwise would not be, stating, “[g]ranted patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, for patents combining previously known elements, deprive prior inventions of their value or utility.”⁸³ Rather, the Court believed that inherent market factors would be a significant driver of innovation, without the need for a chilling monopoly. Where a design need or market pressure provides sufficient incentive to try to solve a problem and there are a finite number of identified, predictable solutions within the technical grasp of the PHOSITA, the Supreme Court reasoned that the results would likely be founded on ordinary skill and common sense and would not deserve patent protection.⁸⁴ The *KSR* opinion thus packs a two-punch: both recognizing the evolution of technology in the innovative process and reiterating the conservative principle that patents are granted to coax advances that would not arrive otherwise.⁸⁵

With this complex evolution, it is easy to see why “obviousness” determinations are one of the most vexing questions in patent

⁷⁹ *Id.* at 402.

⁸⁰ *Id.*

⁸¹ *Id.* at 419.

⁸² *Id.* at 418.

⁸³ *Id.* at 419.

⁸⁴ *Id.*

⁸⁵ *Id.*

prosecution and a frequent subject of patent litigation. The history of the non-obviousness standard reflects a continual struggle between the Federal Circuit (and its predecessors) setting forth a rigid, judicially workable test and the Supreme Court advocating a return to a fact-specific, unconstrained framework that broadly considers “the ordinary skill in the art” above all attempts to reduce it. Underlying this battle is the constant evolution of the ordinary artisan and the technology of the world he lives in, from a workshop surrounded by printed papers, to a screen displaying the sum of all human knowledge at his bequest, and now the summary of that sum through GenAI.

III. CORRELATING OBVIOUSNESS AND INFORMATION TECHNOLOGY

The preeminent challenge with utility patentability standards in the time of GenAI is that GenAI raises notions that challenge the validity of rationales behind each criterion for utility patent eligibility. Nearly all of what is on the internet could be considered prior art, directly raising the novelty criteria. With increased access to information, the boundaries between adjacent art spaces are easier to cross, in turn pushing the boundaries of non-obviousness.⁸⁶ There is also a growing public sentiment that things of utilitarian value accessible on the internet, such as metadata, should be unrestricted for everyone,⁸⁷ mirroring the notions behind “patent eligible subject matter” and the idea of preserving some broad classes of information for the public domain.⁸⁸

Within this context, the non-obviousness standard’s “ordinary creativity” benchmark emerges as a crucially adaptive element in patent law, capable of easily accommodating and evolving with technological advances in information technology such as GenAI. In this time where the Major Questions Doctrine gives

⁸⁶ See Ryan Abbott, *Everything is Obvious*, 66 UCLA L. REV. 2 (2018).

⁸⁷ Oren Bracha, *The Work of Copyright in the Age of Machine Production* (Sept. 24, 2023) (unpublished manuscript) (on file with SSRN); see Lawrence Lessig, *Re-Crafting a Public Domain*, 44 PERSPECTA 177 (2011); LAWRENCE LESSIG, *FREE CULTURE* (2004); ACCESS TO KNOWLEDGE—A GUIDE FOR EVERYONE (Jeremy Malcolm & Frederick Noronha eds., 2010).

⁸⁸ See Lessig, *supra* note 87, at 177–89.

administrative laws and regulations a less legitimate gloss,⁸⁹ it behooves agencies to find the path of statutory *and* constitutional delegation for absorbing the progress of technology,⁹⁰ as the USPTO arguably had for “PHOSITA” standards and “obviousness” with *KSR* in 2007. GenAI should not be seen as a technological phenomenon that leaves the USPTO blindsided and requires Congress to take on GenAI in patent law as though it is wholly a new major question;⁹¹ there was a steady progression to this latest iteration of AI as a productivity tool. The Searchable World Wide Web was a seminal AI development that preceded the 2007 *KSR* decision that set the contours for “obviousness.” The remainder of this Section will first explain the role of information and technology in the evolution of the PHOSITA standard, then discuss the development of the searchable internet and cloud computing in more detail.

A. The Role of Information in the Evolution of the PHOSITA

It should be noted how information was historically disseminated to best understand the context underlying the *KSR* decision. In 1966, during the heyday of the TSM test, a would-be-inventor would not have access to millions of videos on the internet or innumerable online communities. He would likely be limited to printed diagrams and instructions from a finite body of books, periodicals, and patents gathered around him—very much in line with the CCPA’s eloquent description in *In re Winslow*. The only ways he would have been able to find these resources would likely be by spending time finding them through word-of-mouth or

⁸⁹ Oren Tamir, *Getting Right What’s Wrong with the Major Questions Doctrine*, 62 COLUM. J. TRANSNAT’L L. (forthcoming 2024).

⁹⁰ Rachel Reed, *What Critics Get Wrong — And Right — About the Supreme Court’s New ‘Major Questions Doctrine,’* HARVARD L. TODAY (April 19, 2023), <https://hls.harvard.edu/today/what-critics-get-wrong-and-right-about-the-supreme-courts-new-major-questions-doctrine/> [https://perma.cc/9FGP-AYHR].

⁹¹ However, the second prong of the major questions doctrine is “economic and political significance,” and the Court may need to decide that on its own. Even in that case, the analysis in this Article will be helpful for the courts to determine the economic and political significance of GenAI to the Patent Law regime.

through a highly structured search involving ordered taxonomy.⁹² This quintessential scene conjured by the *In re Winslow* court reflects the then-reality of physically organized, limited, and static information—the PHOSITA in one place with a finite number of known and unchanging references around him as he works. The rigid application of the TSM test set a fixed bar for obviousness; any inference by the inventor reaching beyond the prior art or directed by the problem itself beyond this would bring the claimed invention to the realm of *non-obviousness* in this information-sparse era.

The realities of the world continued to evolve around the PHOSITA, and the PHOSITA was due to follow suit. By 2007, as the searchable internet reached the general public, the *KSR* decision concurrently “transform[ed] the PHOSITA from a mere ‘automaton’ to a person having ordinary skill *and creativity* in the art”⁹³ and emphatically evolved the obviousness test to consider the “creative steps and assumptions that the PHOSITA in the particular field would apply.”⁹⁴ The Court made general reference to the technologies available at the time in rejecting the rigid application of the TSM test, stating that “[t]he diversity of inventive pursuits and of modern technology counsels against confining the obviousness analysis by a formalistic conception of the [TSM test].”⁹⁵ Despite not *explicitly* calling out, for example, the searchable internet or rapid advancements in computing power, the *KSR* Court nonetheless recognized that modern technology is an element that makes *creative* inquiry to solve problems *ordinary* and expected in the PHOSITA.⁹⁶ It should be apparent, then, that a similar technological evolution should support a similar reevaluation in the role of patents.

⁹² See PATENT SEARCHING: TOOLS & TECHNIQUES (David Hunt et al. eds., 2007).

⁹³ See Simon, *supra* note 72, at 109 (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)).

⁹⁴ *Id.* at 110 (citing *KSR*, 550 U.S. at 415–19).

⁹⁵ *KSR*, 550 U.S. at 402.

⁹⁶ See Simon, *supra* note 72, at 101 (“The assumption has been that access to information and computing power will result in better understanding, improved creativity, or decreased uncertainty [in regard to the obviousness inquiry] when it in fact may not.”).

B. *The Searchable World Wide Web*

Between the 1966 illustration of the cluttered *In re Winslow* workshop and the 2007 *KSR* opinion rejecting the TSM test, a monumental change in information technology took place: the publicly accessible World Wide Web and smart search. With the advent of smart search engines since at least 1997,⁹⁷ an artisan was long past the days of relying on her knowledge alone or that of a master of complicated taxonomical library searches to do a prior art search.⁹⁸ The process of research became as simple as typing a few keywords into a search browser and hitting “enter.” Internet search engines indexed much of the vast expanse of the internet—including academic journals, patent databases, technical forums, and more—to find the most relevant information instantly, resulting in the most relevant websites at the top of the list.⁹⁹ In a broad sense, ranked internet search results are a result of crowdsourcing artificial intelligence. Every keyword search on the internet that generates an automatically ranked list of relevant results (a generated ranked list) can be considered an application of generative machine learning. While ranked search primarily focuses on organizing existing information, the process of determining that organization can indeed involve generative aspects, especially when artificial intelligence and machine learning are used to dynamically model and predict the most relevant search results.

The abundance of accessible information radically changed the problem-solving process for the average worker or inventor in the art, significantly improving both research efficiency and the variety of material available with a simple natural language web search. The introduction of the searchable internet significantly impacted the analysis of novelty and obviousness for patent examiners as well.

⁹⁷ See James Hendler et al., *Integrating Applications on the Semantic Web*, 122 J. INST. ELEC. ENG'RS JAPAN 676 (2002) (“Consider the state of documentation systems as they were in 1989 when the Internet was starting to become internationally established. At this time, retrieving and referencing information across remote systems was still an expert’s game.”).

⁹⁸ *Id.*

⁹⁹ Panagiotis Takis Metaxas, *Web Spam, Social Propaganda and the Evolution of Search Engine Rankings*, in 45 LECTURE NOTES IN BUSINESS INFORMATION PROCESSING 170, 172 (Jose Cordeiro & Joaquim Filipe eds., 2010).

Technologies or ideas that were formerly obscure or difficult to find became accessible to artisans, patent applicants, and patent examiners.¹⁰⁰ Examiners now use and, in many cases, rely on these search capabilities to inform their judgments of patent applications based on novelty or obviousness.¹⁰¹

The ease of access to data, combined with the user-friendliness of modern research tools, has expanded the average worker's horizons, allowing them to investigate a wide range of references, data sources, and even nuanced advice from strangers across the globe. Such increased access has necessarily raised the bar for what was possible, let alone obvious, in every field of art. The late patent law scholar John Barton wrote in 2004 (before the *KSR* opinion) that “[c]ontemporary patent law has weakened [the] non-obviousness requirement, leading to the grant of many patents on trivial inventions.”¹⁰² He further opined that “only research beyond that done as part of normal product design and development should be rewarded with a patent. Routine design should not be enough, but there is no need for monopolies as an incentive for such research.”¹⁰³

¹⁰⁰ The Supreme Court was not the only governing body reconsidering non-obviousness with the advent of the Information Age. Among the changes in the 2013 AIA was the inclusion of patent applications, including foreign patent applications, among the definition of prior art in 35 U.S.C. § 102. Once nearly impossible to access, many governments began publishing patent applications on the internet, making foreign applications equally as accessible as foreign patents or foreign uses and sales. Combined with significant advances in machine translation, it quickly became possible for an American national to decipher a Japanese, Korean, Russian, German, or nearly any other country's patent applications. *Compare* 35 U.S.C. § 102(b) (pre-AIA) (“A person shall be entitled to a patent unless . . . the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country”) *with* 35 U.S.C. § 102(a)(2) (“A person shall be entitled to a patent unless . . . the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b) . . .”).

¹⁰¹ Jessica Manno, Supervisory Pat. Examiner, U.S. Pat. & Trademark Off., Patent Public Advisory Committee Quarterly Meeting, A Day in the Life of a Patent Examiner: Searching (May 3, 2018) (unpublished presentation) (on file with USPTO).

¹⁰² *See* Barton, *supra* note 48, at 475.

¹⁰³ *Id.* at 491.

In his prescient article,¹⁰⁴ Barton proposed that the standard for granting a patent should be “to grant a patent only if the invention is more substantial than that regularly made by a person of average skill in the art being funded and supported in a way that is typical in the relevant industry.”¹⁰⁵

The Supreme Court's decision in *KSR*, while not adopting the exact language proposed by Barton, raised the standard for non-obviousness to have the PHOSITA endowed with “ordinary creativity.” While the *KSR* Court did not explicitly list what was meant by “modern technology” in its assertion that modern technology is an element that makes *creative* inquiry to solve problems *ordinary* and expected in the PHOSITA, the searchable internet was indisputably an integral component of modern technology in 2007. By 2007, the searchable World Wide Web was accessible to the PHOSITA. People could more easily do interdisciplinary research than ever before and connect the dots, so to speak. This increase in access and information availability changed the dynamics of inventiveness and creativity, resulting in the reimagining of the PHOSITA in *KSR* to reflect a more knowledgeable, interconnected, and resource-rich human—a person whose knowledge base and creativity is augmented by “modern technology.”

Considering the searchable internet in this context, artisans, inventors, and the USPTO have had a nascent form of generative computing as an essential component of research and problem solving since 1997.¹⁰⁶ The searchable internet found widespread adoption in the early twenty-first century, with more than half of the North American population using the internet by the year 2001 and

¹⁰⁴ Barton’s article is fairly categorized as prescient. At present, it has been cited over 150 times, and, perhaps more importantly, was cited in argumentative portions of several amicus briefs filed in the *KSR* decision. See Brief of Bus. Software All. as Amicus Curiae Supporting Petitioner, *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2006) (No. 04-1350); Brief of Economists and Legal Historians as Amici Curiae Supporting Petitioner, *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2006) (No. 04-1350).

¹⁰⁵ Barton, *supra* note 48, at 496.

¹⁰⁶ See *A Brief History of the Internet*, INTERNET SOC’Y, <https://www.internetsociety.org/internet/history-internet/brief-history-internet/> [https://perma.cc/9HK2-NCA8] (last visited Mar. 26, 2024).

Europe enjoying similar ubiquity by the mid-2000s.¹⁰⁷ The searchable internet was notably bolstered by two significant developments: cloud computing and mobile applications. These components are fundamental to understand the present-day public domain and how a matured PHOSITA standard should relate to GenAI tools.

C. Cloud Computing

The National Institute of Standards and Technology defines cloud computing as “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources . . . that can be rapidly provisioned and released with minimal management effort or service provider interaction.”¹⁰⁸ Cloud computing enables end users to store their digital photos, documents, and files such that they can be accessed anytime, anywhere, with little more than an internet connection.¹⁰⁹ This is the essence of cloud computing.

Cloud computers were not available to general businesses and consumers before 2007. Before this time, accessing data was limited to the storage capacity of a local server and the data within it. After 2006, when companies like Amazon Web Services built the infrastructure and offered their specialization in securely storing and managing vast amounts of data to anyone with internet access, limitations of local servers no longer set tight limitations on amounts of data stored or who could access those stores of data, whether for reading the data or for writing to data repositories.¹¹⁰ Cloud data storage is projected to exceed 200 zettabytes (or 200 trillion

¹⁰⁷ See Max Roser, *The Internet's History Has Just Begun*, OUR WORLD IN DATA (Oct. 3, 2018), <https://ourworldindata.org/internet-history-just-begun> [https://perma.cc/47J6-QELJ].

¹⁰⁸ NAT'L INST. STANDARDS & TECH., NIST SP 800-145, THE NIST DEFINITION OF CLOUD COMPUTING 2 (2011) (providing a more detailed overview of the characteristics of cloud computing).

¹⁰⁹ *Id.*

¹¹⁰ *What is a Data Center?*, AMAZON WEB SERVS., <https://aws.amazon.com/what-is/data-center/> [https://perma.cc/HHW5-AKKR] (last visited Mar. 26, 2024).

gigabytes) by 2025, with half of that stored on the cloud.¹¹¹ As data grows exponentially, it becomes unsustainable for either individuals or businesses to store that data locally.¹¹² Data is therefore increasingly stored on “highly distributed architectures made up of several data centers located in various parts of the world” and hosted by entities such as Google, Amazon, or Meta.¹¹³

Cloud computing “facilitate[d] the production, distribution, and use of information commons” and began a new form of business services that “distinguish themselves according to the type of resource involved—Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).”¹¹⁴ With the availability of cloud computing, users were able to access advanced computing resources without having advanced computers, or the expense, space, and risks associated with storing such infrastructure.¹¹⁵ This relates closely to another pocket-sized evolutionary phenomenon that appeared on the heels of *KSR v. Teleflex*—the release of the first generation of the iPhone, arguably the first marvel of seamless human-computer interaction.

D. Mobile Applications and the Leap in Human-Computer Interaction

It is hard to imagine that the Supreme Court appreciated that the next AI epoch was to start the same year as their momentous *KSR* decision; one that would make AI, for the first time, an extension of the human body. With the launch of the iPhone, a notable shift occurred not just in technology itself, but in how people interact with technology. This era marked the beginning of a deep focus on user experience (“UX”) and human-computer interaction (“HCI”) as

¹¹¹ STEVE MORGAN, ARCSERVE, THE 2020 DATA ATTACK SURFACE REPORT (2020).

¹¹² Primavera De Filippi & Miguel Said Vieira, *The Commodification of Information Commons: The Case of Cloud Computing*, 16 COLUM. SCI. & TECH. L. REV. 102, 117 (2014).

¹¹³ *Id.*

¹¹⁴ *Id.* at 117–18.

¹¹⁵ NAT’L INST. STANDARDS & TECH., *supra* note 108, at 2.

formal fields of study.¹¹⁶ Apple's iPhone, with its intuitive design and touch interface, was not merely a technological marvel; it was a study in making complex technology accessible and engaging for the average person. This technology allowed a consumer to carry the abilities of all the services of cloud computing in the palm of her hand. Essentially, she had a supercomputer in her purse.

This focus on UX and HCI resulted in significant changes to society. Computing technology was no longer limited to enthusiasts or specialists; it had become an essential element of most people's daily lives. What was previously the realm of hobbyists quickly became used for everything, from shopping to socializing, to working and learning, even including private aspects, such as fertility tracking and obtaining medical health records. This transition affected both the amount and the quality of technology usage. Because of the ease and intuitiveness of these interactions, people of diverse ages and backgrounds were able to smoothly integrate technology into their daily lives. Even (and perhaps especially) quotidian events during the day, like a long bus ride or subway commute, could turn into a content data-generation event—a Facebook post, Reddit comment, or Wikipedia entry. Facebook, YouTube, X (formerly known as Twitter), and Instagram and the growth generally of social media platforms and mobile apps led to unparalleled connectivity.¹¹⁷

The widespread adoption of smartphones and the emphasis on UX and HCI have had far-reaching implications. They have dramatically accelerated the volume of data generated and consumed by the average person. Every interaction with a device, every choice made on a screen, contributes to the vast pools of data that now inform everything from market trends to technological advancements. In this rapidly changing world, it is no surprise that

¹¹⁶ Linda Rosencrance, *UX Research*, TECHTARGET, <https://www.techtargget.com/searchsoftwarequality/definition/UX-research> [https://perma.cc/NEK5-7NDD] (last updated June 2023).

¹¹⁷ Adrian Ma, *The Next Phase of the Internet is Coming: Here's What You Need to Know About Web3*, THE CONVERSATION (Feb. 27, 2023, 12:41 PM), <https://theconversation.com/the-next-phase-of-the-internet-is-coming-heres-what-you-need-to-know-about-web3-192919> [https://perma.cc/D47C-54ZW].

the PHOSITA rose from a humble “schlub” to an informed, rational thinker.¹¹⁸

IV. GENERATIVE AI AND THE DIGITAL COMMONS

This seamless integration of technology into daily life paved the way for the next level of symbiosis: the average person using GenAI to solve problems. Just as smartphones have made technology a constant companion, GenAI is poised to become an everyday problem-solving tool.¹¹⁹ The evolution from the iPhone’s intuitive interface to the sophisticated and user-friendly interfaces of GenAI reflects a world where the use of advanced technology is ordinary and even expected. From composing emails to generating business reports, from planning a diet to designing a garden, GenAI, trained on vast datasets made possible by the cloud and personal computing, is likely to be at least as ubiquitous and essential as smartphones.¹²⁰ This reality demands the reshaping of expectations from the PHOSITA and a reevaluation of what is considered obvious in patent prosecution and litigation. The remainder of this Part will explore the complex interplay between GenAI and the “digital commons,” the societal institutions responsible for protecting the digital resources essential for its function.¹²¹

¹¹⁸ See generally Ryan Whalen, *Second-Order Obviousness: How Information and Communication Technologies Make Inventions More Obvious and Why the Law Should Care*, 97 J. PAT. & TRADEMARK OFF. SOC’Y 597 (2015) (discussing how information and communication technologies should create a second tier of “obviousness” standard to account for interdisciplinary “teams” having ordinary skill in the art).

¹¹⁹ See Dipankar Dasgupta et al., *A Review of Generative AI from Historical Perspectives* 1 (Feb. 2023) (unpublished manuscript) (on file with ResearchGate).

¹²⁰ See Huang, *supra* note 5.

¹²¹ “Digital commons” refers to the holistic social institutions responsible for the production, ownership, and distribution of digital informational resources. See, e.g., Melanie Dulong de Rosnay & Felix Stalder, *Digital Commons*, 9 INTERNET POL’Y REV. 1, 2 (2020).

A. *An Abstracted Overview of the Workings of Generative AI Models*

In its recognized¹²² emergence over the past two years, GenAI reignited the public's curiosity, fear, and imagination, achieving even seemingly supernatural effects.¹²³ Justice Elena Kagan of the Supreme Court acknowledged the judiciary's nascent understanding, remarking: “[we] don’t even know what the questions about AI are, let alone the answers.”¹²⁴ While this sentiment resonates with the casual user's observation of the feats of advanced AI, technical experts in this centuries-old field¹²⁵ are quick to demystify: AI is not magic, but a product of algorithms.¹²⁶

It is essential to understand in broad strokes how GenAI functions to demystify its relationship to the non-obviousness inquiry. It may be useful to analogize its function to the workings of human intuition. Imagine an artist who has spent years studying and recreating thousands of paintings from various styles and eras. Over time, this artist gains an intuitive understanding of various art forms, what level of creative license is acceptable and what is not, and so on. Eventually, this artist is able to create new, original artworks influenced by this extensive research. The artist may assign mental labels, such as genre, style, author names, etc. to certain characteristics of a painting. For instance, the author may characterize an “impressionist” painting with aspects such as definable brush strokes reflecting a hastily finished or “unrefined” impression, the use of bright colors, or depicting a transient moment

¹²² Although generative AI has only recently made headlines, some of the earliest generative machine-learned models were conceptualized as early as the 1950s. See *History of Generative AI*, TOLOKA (Aug. 22, 2023), <https://toloka.ai/blog/history-of-generative-ai/> [<https://perma.cc/JGD9-3JDK>].

¹²³ See Paul Tassi, *Meet Loab, The AI Art-Generated Demon Currently Haunting the Internet*, FORBES (Sept. 7, 2022, 9:19 AM), <https://www.forbes.com/sites/paultassi/2022/09/07/meet-loab-the-ai-art-generated-demon-currently-haunting-the-internet/?sh=77de2da8da3f> [<https://perma.cc/VVM4-74JB>].

¹²⁴ Cristiano Lima-Strong, *The Supreme Court Has Entered the AI Chat*, WASH. POST (Jan. 18, 2024, 9:09 AM), <https://www.washingtonpost.com/politics/2024/01/18/supreme-court-has-entered-ai-chat/> [<https://perma.cc/6E6L-A4FE>].

¹²⁵ *History of Generative AI*, *supra* note 122.

¹²⁶ Dasgupta et al., *supra* note 119, at 1 (“AI is not magic, it is logic.”).

rather than a staged portrait. GenAI works in a similar fashion, but instead of paintings, it studies vast amounts of digital data.

At its core, GenAI is an advanced pattern-recognition system. It begins its “education” by analyzing enormous datasets—a process akin to reading every book in a library, or studying every painting in a gallery, or every audio file in a repository. GenAI learns to identify patterns, structures, and relationships within this data. Depending on its use, it must learn the rules of language and grammar, the styles of visual art, or the rhythm and melody in music.

The “intelligence” of GenAI comes from its ability to use this learned information to generate new content that resembles the data it has studied. When tasked with creating something, GenAI applies its learned patterns and rules to produce new and original outputs. For example, if it has been trained on a database of Victorian literature, it can generate new stories that mimic the style of nineteenth-century British authors. If trained on Basquiat’s visual works, it can create new images that mimic his style and characteristics, as though those images were created by his own hand.

In the theme of “meta” in this present Article with a metamodernist perspective, ChatGPT was tasked to help explain how the computational engines behind GenAI—neural networks—operate to educate a non-technical audience about how such models use probability-weighted random selection calculations to generate output.¹²⁷ Its output was as follows:

¹²⁷ *AI Hiker’s Creative Journey*, CHATGPT (Jan. 22, 2024), <https://chat.openai.com/share/d7b4af40-1b0d-433b-b61f-361869113c19> [<https://perma.cc/NW47-XHNL>] (detailing a conversation on “Probability-Weighted Random Selection in Generative AI” on OpenAI’s Chat Service). The prompt given that generated the italicized text was “I’m looking for a way to describe the probability-weighted random selection in a way that is accurate for generative AI LLMs and that of generative AI that produces non-textual outputs. Please help me find a good way to do that for a non-technical audience. I think using an analogy like a hiker hiking through the woods may help to explain the neural network’s work involved.” The reference to “The Road Not Taken” by Robert Frost is our own addition. ChatGPT was also instructed to define what the proper Bluebook citation format would be, and its response was, “Bluebook citation for a conversation with an AI, such as ChatGPT, can be a bit unconventional since it doesn’t fit neatly into traditional categories like books or journal articles.

Imagine a hiker (the AI) embarking on a journey through a vast forest (the realm of possible outputs). The forest is filled with countless paths (potential solutions or creations), each leading to different destinations. Some paths are well-trodden and familiar (common or likely outputs), while others are less traveled and more obscure (unique or less likely outputs).

As the hiker progresses, they come to numerous forks in the path. At each fork, the hiker must decide which way to go. This decision isn't random; it's based on a map (the results of training data) they've studied beforehand, which highlights certain routes as more promising or interesting based on past journeys of other hikers (previous training examples).

However, the map doesn't dictate a single route. Instead, it provides a probability for each path, indicating how often previous hikers found it rewarding. The hiker uses this information to make an informed choice, but there's still an element of randomness. Sometimes they might choose a well-traveled path, and other times they might decide to explore a less common route, adding an element of surprise and creativity to their journey. [After all, taking the one less traveled by may make all the difference.]¹²⁸

For GenAI in textual outputs, like language models [such as this instance of ChatGPT], this process is like composing sentences or paragraphs. Each word or phrase is a step along the path, with the model assessing which word fits best next, based on the probability map of language it has learned.¹²⁹

However, given the nature of your work and the need for proper citation, you can adapt the existing rules to suit this format. Here's a suggested format, based on Bluebook Rule 18.2.2 which covers electronic media and online sources."

¹²⁸ This is ours and Robert Frost's contribution. See Robert Frost, *The Road Not Taken*, POETRY FOUND., <https://www.poetryfoundation.org/poems/44272/the-road-not-taken> [<https://perma.cc/97GZ-4HGS>] (last visited Mar. 30, 2024).

¹²⁹ Katherine Lee et al., *Talkin' 'Bout AI Generation: Copyright and the Generative-AI Supply Chain*, J. COPYRIGHT SOC'Y (forthcoming 2024) (manuscript at 22) (on file with SSRN) ("Transformers are a type of model architecture, just like linear regression and neural networks. They are particularly good at capturing context in sequential information by modeling how elements in a sequence relate to each other. Consider our example sentence from above: 'In the summer, I like to go to the [blank]'. The next word (to fill in the '[blank]') is related to many of the other words in the sequence (such as 'summer', 'I', and 'go') in a way that makes the word 'beach' a more likely candidate than 'slopes.' Given their effectiveness, since their release in 2017, transformers have become the de facto way to model sequence-formatted data, including modalities as diverse as text, code, music, and protein structure.").

In non-textual GenAI, such as those creating images or music, the process is similar, but the paths represent visual elements or musical notes and sequences. The AI ‘hiker’ decides on colors, shapes, or musical tones at each step,¹³⁰ guided by the probability map created from its training on various artworks or music.

¹³⁰ The analogy is taking liberties here; it is hard to describe how neural networks work without first talking about how sensory data is first digitized. “Neural networks” are mathematical operators that are the forks of the analogies, and they are not “seeing” any sensory data, they are processing numbers that are some attempt at representing the data. A better way to learn how neural networks work is through visualization. One our favorite videos to show students are these: Grant Sanderson, *But What Is a Neural Network*, 3BLUE1BROWN (Mar. 28, 2024), <https://www.3blue1brown.com/lessons/neural-networks> [<https://perma.cc/E6UE-RKUS>]. A simulation one can play with to experience the complexity of neural networks is this one: Daniel Smikov & Shan Carter, *TensorFlow*, PLAYGROUD.TENSORFLOW.ORG, <https://playground.tensorflow.org> [<https://perma.cc/QAE6-X5PB>] (last visited Mar. 30, 2024). *See also* Lee et al., *supra* note 129, at 28–29 (describing modern GenAI for images through stable diffusion by stating: “For text-to-image diffusion-based model training, the training data consist of pairs of images and corresponding text description captions. Training occurs in two passes. First, for each training data example (image and its caption), noise is incrementally added to the image until it effectively looks like static. This process intentionally corrupts the image, degrading its quality. Second, a neural network is trained to reverse this corruption process—removing noise and restoring the image to its original form. Both of these passes are iterative; each has multiple steps that happen over time. The first pass involves the repeated addition of noise, and the second involves denoising the fully noised image a little bit at a time. During the de-noising pass, the neural network is trained by evaluating how well the de-noised image matches the original, noise-free image in the training data, and this evaluation is associated with the original text caption in the training data. Similar to the case of transformers, once trained, a diffusion-based model can be used to produce generations. Generation treats text prompts like description captions, and leverages relationships that the model has learned between captions and images in the training data. The process begins with a completely noisy image, and repeatedly applies the model to remove noise, iteratively producing a series of images that are intended to increasingly align with the text prompt. We can therefore think of the production of an out-put generation as sequence of images unfolding over time, starting from the completely noisy image and ending with the final generation, with every iteratively de-noised image between the two”); *see generally* Ian Goodfellow et al., *Generative Adversarial Networks*, 63 COMMC’NS ACM 139 (2020) (describing generative adversarial network (GANs)) Yang Song & Stefano Ermon, *Generative Modeling by Estimating Gradients of the Data Distribution* (Oct. 10, 2020) (unpublished manuscript) (on file with arXiv); Jonathan Ho et al., *Denoising Diffusion*

In both cases, the GenAI is like a hiker using both a map of probabilities and a touch of randomness to explore the rich and diverse landscape of possibilities, creating something unique at the end of their journey. This approach balances between replicating patterns seen in the training data and introducing novel elements, ensuring outputs that are both familiar and refreshingly new.

In this instance, ChatGPT gave an optimistic conclusion. ChatGPT's response omits that outputs of GenAI systems can be nonsensical, grotesque, or practically impossible. For example, to date, GenAI image generators still have trouble depicting hands in use.¹³¹ This is ironic, as hands are arguably the most primitive tool for problem solving. GenAI “will often create hands that have too many or too few fingers, left hands in a right hand context (and vice versa), and fingers that are bent at unnatural angles.”¹³² This may be because the training data set for images are 2-D images in which hands are not a large part of the image, so extrapolation of how 3-D hands actually work for novel situations is difficult and hard to render for new images. It is possible for GenAI to depict hands more accurately, but it usually requires specified prompting from the end-user. There is little doubt that the technology will improve, but one salient lesson from this example is that the extrapolations of GenAI do not always map usefully or meaningfully with what end-users need or want.

Another important takeaway from this example is that for many prompted purposes, the usefulness of GenAI is tied to how closely it takes lessons and cues from patterns in the data set. The machine learning models that power GenAI reflect their training data.¹³³ These base models “trained on large-scale, web-scraped datasets reflect a lot of general information sourced from different parts of the [i]nternet. They are not typically trained to reflect specialized

Probabilistic Models, in 33 ADVANCES NEURAL INFORMATION PROCESSING SYSTEMS 6840 (2020) (detailing the first methods that were competitive with GANs on image generation tasks).

¹³¹ See Yue Yang et al., Annotated Hands for Generative Models 1 (Jan. 26, 2024) (unpublished manuscript) (on file with arXiv).

¹³² *Id.* at 1.

¹³³ Lee et al., *supra* note 129, at 42.

domains of knowledge.”¹³⁴ That specialized training can come in a subsequent iteration of training, called “fine-tuned training.” “Fine tuning describes the process of modifying a pre-existing, already-trained model, and has the general goal of taking such a pre-existing model and making it better along some dimension of interest.”¹³⁵ This process means selecting training data that is more representative of the specific goals and running more training.¹³⁶ By way of example in real world application, “a base language model could be fine-tuned on scientific papers to improve its ability to summarize scientific content; the fine tuning stage” takes the training of the general base model and updates it by “training further on scientific text data.”¹³⁷

GenAI training is a tremendous investment of resources; it is therefore realistic to assume that base models may be licensed for fine tuning for specific purposes.¹³⁸ The cost, not necessarily financial, will predominantly be in time, data storage, and computing power.¹³⁹ “Altogether, the dollar cost [of GenAI model training] can range from six to eight figures, depending on the size of the model, the size of the training data set, the length of the training process, the efficiency of the software and hardware used, and other choices.”¹⁴⁰ In whatever form the specific GenAI application takes, it is a direct outcome of publicly available data and the public’s semantic data, discussed below.

¹³⁴ *Id.*

¹³⁵ *Id.*

¹³⁶ *Id.*

¹³⁷ *Id.* at 43.

¹³⁸ This process is referred to as “white-labeling” a model. For a discussion of white-labeling practices, see *How To White-Label A Custom ChatGPT Chatbot For Your Clients*, CUSTOMGPT.AI, <https://customgpt.ai/chatgpt-white-label/> [<https://perma.cc/Z4PG-UQBU>] (last visited Mar. 26, 2024).

¹³⁹ Lee et al., *supra* note 129, at 40.

¹⁴⁰ *Id.*

B. Publicly Available Data and the Public's Semantic Data in the Development of Advanced Generative AI

It's important to reiterate, as many do, that GenAI does not “think” or “create” in the human sense.¹⁴¹ Rather, it uses statistical probabilities and learned patterns to generate outputs. To a large extent,¹⁴² the more data it has been trained on, the more sophisticated and varied its creations can be. This is where the data on the internet plays a crucial role—it provides the AI with a diverse and extensive “training ground,” enabling it to learn from a wide range of human expressions and experiences. Any particular GenAI may have some preset parameter for probabilistic extrapolation,¹⁴³ a proxy for a level of wildness in creativity.

Computing systems perceive and process data differently than human systems do. Although sometimes there is a high correlation between the patterns that humans discern and those that advanced AI will detect without human supervised training, there are many instances of divergence between human and computer processing. Sometimes the divergence leads to results where the average human clearly outperforms the particular AI system, like in the prototypical

¹⁴¹ David Goldman, *Why AI Can't Think*, LAW & LIBERTY (May 30, 2023), <https://lawliberty.org/why-ai-cant-think/> [https://perma.cc/8BUQ-JQWJ].

¹⁴² Although size of a training data corpus is a major factor in improving model quality, it is often characteristics of that dataset—how well the data captures remote aspects of a problem, how generalizable and diverse the dataset, etc.—that suggest how effective a model will be. A larger dataset is more likely, but not guaranteed, to include the necessary data, and there is a point of diminishing returns with training data, especially if the data is relatively homogenous. See Ryan Sevey, *How Much Data is Needed to Train a (Good) Model?*, DATAROBOT (Aug. 4, 2017), <https://www.datarobot.com/blog/how-much-data-is-needed-to-train-a-good-model/> [https://perma.cc/UQC7-HZX6].

¹⁴³ One example of this parameter is the so-called “temperature” parameter, which describes how much the model deviates from the “optimal” or “most likely” output. At a value of zero, for example, a model would only output a single, most likely, output. At higher temperature values, the model may choose an output that is near the most likely output, but is not necessarily the most likely output. See *Temperature in the AI World. A Short Guide on How to Use OpenAI Temperature Parameter for Better ChatGPT Responses (Both in GPT-3 and GPT-4)*, GPT WORKSPACE, <https://gpt.space/blog/how-to-use-openai-model-temperature-for-better-ai-chat-responses> [https://perma.cc/FM2K-YQTF] (last visited Mar. 26, 2024).

case of identifying whether pictures are of dogs or muffins.¹⁴⁴ Yet, there are some cases where the AI systems perform feats humans could not, like identifying possible life-saving compounds for the COVID-19 pandemic in a matter of days.¹⁴⁵

Most of the over fifty classified AI algorithms are inherently data-driven; their efficacy hinges on the availability and analysis of large datasets. This reliance underscores a pivotal yet understated narrative about GenAI—the indispensable role of the digital commons, publicly available data, and public domain contributions. Text-to-Text GenAI training datasets are massive and “predominantly contain data scraped from the web”—rarely with consideration for privacy or copyright accompanying that data.¹⁴⁶ Popular training language datasets range from 800 gigabytes to 1.6 terabytes.¹⁴⁷ For sake of contrast, it is recommended to purchase eight gigabytes per month for a phone plan that is used for “hardcore streamers of Netflix and other HD Video-content.”¹⁴⁸ Some modern-day datasets used to train text-to-text GenAI include RealNews, C4, and WebText.¹⁴⁹

Many businesses keep databases of the information that their customers generate. Some of these businesses have made available for external entities the use of samples or subsets of the datasets that they have worked on. Such datasets are capable of having user actions marked on them. As an illustration, the Review dataset from Amazon, which was released in 2018, includes 233.1 million

¹⁴⁴ Mariya Yao, *Chihuahua OR Muffin? Searching For The Best Computer Vision API*, TOPBOTS (Sept. 22, 2017), <https://www.topbots.com/chihuahua-muffin-searching-best-computer-vision-api/> [<https://perma.cc/7NDS-UJ63>].

¹⁴⁵ Cade Metz, *How A.I. Steered Doctors Toward a Possible Coronavirus Treatment*, N.Y. TIMES (updated Dec. 4, 2020), <https://www.nytimes.com/2020/04/30/technology/coronavirus-treatment-benevolentai-baricitinib.html> [<https://perma.cc/LQB9-CGVX>].

¹⁴⁶ Katherine Lee et al., *AI and Law: The Next Generation 9* (July 6, 2023) (unpublished manuscript) (on file with SSRN).

¹⁴⁷ *Id.*

¹⁴⁸ Daniel Pateman, *How Much Data Do I Need? A Guide To Data Usage on the Most Popular Phone Apps*, TECHRADAR (Feb. 18, 2020), <https://www.techradar.com/deals/how-much-data-do-i-need> [<https://perma.cc/9QQK-S5WG>].

¹⁴⁹ Lee et al., *supra* note 146, at 7.

samples with customer ratings.¹⁵⁰ Additionally, the suggestions dataset from Netflix includes 100 million customer reviews.¹⁵¹ IMDb movie reviews is another popular dataset.¹⁵² This work of curating training data for fine-tuning is unwittingly done by the public; “upvotes” of comments and content make it more likely that the subject data is included in the datasets.¹⁵³ The end user supplied data is referred to herein as the “public’s semantic data” resulting from “semantic work” in which the end users are unwittingly tagging and indexing content with meaning that is used by data brokers¹⁵⁴ that provide datasets for GenAI systems.

Central to this discourse is the role of non-profit organizations and open-source and open-sharing communities. Entities like Common Crawl,¹⁵⁵ which amasses and maintains open repositories of web crawl data, and Creative Commons,¹⁵⁶ whose open licenses underpin the ethical use of vast datasets, are unsung heroes in this narrative. Similarly, platforms such as GitHub have emerged as nexuses of collaborative innovation, hosting an array of open-source AI and machine learning projects.¹⁵⁷ These platforms are not mere repositories; they are vibrant ecosystems fostering iterative

¹⁵⁰ Jianmo Ni, *Amazon Review Data*, UCSD (2018), <https://nijianmo.github.io/amazon/index.html> [<https://perma.cc/8LT9-7HP9>].

¹⁵¹ *Netflix Prize Data*, KAGGLE, <https://www.kaggle.com/datasets/netflix-inc/netflix-prize-data> [<https://perma.cc/F98T-SVGD>] (last updated 2020).

¹⁵² Lee et al., *supra* note 146, at 7–8.

¹⁵³ *Id.* at 7.

¹⁵⁴ *See Data Brokers*, EPIC, <https://epic.org/issues/consumer-privacy/data-brokers/> [<https://perma.cc/TDQ3-WC72>] (explaining that a “data broker” is a business or organization that collects and sells personal information about consumers, ranging from names and addresses to political leanings) (last visited Mar. 26, 2024).

¹⁵⁵ COMMON CRAWL, <https://commoncrawl.org/> [<https://perma.cc/EM7J-VEKJ>] (last visited Apr. 8, 2024).

¹⁵⁶ CREATIVE COMMONS, <https://creativecommons.org/> [<https://perma.cc/9CFE-LQCU>] (last visited Apr. 8, 2024).

¹⁵⁷ *GitHub Packages*, GITHUB, <https://github.com/features/packages> [<https://perma.cc/2BUF-SC6P>] (last visited Apr. 8, 2024).

development, global collaboration, and rapid dissemination of advancements in AI.¹⁵⁸

Yochai Benkler had conducted more than two decades worth of interdisciplinary research and published about how computers and communications technologies have made social sharing and exchange “a common modality of producing valuable desiderata at the very fore of most advanced economies—in information, culture, education, computation, and communication sectors.”¹⁵⁹ He calls this “commons-based peer production” and states that the goods produced are “relatively free of the structuring effects of property rights and the distribution of wealth.”¹⁶⁰ In this vein, various licenses exist to foster cooperation by ensuring that these goods remain free from proprietary claims. For example, the Free and Open Source Software movement (“FOSS”),¹⁶¹ led to the development of the GNU General Public License to ensure that software source code could remain free so that every user can “share and change all versions of a program.”¹⁶² In 2001, Lawrence Lessig helped to start the Creative Commons license, which also normalizes sharing.¹⁶³ Wikipedia is a result of this ethos of sharing, and is among the largest sources for data for GenAI.¹⁶⁴

¹⁵⁸ See Raina Haque et al., *Blockchain Development and Fiduciary Duty*, 2 STAN. J. BLOCKCHAIN L. & POL. 139, 180 (2019) (discussing open source development methods and motivations and legal liability).

¹⁵⁹ Yochai Benkler, *Sharing Nicely: On Sharing Goods and the Emergence of Sharing as a Modality of Economic Production*, 114 YALE L.J. 274, 278, 334, 343 (2004).

¹⁶⁰ *Id.*

¹⁶¹ Richard Stallman, *Free Software*, in KNOWLEDGE POLICY FOR THE TWENTY-FIRST CENTURY: A LEGAL PERSPECTIVE 2, 415 (Mark Perry & Brian Fitzgerald eds., 2011); *GNU General Public License*, GNU OPERATING SYSTEM, www.gnu.org/licenses/gpl.html [<https://perma.cc/HLG2-ZNEG>] (last visited Mar. 26, 2024).

¹⁶² *Id.*

¹⁶³ *What We Do*, CREATIVE COMMONS, <http://creativecommons.org/about> [<https://perma.cc/52FX-A4QU>] (last visited Mar. 26, 2024).

¹⁶⁴ See Kevin Schaul et al., *Inside the Secret List of Websites that Make AI like ChatGPT Sound Smart*, WASH. POST (April 19, 2024, 6:00 AM), <https://www.washingtonpost.com/technology/interactive/2023/ai-chatbot-learning/> [<https://perma.cc/3Y5K-ZUKL>].

These data troves are the bedrock upon which these generative models are trained. From the curated entries of Wikipedia to innumerable literary works, and from the billions of conversational snippets on platforms like Reddit to the repositories of images and multimedia content on the internet, the scope of open-internet-reliance is staggering.¹⁶⁵ With such a significant reliance on both public data and private ingenuity, GenAI raises unprecedented questions about the balancing between the incentivizing monopoly of patents and the public's reward for its contribution through the public domain. It is precisely this unique balance of interests that is, interestingly, so well solved by the tools patent law already has in the non-obviousness standard.

V. POLICY CONSIDERATIONS AND RECOMMENDATIONS FOR ABSORBING UBIQUITOUSLY AVAILABLE GENERATIVE AI INTO THE PHOSITA STANDARD

Mapping a relatively new technology to the existing non-obviousness framework does, expectedly, raise some policy considerations about its implementation. While new factors in these considerations will undoubtedly come to light as GenAI is tried and tested, this Part will discuss some of the present discourse and solutions legislators and judiciaries may wish to consider at the time of this Article's publication.

A. *Evaluating the AI-Assisted PHOSITA*

"The skilled standard must keep pace with real world conditions."¹⁶⁶ Although not explicitly listed as a factor, the open-endedness of the *Graham* framework and the changing non-obviousness standard set forth in *KSR* in light of the searchable internet suggests the important role that conventional tools and technology play in the level of ordinary skill. As the ordinary artisan rapidly absorbs GenAI into his toolkit, so too should examiners consider GenAI when determining the level of ordinary skill in the art. This approach treats AI as what it is—a tool to augment human

¹⁶⁵ See Huang, *supra* note 5, at 5 (citing that LAION-5B, which Stable Diffusion is trained on, has 5 billion text-image pairs and the Pile has 100+ GB of books).

¹⁶⁶ Abbott, *supra* note 86, at 5.

ingenuity and creativity—without invoking the fruitless rabbit hole that is the “significant contribution” standard. The elegance of the non-obviousness standard as a “technological razor” for handling AI-assisted inventions, just as it has for each previous technological renaissance, is that as the ubiquity of GenAI systems increases, the level of ordinary skill increases in turn by that same ubiquity. Patent examination may therefore easily adapt to advances in GenAI, without requiring an executive order for each future development.

1. *The “Average” AI at the Time of Filing*

What GenAI contributes to the level of ordinary skill, however, is a question almost as complicated as the PHOSITA itself. Conventional analysis of the PHOSITA has assumed a relatively constant intellect over time. Developments in the art are represented only by the neatly established priority date of a patent application.¹⁶⁷ There is no statutory consideration for how “advanced” humans were at the priority date, and indeed such a consideration would be misguided, since notable advances in human intellect are not routinely observed. Unlike humanity, however, GenAI is not guaranteed to (and, in fact, is almost certain not to) remain constant over time. Given the statutory mandate to reject inventions obvious “at the time the invention was made,”¹⁶⁸ examiners must consider the sophistication of generative systems available to the PHOSITA at the time of filing—a point which is generally two to three years earlier than when the analysis occurs.¹⁶⁹ Advances in GenAI over that span could be significant, reflecting several years’ worth of new data available to the system as well as training iterations and improved cognitive capabilities.

This point will undoubtedly prove challenging to evaluate, as previous versions of GenAI systems are often not maintained, and

¹⁶⁷ See 35 U.S.C. § 102. This section fixes prior art to only that available to the public at the day in which a patent application (or another from which it depends) is filed. This represents the “state of the art” at the moment the application is filed. In the United States, there are limited exceptions for otherwise-valid prior art derived from a patent’s own author(s), but generally this cutoff is absolute.

¹⁶⁸ § 103.

¹⁶⁹ See *Patents Pendency Data January 2024*, U.S. PAT. & TRADEMARK OFF., <https://www.uspto.gov/dashboard/patents/pendency.html> [<https://perma.cc/TYT5-44V3>] (last updated Dec. 8, 2023, 5:55 PM).

these models evolve by design with each prompt and output. The USPTO may choose to maintain proprietary GenAI models, perhaps indexed by month, year, or even day, that reflect an approximation of the industry's counterparts. Alternatively, it may maintain historical versions of those industry counterparts directly, or request that Congress impose that burden on the models' respective developers to head off access and privacy issues.¹⁷⁰ What an ordinary artisan would receive from using a GenAI model could be established by outputs from these archived models with simple prompting, with the examiner playing the role of a curious PHOSITA querying a commercially-available GenAI system. In some cases, this could even support a finding of non-obviousness, especially if conventional AI systems teach away from the proposed invention.

These early challenges should not sound a death knell for the proposed non-obviousness-driven analysis. A dutiful USPTO would need to consider the contribution from GenAI systems even under the current inventor-focused analysis, as the capability of an AI system affects whether an inventor's contribution has risen to a significant contribution (i.e., rising above simply regurgitating what an AI system has output) much like it affects whether the inventor's contribution is non-obvious over the contemporary generative capabilities of AI. Unlike the significant contribution standard, however, the non-obviousness-focused approach considers the state of the art as a whole, rather than a drudging investigation into each and every AI-assisted invention. Furthermore, it is not entirely reliant on what the purported inventor discloses (or fails to disclose) in arriving at a fair judgment of whether to award a patent.

¹⁷⁰ FUMIO MACHIDA, *N-Version Machine Learning Models for Safety Critical Systems*, in 2019 49TH ANNUAL IEEE/IFIP INTERNATIONAL CONFERENCE ON DEPENDABLE SYSTEMS AND NETWORKS WORKSHOPS (DSN-W), at 48–51 (2019); see also Josh Tucker & Josh G. Graham, *AI as Prior Art: New Hurdles and Horizons in Patent Disputes*, PILLSBURY (Apr. 20, 2023), <https://www.internetandtechnologylaw.com/generative-ai-llm-prior-art/> [<https://perma.cc/7A7F-SPMV>].

2. *Intrafield Disparities in GenAI Sophistication*

Different industries will undoubtedly experience significant differences in the usefulness of GenAI; while a GenAI model may output a complete and working computer science algorithm, for example, output of a chemical, biotechnical, or even mechanical GenAI model will likely require extensive verification and testing, at least for the foreseeable future.¹⁷¹ The USPTO's recent guidance already suggests unwieldiness in handling these field-specific differences, as it seemingly affords a chemical invention a patent for relatively standard post-conception testing while denying inventiveness for a similarly-conceived mechanical invention.¹⁷² The non-obviousness standard better absorbs intrafield differences by considering field-specific factors such as, among other things, the sophistication of the technology and education level of active workers.¹⁷³ It is therefore equally suited to fairly judge what level of contribution a GenAI system provides in one field without necessarily equalizing these systems across all fields.

B. Countering of Hindsight Bias Concerns in Light of GenAI

“It has always been important to the [US]PTO and the courts to protect the inventor against the phenomenon that most inventions look obvious in retrospect.”¹⁷⁴ The Manual of Patent Examining Procedure (“MPEP”)—the distilled examination guidelines for patent examiners—acknowledges this tension, noting that “[t]he tendency to resort to ‘hindsight’ based upon an applicant’s disclosure is often difficult to avoid due to the very nature of the examination process” despite mandating that “impermissible hindsight must be avoided and the legal conclusion must be reached

¹⁷¹ See Calum Chace, *First Wholly AI-Developed Drug Enters Phase 1 Trials*, FORBES (Feb. 25, 2022, 4:45 AM), <https://www.forbes.com/sites/calumchace/2022/02/25/first-wholly-ai-developed-drug-enters-phase-1-trials/?sh=6c878fbe2680> [<https://perma.cc/7HVQ-QS8D>].

¹⁷² See *AI-Related Resources*, U.S. PAT. & TRADEMARK OFF., <https://www.uspto.gov/initiatives/artificial-intelligence/artificial-intelligence-resources> [<https://perma.cc/33EW-SW9D>] (last updated Feb. 12, 2024, 10:16 AM). In particular, compare *Transaxle for Remote Control Car (Example 1)* and *Developing a Therapeutic Compound for Treating Cancer (Example 2)*. *Id.*

¹⁷³ See *Jacobson Bros., Inc. v. U.S.*, 512 F.2d 1065, 1071 (Ct. Cl. 1975).

¹⁷⁴ Barton, *supra* note 48, at 496.

on the basis of the facts gleaned from the prior art.”¹⁷⁵ In the world of human-derived inventions, this caution serves to safeguard legitimate inventions cursed with the quality of being easy to follow while protecting the public domain against trivial improvements that could be pieced together by an automaton. Equally underlying this policy is the reality of the disconnect between a patent application and the technology it protects; what seems simple when described on paper may not be so trite in reality.

Inventions derived from GenAI output should receive similar protection. The potential for improper hindsight is equally present, if not more so, as inventors and examiners alike gain increasing access to GenAI systems. For instance, it is apparent even in this early stage that inventiveness may be found in the particular choice of words used to query an AI system.¹⁷⁶ Much like the claims of a patent application, however, the inventive process taken to derive a successful prompt is not apparent from the prompt itself. This makes the examiner’s consideration of whether a prompt demonstrates creativity rising to the level of non-obviousness susceptible to impermissible hindsight, perhaps even more so than the claims of a patent application. Examiners may wish to consider factors such as complex grammar or eloquent phrasing, the creative use of jargon, alternative prompts that would result in similar or identical outputs (assuming the examiner has access to a comparable GenAI system from the time the invention was made), and similar prompts that do not result in similar or successful outputs. If an examiner is unable to easily replicate the purported invention using contemporary GenAI, the solution should, by definition, be non-obvious.

C. The Role of Data in Non-Obviousness

The current discourse around GenAI inventions is quick to downplay the contribution from developers and trainers of these

¹⁷⁵ U.S. PAT. & TRADEMARK OFF., *supra* note 54, § 2142 (Legal Concept of Prima Facie Obviousness).

¹⁷⁶ Although diverging from the USPTO’s current guidance on many points, their conclusion that inventiveness may be found in the creativity needed for generating a successful input to a generative AI system is aligned with this proposal. This creativity, however, would better be described as a non-obvious activity than a significant contribution to an invention.

GenAI systems. This dismissal, however, is not aligned with the reality of GenAI operation. Perhaps counterintuitively, general purpose GenAI trained on untold volumes of training data is not the gold standard for meaningful output. The quality of training data, measured by factors such as consistency, diversity, and absence of bias, is one of the strongest indicators of quality machine-learning outputs.¹⁷⁷ Rarely are widely available commercial systems trained with the diligence needed to produce non-obvious outputs. OpenAI's ChatGPT, for instance, accepts unfiltered feedback from the general population it interacts with.¹⁷⁸ Current GenAI models may get worse, not better, over time as they interact with the public.¹⁷⁹ This reality evidences that the pre-solution activity of training a GenAI system can contribute to non-obvious solutions in the same vein as the prompt used to query the GenAI system. If a GenAI system is trained on highly specialized, proprietary data, its outputs may be more profound and sensible, in the same way that a human inventor rises above the level of an ordinary worker. A model that is fine-tuned on specialized data to perform a specific function, solve a specific problem, or reason about a specific field could produce outputs that rise above the obvious outputs of other, more ubiquitous GenAI models.

¹⁷⁷ See Giuseppe Fenza et al., *Data Set Quality in Machine Learning: Consistency Measure Based on Group Decision Making*, 106 APPLIED SOFT COMPUTING (2021); *The Importance of High-Quality Training Data for Building Machine Learning and Deep Learning Models*, LINKEDIN (Aug. 11, 2023), <https://www.linkedin.com/pulse/importance-high-quality-training-data-building-machine-learning/> [<https://perma.cc/JSH2-B9HM>].

¹⁷⁸ See Rowena Zaballa, *User and AI Model Interaction: Does ChatGPT Learn from Users?*, PENJI (Oct. 28, 2023), <https://penji.co/does-chatgpt-learn-from-users/> [<https://perma.cc/K4RF-N95T>].

¹⁷⁹ In fact, current trends shows that certain GenAI systems are getting worse over time the more they interact with the public. See e.g., Lauren Leffer, *Yes, AI Models Can Get Worse Over Time*, SCI. AM. (Aug. 2, 2023), <https://www.scientificamerican.com/article/yes-ai-models-can-get-worse-over-time/> [<https://perma.cc/F2AN-ECVR>]. OpenAI's large language model GPT-4 was tasked with classifying 500 prime numbers in both March 2023 and June 2023, and while it correctly labeled 97.6 percent of them in March, it correctly labeled only 2.4 percent in June—fascinatingly, a perfect reversal in accuracy.

D. The Future Evolution of GenAI and its Regulation

It would be naive to assume that GenAI, as it is now, is how it will be forever. Technology changes, and so too does regulation. Legislation and regulation is proposed around all aspects of GenAI, at every step of its supply chain, and from every angle—copyright concerns; privacy concerns about their training datasets; explainability and bias concerns about their methods and results; the environmental cost of their computing processes and internal algorithms; the digital divide in their cost and access to end users; cognitive atrophy of their users; the worrisome centralization and commodification of cloud data and infrastructure—these are all ripe concerns for policy makers that will impact GenAI as a tool for end users. How GenAI operates today may very well not be how it operates in a year in light of these policy concerns. Because of this, agencies like the USPTO need to identify where in the apparatus of their regulatory delegations they are allowed to evolve standards with changes in technologies. It could be that GenAI is not a ubiquitous tool in some arts, while it is for others, or that it loses its popularity or effectiveness over time.

Fortunately for the USPTO, it is, once again, the non-obviousness standard that has the built-in elasticity to account for such societal shifts without requiring an extensive reimagining of patent law. The PHOSITA is the entity best poised and best able to benefit or suffer from, and therefore represent, these changes in the ubiquity of GenAI, whether due to governmental restrictions, divides in access due to cost, or public availability of training data. By turning to the conceptually simple analysis of whether one's use of GenAI was within "ordinary creativity," the USPTO circumvents having to reimagine the patentability standards with each new advance—or setback—in GenAI.

VI. CONCLUSION

The Supreme Court reminds us that "progress beginning from higher levels of achievement is expected in the normal course," and that "the results of ordinary innovation are not the subject of exclusive rights under the patent laws. Were it otherwise, patents

might stifle, rather than promote, the progress of useful arts.”¹⁸⁰ The conclusion from *KSR* proves its timelessness:

We build and create by bringing to the tangible and palpable reality around us new works based on instinct, simple logic, ordinary inferences, extraordinary ideas, and sometimes even genius. These advances, once part of our shared knowledge, define a new threshold from which innovation starts once more.¹⁸¹

Any technology, be it typewriters, the internet, GenAI, or artificial reality, will inevitably cross the threshold from extraordinary to ordinary. There is only one patentability standard poised to assess the ordinary, and that is the non-obviousness standard. This non-obvious razor is patent law’s best existing option to adapt to advances in GenAI. It simply but effectively handles the policy balance that GenAI is not only dependent on society’s shared knowledge, but is poised to become society’s ubiquitous go-to for problem solving. These tools may raise the threshold for what is considered non-obvious, but it does not follow that everything should become obvious; patent law and procedure can and should adapt as best as possible to “promote progress,” as it has before. GenAI, as dazzling as it is, does not obviate the non-obvious standard.¹⁸²

¹⁸⁰ *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007).

¹⁸¹ *Id.*

¹⁸² Ryan Abbott opines that in about 25 years AI may advance so much that it will not only solve “known problems, but unknown problems” but will transform “into artificial superintelligence . . . [which will] mean the end of obviousness. Everything will be obvious to a sufficiently intelligent machine.” RYAN ABBOTT, *THE REASONABLE ROBOT: ARTIFICIAL INTELLIGENCE AND THE LAW* 99 (2020). In such cases, we posit that a new patent class may be in order. We are planning a future publication to contemplate this, “Plant Patents as Precedence for Generative AI.”