# ARTICLE

## ENABLING ARTIFICIAL INTELLIGENCE

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ABSTRACT

An inventor's patent must enable others to make or use their invention. This rule is referred to as the enablement requirement. The enablement requirement ensures that the inventor is in possession of the invention. In addition, the enablement requirement ensures that, in exchange for a patent, the public has received a sufficient invention disclosure.

Historically, the application of the enablement requirement has differed based on the technology in question. Inventions in the "predictable" arts, such as engineering, have required less description to meet the enablement requirement. In contrast, unpredictable inventions, in areas such as biotechnology, have required more detailed disclosures to satisfy the enablement requirement.

Inventions that incorporate artificial intelligence (AI) present an interesting challenge for the enablement doctrine. AI has its origins in the disciplines of math and computer science. Both disciplines are traditional examples of predictable technology. Yet, AI inventions are perceived to produce unpredictable results.

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In a recent request for public comment, the United States Patent and Trademark Office (USPTO) asked: "How can patent applications for AI inventions best comply with the enablement requirement, particularly given the degree of unpredictability of certain AI systems?" The USPTO's question raises a larger inquiry: Is the enablement requirement a significant impediment to the patenting of AI inventions? If so, what should be done to incentivize inventors to patent AI technology?

This Article concludes that the current enablement doctrine is not a significant doctrinal obstacle to the patenting of AI inventions. Further, it argues that the enablement requirement should not be modified in response to AI inventions nor should the standard be applied differently to inventions directed to AI.

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## I. INTRODUCTION

What is artificial intelligence (AI)? One of the earliest definitions of AI is attributed to John McCarthy in 1955. McCarthy defined AI as a machine that could behave as though it were intelligent.[1] A more interesting definition, attributed to Elaine Rich, is that "*[a]rtificial intelligence* . . . is the study of how to make computers do things at which, at the moment, people are better."[2] This last definition encapsulates the technical promise of AI. In less than a century, AI applications have evolved from simple programs that can play checkers to applications that can understand natural language and beat humans at the game "Jeopardy!"[3]

Although AI in various forms has existed for decades, recent progress has attracted new attention from innovation stakeholders. Developments in the area of neural networks ushered in an AI revolution in 2010.[4] These deep learning neural networks allow AI applications to classify images.[5] One such application of this technology is autonomous vehicles, which could reshape human transportation. That is, if machines can become as good or better at driving than humans, navigating a city could become more safe, more efficient, and consume less resources.[6]

The United States Patent and Trademark Office (USPTO) seems to understand the significance of this moment.[7] How the USPTO engages AI will likely shape U.S. innovation for decades. In a 2019 speech, then-Director Iancu said that understanding and exploiting AI would be important if the United States is to keep

1. *See* WOLFGANG ERTEL, INTRODUCTION TO ARTIFICIAL INTELLIGENCE 1 (Springer Int'l Publ'g AG 2d ed. 2017) (2011).

2. ELAINE RICH, ARTIFICIAL INTELLIGENCE 1 (Eric M. Munson & Joseph F. Murphy eds., 1983).

3. *See* ERTEL, *supra* note 1, at 6–7.

4. *See id.* at 11.

5. *Id.*

6. Paul Gao et al., *A Road Map to the Future for the Auto Industry*, MCKINSEY Q., Oct. 2014, at 9–11.

7. *See, e.g.*, *Remarks by Director Iancu at the Artificial Intelligence: Intellectual Property Considerations Event*, USPTO (Jan. 31, 2019) [hereinafter *Remarks by Director Iancu*], https://www.uspto.gov/about-us/news-updates/remarks-director-iancu-artificial-intelligence-intellectual-property [https://perma.cc/7HSU-JT3U] (discussing the capabilities and economic impact of AI); *see also generally* Request for Comments on Patenting Artificial Intelligence Inventions, 84 Fed. Reg. 44889 (Aug. 22, 2019) [hereinafter Request for Comments] (listing a number of questions from the USPTO regarding AI).

pace with other countries, such as China.[8] In 2019, the USPTO issued a request for comments on AI. The request asked the public for responses to several questions ranging from how AI should be used in the patent examination process to whether inventions created by AI should be eligible for patenting.[9]

One question concerned patent law's enablement requirement. It asked, "How can patent applications for AI inventions best comply with the enablement requirement, particularly given the degree of unpredictability of certain AI systems?"[10] The USPTO's question raises a larger inquiry. Is the enablement requirement a significant impediment to the patenting of AI inventions? If so, what should be done to incentivize inventors to patent AI technology? This Article concludes that the current enablement doctrine is not a significant doctrinal obstacle to the patenting of AI inventions. Further, it argues that the enablement requirement should not be modified in response to AI inventions nor should the standard be applied differently to inventions directed to artificial intelligence.

In patent law, the enablement requirement states that a patentee must describe her invention in enough detail that any person having ordinary skill in the art (PHOSITA) can make or use the invention without undue experimentation.[11] Thus, to determine whether an invention is enabled, one must look to the patent's specification. If the invention is enabled, the specification should include enough information to allow a PHOSITA to practice the invention.[12] Because the patent must enable a PHOSITA, the specification does not need to disclose what is well-known in the art.[13] Further, the patent specification does not need to hold the hand of skilled technologists. Some effort and experimentation on

8. *See Remarks by Director Iancu*, *supra* note 7.

9. *See* Request for Comments, *supra* note 7.

10. *See id.* Note that the question assumes that some AI inventions are unpredictable.

11. 35 U.S.C. § 112(a); Alan L. Durham, *Patent Scope and Enablement in Rapidly Developing Arts*, 94 N.C. L. Rev. 1099, 1103–04 (2016).

12. *See* Amgen Inc. v. Sanofi, Aventisub LLC, 987 F.3d 1080, 1084 (Fed. Cir. 2021), *cert. granted in part sub nom.* Amgen Inc. v. Sanofi, No. 21-757, 2022 WL 16703751 (U.S. Nov. 4, 2022) ("The purpose of the enablement requirement is to ensure that the public is told how to carry out the invention, i.e., to make and use it.").

13. *See* DONALD S. CHISUM, 3 CHISUM ON PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY, AND INFRINGEMENT § 7.03[6] (Matthew Bender & Co., Inc. 2021) (1978) (explaining that well-known information may be omitted from the specification).

behalf of the PHOSITA is acceptable.[14] However, for inventions in unpredictable technology areas, a more thorough disclosure may be required if a PHOSITA needs significant guidance to practice the invention.[15]

In addition to this educational function, enablement also serves to accomplish other patent system goals. One of the more important functions of the enablement requirement is that it limits the ability of a patentee to claim a property right in more than they have invented. The enablement requirement accomplishes this by requiring a patentee's claim scope to be commensurate with what is described in the patent disclosure.[16]

Policies that force patentees to narrow the scope of their patent claims disadvantage the patentee and benefit follow-on innovators. Specifically, it may discourage an inventor from inventing and/or commercializing their invention. Conversely, patentees prefer to have a broad claim scope, which negatively impacts competitors and follow-on innovators. Thus, innovation policymakers must balance two competing considerations. How does the patent system incentivize inventors to invent (*ex ante*) while at the same time provide ample opportunity for market competition and follow-on inventive activity (*ex post*)?

Current law responds to these competing incentives by focusing on the patent disclosure: broader patent claims are granted to patentees that provide a "thorough" disclosure.[17] Further, in unpredictable technology areas, the law requires a "disclosure sufficient to enable one skilled in the art to carry out the invention commensurate with the scope of his claims."[18] See the enablement continuum chart below:

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14. *See* N. Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 943 (Fed. Cir. 1990) (concluding that requiring routine and ordinary effort did not support a finding of undue experimentation).

15. *See Amgen Inc.*, 987 F.3d at 1088 (agreeing with the district court that given the unpredictability in the art, the patent did not provide significant guidance or direction).

16. *See* Nat'l Recovery Techs., Inc. v. Magnetic Separation Sys., Inc., 166 F.3d 1190, 1196 (Fed. Cir. 1999) (explaining that the scope of the claims must be less than or equal to what is disclosed in the specification plus "what would be known to one of ordinary skill in the art without undue experimentation").

17. *See* CRAIG ALLEN NARD ET AL., THE LAW OF INTELLECTUAL PROPERTY 64 (5th ed. 2017) (explaining two functions of enablement requirement).

18. *See* Amgen, Inc. v. Chugai Pharm. Co., 927 F.2d 1200, 1213 (Fed. Cir. 1991).

| Enablement Continuum | | Claim Scope | |
|---|---|---|---|
| | | Narrow | Broad |
| Tech Predictability | Predictable | Normal disclosure required. Follow-on innovators benefit. | “Thorough” disclosure required. Patentee benefits. |
| | Unpredictable | “Significant” disclosure required. Follow-on innovators benefit. | “Significant” disclosure required. Patentee benefits. |
| | | *Favors *ex post* incentives. | *Favors *ex ante* incentives. |

Given this existing framework, this Article explores various aspects of the enablement doctrine and how it might impact AI inventions. What is the effect of the enablement requirement on AI inventions? Should the application of the enablement requirement be modified to incentivize innovation in the AI space?

In its current state, the enablement doctrine does not seem to be a significant impediment to the patenting of AI inventions. First, in comparison to other statutory requirements, enablement seems to be a relatively easy requirement to satisfy. For example, it does not require an inventor to understand exactly how an invention works[19] and, at the same time, requires those who wish to practice the patent to use some reasonable effort.[20] In practice, patents are rarely invalidated for lack of enablement.[21] Moreover, the primary function of the enablement doctrine is to limit claim scope.[22] The enablement doctrine's purpose arises in patent litigation to ensure that a patentee has adequately described in a patent specification what they have claimed as their invention.

Second, despite recent legal developments concerning the enablement of biological inventions, this Article argues that no

19. *See* Fromson v. Advance Offset Plate, Inc., 720 F.2d 1565, 1570 (Fed. Cir. 1983) (“[I]t is axiomatic that an inventor need not comprehend the scientific principles on which the practical effectiveness of his invention rests.”).

20. *See* N. Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 943 (Fed. Cir. 1990) (concluding that requiring routine and ordinary effort did not support a finding of undue experimentation).

21. *See* Colleen V. Chien, *Contextualizing Patent Disclosure*, 69 VAND. L. REV. 1849, 1862 (2016) (arguing that patents are rarely rejected on enablement grounds).

22. Sean B. Seymore, *Patenting Around Failure*, 166 U. PA. L. REV. 1139, 1150 (2018).

modifications to the enablement doctrine are necessary. Courts and patent examiners already possess the legal tools to address enablement questions related to AI inventions, and current enablement law does not need to be redesigned for AI despite the perceived unpredictability of the field. It has been difficult to obtain guidance from court opinions on how best to satisfy the enablement requirement for inventions in unpredictable fields. Some jurisprudence suggests that courts have attempted to minimize the distinction between unpredictable and predictable technologies in enablement determinations.[23] However, the Federal Circuit's decision in *Amgen Inc. v. Sanofi, Aventisub LLC* advances the idea that for an invention in an unpredictable field to be enabled, a patent must provide sufficient guidance to make and use the full scope of the claims.[24] Recently, the Supreme Court granted the petition for certiorari in *Amgen Inc. v. Sanofi, Aventisub LLC*.[25] Thus, patent stakeholders must wait to see whether the Supreme Court provides further clarity on enablement.

Further, there is significant debate as to the effectiveness of the disclosure function of patents in disseminating technical knowledge. Contrary to popular belief, the purpose of the enablement requirement is not to provide patent stakeholders with a sufficient understanding of the patent. Requiring a higher level of disclosure to satisfy the enablement requirement could harm AI in two respects. First, the enablement requirement does little to increase the public's understanding of technology. Second, a robust enablement requirement would deter the exploitation of AI by limiting the contributions of follow-on innovators.

Given this understanding of the enablement requirement's purpose, it follows that for AI inventions, the enablement doctrine as we currently understand it is a sufficient legal standard. In sum, if we accept how enablement works in the real world and that AI is not significantly different from other emerging technologies, we understand that no changes are necessary.

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23. *See generally* Liebel-Flarsheim Co. v. Medrad, Inc., 481 F.3d 1371 (Fed. Cir. 2007); Auto. Tech. Int'l, Inc. v. BMW of N. Am., Inc., 501 F.3d 1274 (Fed. Cir. 2007).

24. *See* Amgen Inc. v. Sanofi, Aventisub LLC, 987 F.3d 1080, 1085 (Fed. Cir. 2021), *cert. granted in part sub nom.* Amgen Inc. v. Sanofi, No. 21-757, 2022 WL 16703751 (U.S. Nov. 4, 2022) (summarizing Sanofi's arguments as to why Amgen's claims are not enabled because they require undue experimentation).

25. Amgen Inc. v. Sanofi, 2022 WL 16703751, at *1.

This Article is one of few to consider how the enablement doctrine may impact AI inventions. Recent scholarly articles on enablement have focused on the doctrine's shortcomings and offered solutions for how it may be "fixed."[26] This Article contributes to the literature by analyzing how pro-AI innovation policy intersects with the enablement requirement.

Understanding how doctrinal rules impact the patenting of emerging technologies is a useful endeavor. It provides patent practitioners with a roadmap that allows them to counsel their clients with greater predictability. It flags opportunities for the USPTO to issue guidance to examiners and for legislative reform. A more robust enablement requirement will do little to increase the public's understanding of AI. Further, a more rigid enablement requirement will increase the scope of patent claims, which may discourage follow-on innovation. A strict enablement requirement also increases the cost of patenting because applicants must spend more time and resources to include necessary information in the specification.

This Article will begin by discussing AI and enablement in Part II. Part III elaborates on the Article's main claim: the patent system should not change how the test for enablement is applied to AI inventions.

## II. ARTIFICIAL INTELLIGENCE AND PATENT LAW'S ENABLEMENT DOCTRINE

This part provides a brief introduction to AI. It then summarizes the law of enablement, highlighting aspects of the doctrine that are relevant to AI. These topics will provide a foundation for understanding the arguments and policy proposals put forth in Part III.

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26. *See generally* Jason Rantanen, *The Doctrinal Structure of Patent Law's Enablement Requirement*, 69 VAND. L. REV. 1679 (2016) (recommending that courts "make explicit the process of target articulation for purposes of the enablement inquiry"); Chien, *supra* note 21 (arguing for a broader "contextual" approach to patent disclosure examination).

## *A. Artificial Intelligence*[27]

Defining AI can be difficult. Different definitions exist across technology domains. The meaning of the term has also evolved over time. Experts within the fields of computer science and mathematics have defined different types of AI. These complexities reveal that AI is both more and less than what Hollywood has depicted in film.[28] In sum, in order to design a coherent innovation policy for AI, decision-makers must first understand and then define exactly what type of AI applications their policies are designed to incentivize.

> When discussing AI, fact must be separated from fiction. General AI, an all-knowing, all-seeing computer brain that can do every human job, does not exist. Different predictions exist for if and when general AI will become a reality. According to one commentator, general AI could come into being as early as 2050. Other commentators are much more skeptical and predict it will be at least another century if more before general AI technology is realized. Some researchers argue that it will never exist.
>
> In the alternative, [narrow] AI is a technology that is well-suited to operate in a discrete problem domain. [Narrow] AI is defined as "mathematical model for prediction." For example, an AI technology that is tasked with determining how a baseball team can maximize its chance of winning is a [narrow] AI model. The outcome is concrete and the problem domain is narrowly defined. [Narrow] AI is our current reality.
>
> In her book, *Weapons of Math Destruction*, Cathy O'Neil explains that an important building block of artificial technology systems is modeling. A model is a simplistic representation of a system. That system could be the world at large, but more likely, the system represents a discrete problem domain. Games such as Go are a primary example of a discrete domain where [narrow] AI technology can gain a competitive advantage. Each player has a clear objective and their moves are confined to a finite number by the rules of the game. In these situations, computers shine because

27. Portions of this section were excerpted from W. Keith Robinson, *Artificial Intelligence and Access to the Patent System*, 21 NEV. L.J. 729, 751–53 (2021).

28. *See* ERTEL, *supra* note 1, at 1 (stating that AI "[invokes] fears of intelligent cyborgs").

> their raw computing power allows a game [narrow] AI to process thousands of move possibilities in seconds.[29]

Another important building block for AI systems is data.[30]

> Typically, the more data available, the more complex the system. In addition, the more data there is available from a historical standpoint, the better a model can be at making predictions about the future. The rise of big data has allowed for mathematical modeling to reach new heights.
>
> Big data is the explosion in the quantity of potentially useful data. The advancements made in computing power and storage have made it possible for this field of endeavor to exist. In addition, interconnectivity has been instrumental in allowing the sharing of data across the globe. One development that has been instrumental in the field of big data is the proliferation of the smart phone. This device has allowed the collection of huge amounts of data from individuals in various walks of life and in various locations across the globe.[31]

Data is a collection of past human interactions and behaviors.

> Data is used to train AI technologies. This is often referred to as machine learning. These technologies learn from the data and use what they have learned to make determinations or predict what is likely to happen in the future.
>
> . . . .
>
> It is no surprise then that billions of dollars are spent each year to collect and store data in every human endeavor from shopping to medical information. This data is used to create models. As time passes, these models become more accurate at predicting possible future outcomes. Armed with some idea of what is likely to happen in the future, AI developers [can] shape the course of human events.
>
> Often the human effort required to achieve a technological accomplishment is dwarfed by the technology itself. For example, the atomic bomb is marveled at as a significant technical accomplishment. However, Richard Rhodes' book,

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29. W. Keith Robinson, *Artificial Intelligence and Access to the Patent System*, 21 NEV. L.J. 729, 751 (2021).

30. MEREDITH BROUSSARD, ARTIFICIAL UNINTELLIGENCE: HOW COMPUTERS MISUNDERSTAND THE WORLD 32 (2018) (explaining that narrow AI relies on datasets).

31. Robinson, *supra* note 29, at 752.

> *The Making of the Atomic Bomb*, captures the human effort and toll that went into the creation of such a powerful weapon. Similarly, the team that worked on AlphaGo is an example of the power of collective human achievement.
>
> Why is it important to remember the human effort that created such technological marvels? For one, it reaffirms the ingenuity and creativity of humans as a species. It is a subtle reminder that given proper motivation and resources, the collective ability of humans can do amazing things.[32]

Second, the innovation policies that govern the creation of AI innovation are designed to incentivize human (inventor) behavior.

"These [reminders] are incredibly important in this era of AI enthusiasm."[33] The idea of AI enthusiasm permeates through recent literature about AI.[34] AI enthusiasm is placing an irrational amount of confidence in a technological solution. Irrationality causes the creators of the technology and those who put it to use to not question the results.[35] In addition, as documented throughout the book *Weapons of Math Destruction*, AI enthusiasm can result in the implementation of hasty policy with disastrous consequences.[36] Accordingly, once we understand AI enthusiasm, we can then put systems in place to combat its negative side effects.

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32. Robinson, *supra* note 29, at 752–53.

33. *Id.* at 753.

34. *See* BROUSSARD, *supra* note 30, at 44; SAFIYA UMOJA NOBLE, ALGORITHMS OF OPPRESSION: HOW SEARCH ENGINES REINFORCE RACISM 1 (2018) (defining the phrase "technological redlining" as the way in which technology reinforces oppressive social relationships). *See generally* CATHY O'NEIL, WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY 3 (2016) (referring to biased models as "Weapons of Math Destruction").

35. *See* BROUSSARD, *supra* note 30, at 44.

36. *See* O'NEIL, *supra* note 34, at 7–8 (referring to the firing of over 200 teachers based on a problematic statistical model).

### *B. Patent Law's Enablement Requirement*

*1. Disclosing an Invention.* The primary purpose of a patent is to disclose information related to a new and useful invention.[37] A patent application must include a written specification.[38] The patent statute includes "disclosure" requirements that must be satisfied by the specification for the USPTO to grant the patent.[39] Section 112 of the patent statute states that:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.[40]

There are several justifications for the disclosure requirement. First, disclosure helps achieve the patent system's goal of the broad dissemination of knowledge.[41] In exchange for disclosing their invention to the public, a patentee receives a limited "monopoly" to exploit their invention.[42] This is known as the "quid pro quo" of the patent system.[43] Another explanation for the disclosure requirement is that it disseminates useful information to the public.[44] Ideally, a patent disclosure spreads knowledge and teaches others how to use a new invention.[45] In

37. *See* Sean B. Seymore, *Patenting the Unexplained*, 96 WASH. U. L. REV. 707, 715 (2019) (emphasizing the importance of disclosure).

38. MPEP § 601(a)(2)(A) (9th ed. Rev. 10, June 2020); 35 U.S.C. § 112(a).

39. MPEP § 608 (9th ed. Rev. 10, June 2020).

40. 35 U.S.C. § 112(a).

41. J. Jonas Anderson, *Nontechnical Disclosure*, 69 VAND. L. REV. 1573, 1573 (2016) (discussing the goal of the patent system); *see also* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 151 (1989) ("[T]he ultimate goal of the patent system is to bring new designs and technologies into the public domain through disclosure.").

42. *See* Chien, *supra* note 21, at 1851 (arguing that these "exclusive rights are needed to induce innovators to lay open, or disclose, technical information to the world").

43. *See* Anderson, *supra* note 41, at 1585 (explaining the incentive to disclose theory); *see also* Chien, *supra* note 21, at 1851 (explaining that ideally the patent system rewards those who invest in innovation and disclose their inventions in a way that will spur follow-on innovation); Seymore, *supra* note 37, at 713 (explaining quid pro quo of patent system).

44. *See* Seymore, *supra* note 37, at 712 (explaining that one function of the patent document is to provide the public with details of the invention).

45. *See id.* at 714–15 ("[T]he disclosure conveys technical information."). *But see* Anderson, *supra* note 41, at 1581 (summarizing academic debate over disclosure).

addition, a patent disclosure promotes innovation by educating future innovators how to design around and improve the invention.[46]

There are three separate requirements embedded in § 112. They are the written description requirement, the best mode requirement, and the enablement requirement.[47] The purpose of the written description requirement is to ensure that the inventor was in possession of the invention.[48] In contrast, the purpose of the enablement requirement is to enable one of ordinary skill in the art to make or use the invention without undue experimentation. The rest of this section and Article will focus on the enablement requirement.

*2. Enabling an Invention.* To be patented, an invention must satisfy the enablement requirement. An invention is enabled if it is disclosed such that a PHOSITA can make and use the invention without undue experimentation.[49] To determine whether this requirement is met, patent examiners typically review the patent application's specification. An examiner considers whether the information in the specification satisfies the enablement requirement with respect to what the applicant has defined as the invention, indicated by the patent claims.[50] An enabling disclosure is considered the "sine qua non of a valid patent."[51]

The enablement requirement has two primary functions. First, it ensures that the type of information disseminated in a patent's disclosure is useful to the public.[52] Second, the enablement requirement places limits on how broad a patent's

46. *See* Anderson, *supra* note 41, at 1586 (describing a limited role-of-disclosure theory); *see also* Sean B. Seymore, *Uninformative Patents*, 55 HOUS. L. REV. 377, 395 (2017) (explaining that disclosure stimulates fast follow-on innovation); Seymore, *supra* note 37, at 716 (describing the various ways in which the public can make use of a patent disclosure).

47. *See* Michael Dignan, *Of Experimentology: A Genealogical Deconstruction of Invention in Patent Law's Enablement Requirement*, 18 WAKE FOREST J. BUS. & INTELL. PROP. L. 40, 43 (2017); *see also* 35 U.S.C. § 112(a).

48. *See* Alan L. Durham, *Patent Scope and Enablement in Rapidly Developing Arts*, 94 N.C. L. REV. 1101, 1105 (2016).

49. 35 U.S.C. § 112(a); *see* Durham, *supra* note 48, at 1103–04 (explaining that enablement may be broken down into two parts: (1) "how to make"; and (2) "how to use").

50. Chien, *supra* note 21, at 1856–57.

51. *See* Durham, *supra* note 48, at 1103.

52. *See* NARD ET AL., *supra* note 17, at 46 (explaining two functions of enablement requirement); *see also* Seymore, *supra* note 37, at 717 (discussing enablement's teaching function).

claims are by requiring that the patent's specification enable the full scope of the patent's claims.[53]

The justification for requiring an enabling disclosure is the idea that the purpose of the patent system is to incentivize the disclosure of inventions to the public. This facilitates the dissemination of knowledge and technical know-how.[54] In return for a patentee's disclosure, the government gives the patentee a limited amount of time to exploit their exclusive patent rights.[55] For the patentee, this period of exclusivity is beneficial and worth her up-front time and financial investment.[56]

Enablement is intended to benefit the public in two ways. First, it provides the public with technical knowledge.[57] That is, a patentee has enabled the invention by revealing its secrets.[58] Second, once the patent expires, theoretically the public acquires complete possession of the invention.[59]

Enablement is a question of law.[60] While the statute is straightforward, commentators have argued that the judicial interpretation of enablement is more important than the statutory language.[61] Accordingly, to understand the enablement requirement, stakeholders have looked to its application by patent examiners and the courts.

53. *See* NARD ET AL., *supra* note 17, at 46; *see also* Chien, *supra* note 21, at 1856 ("The purpose of the enablement requirement, codified in the international TRIPS agreement, is to ensure that the public is gaining from the patent specification a level of knowledge that is commensurate with the scope of the patent's claims.").

54. *See* Anderson, *supra* note 41, at 1574–75, 1578; *see also* Sean B. Seymore, *Patenting Around Failure*, 166 U. PA. L. REV. 1139, 1150 (2018) ("By compelling an applicant to prepare a written description of the invention sufficient to teach a PHOSITA how to make and use it without undue experimentation, enablement ensures that the applicant's disclosure sufficiently enriches the public storehouse of technical knowledge and that the public will get complete possession of the invention once the patent expires.").

55. *See* Seymore, *supra* note 37, at 713.

56. *See* Chien, *supra* note 21, at 1851.

57. *See* Seymore, *supra* note 54, at 1150; *see also* Chien, *supra* note 21, at 1856.

58. *See* Dignan, *supra* note 47, at 106 (characterizing the enablement requirement as revealing an inventor's secrets).

59. *See* Seymore, *supra* note 54, at 1150.

60. *See* CHISUM, *supra* note 13, § 7.03[4][d](3)(b)(iii).

61. *See* Rantanen, *supra* note 26, 1680–81, 1685 (arguing that enablement is mostly defined in caselaw, not in the statute).

*3. Determining Whether an Invention is Enabled.* Legal decisions have defined the limits of the enablement requirement. Despite the fact that the specification is subject to statutory requirements, a patent applicant is not required to describe the invention in exhaustive detail. For example, the patent applicant is not required to describe what is already well-known in the relevant art.[62]

Nor is the enablement requirement tied to the production or commercialization of a product. Past patent regimes required a patentee to produce a physical product to satisfy the disclosure requirement.[63] In contrast, the current U.S. patent system does not require successful commercialization to obtain a patent. Further, lack of commercial success of an invention is not sufficient to prove that the invention is not enabled.[64] Instead, a patentee can satisfy the enablement requirement by disclosing embodiments of the invention that are within the scope of what the specification discloses, a.k.a. "prophetic examples."[65]

The central determination in an enablement dispute is whether, as of the patent's filing date, the patent specification allows a PHOSITA to make or use the invention without undue experimentation.[66] Enablement is "a legal conclusion that rests on underlying factual inquiries."[67]

One such factual inquiry concerns the PHOSITA. It is the PHOSITA, not a layperson, that the patent specification must enable to practice the invention.[68] The type of information a specification must disclose depends in part on the technology and amount of skill practitioners in the area possess.[69] A PHOSITA is

62. *See* CHISUM, *supra* note 13, § 7.03[6] (explaining that well-known information may be omitted from the specification).

63. *See* Chien, *supra* note 21, at 1854.

64. *See* CHISUM, *supra* note 13, § 7.03[4][e] (explaining that enablement does not require disclosure of a commercial product); *see also* CFMT, Inc. v. YieldUp Int'l Corp., 349 F.3d 1333, 1338 (Fed. Cir. 2003) ("Enablement does not require an inventor to meet lofty standards for success in the commercial marketplace.").

65. *See* Seymore, *supra* note 54, at 1148 (defining prophetic examples).

66. *See* Durham, *supra* note 48, at 1109, 1130 (describing a simple enablement suit).

67. *See* Seymore, *supra* note 37, at 718 (discussing the legal test for enablement); *see also* CHISUM, *supra* note 13, § 7.03[8][b].

68. *See* Durham, *supra* note 48, at 1105–06; *see also* Mowry v. Whitney, 81 U.S. 620, 644 (1871); Webster Loom Co. v. Higgins, 105 U.S. 580, 585–86 (1881) (explaining that the specification does not have to enable the "unskilled").

69. *See* Durham, *supra* note 48, at 1107–08 (describing how enablement varies with knowledge in the art and level of skill in the art).

presumed to have a vast knowledge of all the prior art in a specific technological domain. The relevant art relates to the problem to be solved.[70] Further, the PHOSITA is expected to use their expertise to fill in gaps in knowledge not disclosed in a patent specification.[71] Accordingly, one commentator has characterized the PHOSITA as an "idiot savant."[72]

Enablement disputes focus on whether the relevant patent specification allows a PHOSITA to make or use the invention without undue experimentation.[73] Prior to the 1952 Patent Act, the Supreme Court's view was that a disclosure was defective if it required a PHOSITA to experiment to make or use the invention.[74] Later, the Supreme Court modified its view, requiring that the disclosure not call for undue or unreasonable experimentation.[75]

Several factors are used to determine whether a PHOSITA can practice the invention without undue experimentation.[76] The test infers that the question is one of degree. That is, some experimentation is permissible up to a limit. If a PHOSITA must exercise ordinary effort to practice the invention, then the patent is sufficiently enabled.[77] To determine whether this limit is exceeded, courts have considered whether the specification "teaches away" from particular approaches and the success or lack thereof of the inventor or assignees in implementing the invention.[78]

Courts also use undue experimentation as a proxy for whether a technology is predictable.[79] This calculus has led to the view that

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70. *See* CHISUM, *supra* note 13, § 7.03[2][b][i] (explaining that the PHOSITA mentioned in §§ 103 and 112 presumably have similar characteristics); *id.* § 7.03[2][b][ii].

71. *See id.* § 7.03[8][b][6][a]; *see also* Rengo Co. v. Molins Mach. Co., 657 F.2d 535, 549 (3d Cir. 1981) (explaining that skill in the art must be used to supplement the description).

72. *See* Dan L. Burk, *Patent Silences*, 69 VAND. L. REV. 1603, 1614 (2016) (characterizing the PHOSITA as an "idiot savant").

73. *See* Durham, *supra* note 48, at 1109.

74. Wood v. Underhill, 46 U.S. 1, 4 (1847).

75. Mins. Separation, Ltd. v. Hyde, 242 U.S. 261, 271 (1916).

76. *See In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988) ("Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations.").

77. *See* N. Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 943 (Fed. Cir. 1990) ("[A] programmer of reasonable skill could write a satisfactory program with ordinary effort.").

78. *See* CHISUM, *supra* note 13, § 7.03[3][a][i] (explaining that evidence used to determine enablement includes difficulty of inventor and teachings away of inventor).

79. *See* NARD ET AL., *supra* note 17, at 62.

chemical and biological technologies are less predictable than technologies in the mechanical and electrical arts.[80] Whether the technological art the patent is directed to is predictable is one of the several *Wands* factors a court may consider in making an enablement determination.

In *In re Wands*, the Federal Circuit set forth several factors that are relevant to determining whether a patent is enabled. Those factors include:

> (1) the quantity of experimentation necessary; (2) the amount of direction or guidance presented; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill of those in the art; (7) the predictability or unpredictability of the art; and (8) the breadth of the claims.[81]

If the invention is complex, a consideration of the *Wands* factors can quickly increase the difficulty of the enablement inquiry.

Another factor courts consider when determining whether an invention is enabled is the number of embodiments disclosed in the patent's specification. Federal Circuit precedent seems inconsistent on this point.[82] There is evidence to suggest that disclosure of a single embodiment can be enough to satisfy the enablement requirement.[83] In contrast, another line of cases suggests that for the full scope of an invention to be enabled, the patent's specification must disclose multiple embodiments.[84] This last perspective coincides with the increase in patenting of chemical and biological patents, which may be considered more unpredictable than other technologies.[85]

80. *See id.* at 62–63; *see also* John R. Allison & Lisa Larrimore Ouellette, *How Courts Adjudicate Patent Definiteness and Disclosure*, 65 DUKE L.J. 609, 622 (2016).

81. *In re* Wands, 858 F.2d at 737.

82. *See* Fei Sha, *When Enough Is Not Enough: Can Post Filing Experimental Data Bridge the Gap in Patent Disclosure of Non-Enabling Specifications in the Unpredictable Arts?*, 18 J. MARSHALL REV. INTELL. PROP. L. 496, 499 (2019) (describing a perceived Federal Circuit split on enablement law).

83. *See* Rantanen, *supra* note 26, at 1681 (explaining that enablement is satisfied if one mode of the invention is disclosed); *see also* Spectra-Physics, Inc. v. Coherent, Inc., 827 F.2d 1524, 1533 (Fed. Cir. 1987) (stating that a broad claim can be enabled by the disclosure of one embodiment if the technology "pertains to an art where the results are predictable").

84. *See* Rantanen, *supra* note 26, at 1681–82 (discussing that another line of cases says enabling one mode of the invention is not enough).

85. *See* Fei Sha, *supra* note 82, at 505–09; John King & Paul Heisey, *Ag Bitotech Patents: Who Is Doing What?*, USDA ECON. RSCH. SERV. (Nov. 1, 2003), https://www.ers.usd

Indeed, there is some debate as to whether the enablement requirement should be applied uniformly to all patents despite their technology area or perceived importance.[86] It is well settled that a patent does not need to disclose routine technology, or those topics well understood in the art.[87] Similarly, after-arising technologies that are within the scope of the claimed invention but were not foreseeable at the time the patent was filed do not have to be enabled.[88]

Any information not falling into the two categories described above must be enabled. The disclosure must enable complex inventions that may be difficult to reverse engineer.[89] In addition, the Federal Circuit has held that "pioneering inventions" should not be held to a lower enablement standard.[90] That is, nascent technologies, despite their novelty, must be fully enabled to receive patent protection.[91] Despite this call for uniformity across technology areas, some differences in application of the enablement requirement can be observed because of differences in the predictability of certain technologies.

Whether an invention is a predictable or unpredictable technology is an important *Wands* factor in determining if an invention is enabled.[92] In predictable technologies, a PHOSITA can rely on general knowledge, their knowledge, and skill to make or use an invention without undue experimentation.[93] Omissions in a patent specification can easily be solved for in a predictable technology area.[94] For a patentee, this is particularly advantageous when an embodiment of the invention is claimed but not explicitly disclosed. Because that embodiment is in a predictable technology field, it is likely enabled even though it is

a.gov/amber-waves/2003/november/ag-biotech-patents-who-is-doing-what/ [https://perma.cc/5UQV-2GFU]; *see also* Chiron v. Genentech, 363 F.3d 1247, 1254–56 (Fed. Cir. 2004).

86. *See generally* Fei Sha, *supra* note 82.

87. *Chiron*, 363 F.3d at 1254.

88. *See* Durham, *supra* note 48, at 1101, 1130 ("[I]n fields of rapidly developing technology it is almost inevitable that, before the patent has expired, the claims will read on embodiments that the specification does not teach.").

89. *See* Seymore, *supra* note 37, at 714, 723–24 (explaining that disclosure plays an important role for inventions that cannot be easily reverse engineered).

90. CHISUM, *supra* note 13, § 7.03[3][a][ii][B][III] (explaining that pioneering inventions have the same enablement standard as other inventions).

91. *See* NARD ET AL., *supra* note 17, at 63.

92. JANICE M. MUELLER, PATENT LAW 161–62 (5th ed. 2017).

93. *See* NARD ET AL., *supra* note 17, at 62.

94. *See* Durham, *supra* note 48, at 1114.

not completely disclosed.[95] Thus, in a predictable field, the disclosure of a single embodiment of an invention may enable a broad claim/range of additional embodiments that a PHOSITA can make without undue experimentation.[96]

In contrast, a PHOSITA may not be able to make or use embodiments of an invention in an unpredictable technology area that are not sufficiently disclosed in the patent's specification.[97] Unpredictable technologies require greater disclosure to enable broad claims.[98] Without greater disclosure, the scope of a patent in an unpredictable technology field may be significantly less than the scope of a patent in a predictable field. In some unpredictable fields, such as antibody patents, this has been taken to the extreme.[99]

Some commentators have argued that distinguishing between predictable and unpredictable inventions for enablement is improper. Specifically, the statute makes no such distinction.[100] Further, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement cautions countries against treating fields of technology differently.[101] Despite these suggestions for uniformity, in the United States, inventions are clearly treated differently depending on the predictability of the technology.[102] One area where this distinction is acute is the comparison between the enablement standard for mechanical and electrical inventions to that of biotechnology.[103] This is because the underlying scientific principles in the mechanical and electrical arts allow a PHOSITA to make relatively accurate predictions as compared to biology or

95. *See id.*

96. *See id.*; *see also* Spectra-Physics, Inc. v. Coherent, Inc., 827 F.2d 1524, 1533 (Fed. Cir. 1987).

97. *See* NARD ET AL., *supra* note 17, at 62.

98. *See id.*; CHISUM, *supra* note 13, § 7.03.

99. *See* Fei Sha, *supra* note 82, at 497, 501, 505 ("When forty-one examples of a therapeutic antibody may still be deemed insufficient, what more can be done?").

100. *See* 35 U.S.C § 112.

101. *See* Allison & Ouellette, *supra* note 80, at 620 (explaining that TRIPS "imposes minimum levels of IP protection on all members of the World Trade Organization").

102. *See* NARD ET AL., *supra* note 17, at 62 (explaining that courts have historically made the distinction between predictable and unpredictable arts).

103. *See* Allison & Ouellette, *supra* note 80, at 624; *see also* Pharm. Res., Inc. v. Roxane Lab'ys, Inc., 253 F. App'x 26, 28 (Fed. Cir. 2007) (noting a higher enablement requirement due to the unpredictable nature of the art); Chien, *supra* note 21, at 1857 (explaining how disclosure requirements are stricter for unpredictable arts).

chemistry, where the result of the combination of certain elements are unknown before they occur.[104]

Although the language of the statute has remained mostly the same, there is some debate as to how the enablement requirement affects different technologies. For example, one commentator has argued that the courts have strengthened the enablement doctrine in response to the increase in patenting in the chemical, biotech, and pharmaceutical areas to require the disclosure of more than one embodiment of the invention to satisfy the statute.[105] Other commentators have argued that the law has imposed relaxed enablement standards for software inventions.[106]

One empirical study has attempted to determine how different technology categories are impacted by the enablement requirement.[107] In reviewing patent litigation decisions, the study found that patents in certain fields were less likely to be invalidated than in other fields.[108] The study is illuminating because it suggests that the predictability of a technology area is not always indicative of how the enablement doctrine will be applied. For example, the study found that traditionally predictable technologies in the computer and electronic industries were more likely to be invalidated for lack of enablement.[109] Technologies in traditional fields like electrical, chemistry, and mechanics were less likely to be invalidated.[110] However, the study does seem to confirm the observations of other commentators that the enablement doctrine is a challenge for biotech inventions. Specifically, the study found that patents in traditional technologies are less likely to be invalidated than biotechnology patents.[111]

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104. *See* NARD ET AL., *supra* note 17, at 62 (explaining the distinction between predictable and unpredictable arts).

105. *See* Fei Sha, *supra* note 82, at 499; *see also* Allison & Ouellette, *supra* note 80, at 621 (citing scholars that have argued that the § 112 standard is applied more rigidly to biotech patents).

106. *See* Allison & Ouellette, *supra* note 80, at 624 (describing lower enablement standards in software).

107. *See id.* at 624, 628.

108. *See id.* at 647.

109. *See id.*

110. *Id.*

111. *Id.* at 645–46 (concluding that biotech, optics, and software patents are less likely to withstand § 112 challenges).

It is unclear what the implications of these various perspectives are for AI inventions. Are AI inventions subject to a heightened enablement requirement? Researchers will need to examine the prosecution history and legal decisions to resolve that question. That effort is beyond the scope of this Article. However, the question this Article attempts to explore is whether the enablement requirement should be modified in response to AI inventions. To illuminate this question, the next section explores some critiques of the enablement requirement.

*4. Critiquing the Enablement Doctrine.* Several critiques of the enablement doctrine exist. Some critics argue that the burden on inventors to provide an enabling disclosure outweighs the benefit received by the public.[112] With respect to the public, other critics question whether the enablement doctrine is accomplishing the goal of disseminating knowledge to the public.[113] This critique raises two important questions. First, whether the enablement doctrine encourages the dissemination of useful information in patents? Second, whether public stakeholders such as inventors, scientists, and others are making use of the information included in patents?

Several observers have argued that the disclosure requirement fails to successfully incentivize innovators to disclose their knowledge.[114] One commentator has argued that inventors only disclose what is necessary to obtain a patent and keep any additional information undisclosed.[115] This practice is a function of the fact that, historically, inventors are able to obtain patents without complete disclosures.[116] In other cases, an innovator may be attempting to patent an invention that is also a trade secret. In those instances, withholding trade secret information from a

112. *See* Seymore, *supra* note 46, at 393 (arguing that robust disclosures disadvantage inventors).

113. *But see id.* at 392–93 (arguing that the public benefits from robust patent disclosures).

114. *See* Burk, *supra* note 72, at 1605 (arguing that there are a "surprising number of doctrines that allow and encourage patent applicants to remain silent about aspects of their inventions").

115. *See* Chien, *supra* note 21, at 1851 ("[W]hen inventors can keep inventions or details secret, they will, by declining to apply for patents or, in some cases, withholding key information from patent applications.").

116. *See id.* at 1859 (discussing Professor Machlup's factors that undermine the disclosure of the patent disclosure function).

patent disclosure may keep the patent specification from satisfying the enablement requirement.[117]

Another major theme in the literature is that the enablement requirement is ineffective because it fails to encourage the dissemination of robust scientific information and knowledge. For example, Professor Jacob Sherkow has argued that the "weak" enablement doctrine has produced a reproducibility problem in science.[118] Specifically, Sherkow argues that the doctrine encourages the early filing of patent applications that include irreproducible information.[119] That sentiment is echoed by another commentator that has observed that the incentive to file patents early results in less than complete invention disclosures.[120] Thus, there seems to be some agreement that encouraging early patent filings does little to advance knowledge in a particular technical area.[121]

An additional criticism of the enablement doctrine relates to what it demands of the inventor herself. Generally, an inventor does not need a complete understanding of how an invention works to be awarded a patent.[122] One commentator has argued that this principle leads to dissatisfactory disclosures because "an inventor . . . has no incentive to figure out how [her] invention works."[123] Thus, the enablement doctrine falls short of its promise to disseminate technical knowledge to the public.[124]

117. *See* CHISUM, *supra* note 13, § 7.03[3][b] (explaining that withholding trade secret information may keep claims from being enabled).

118. *See* Jacob S. Sherkow, *Patent Law's Reproducibility Paradox*, 66 DUKE L.J. 845, 868 (2017) (arguing that patents have caused the reproducibility problem).

119. *See id.* at 883.

120. *See* Chien, *supra* note 21, at 1852 ("The patent system . . . disfavors mature, complete disclosure . . . .").

121. *See* Seymore, *supra* note 54, at 1145 (arguing that early filing leads to nonenabled inventions).

122. *See* Seymore, *supra* note 46, at 387–88 (surveying a number of cases where courts found that a lack of understanding of the scientific principles of the invention on behalf of the inventor did not invalidate the patents); *see also* Seymore, *supra* note 37, at 720 (discussing that an invention does not need to be understood by the inventor to be enabled).

123. Seymore, *supra* note 46, at 377, 379 ("[E]xplaining how to make and use something without understanding how or why it works yields patents with uninformative disclosures.").

124. *See id.* at 382–84, 392 (arguing that minimally disclosed inventions deprive the public).

## III. IS THE ENABLEMENT DOCTRINE PROBLEMATIC FOR AI INVENTIONS?

Part II discussed enablement and AI. It also questioned whether the enablement requirement is a significant impediment to the patenting of AI inventions. This part argues that the answer is no. Further, it argues that the enablement requirement should not be modified in response to AI inventions nor should the standard be applied differently to inventions directed to AI.

First, enablement does not seem to be a significant bar to patentability. Patent examiners and courts rarely invalidate patents based on enablement grounds.[125] Instead, the enablement doctrine's primary function is to limit the scope of patent claims.[126] There is little evidence to suggest that the enablement doctrine is doing a poor job of controlling the claim scope of AI inventions.[127]

Second, despite recent legal developments concerning the enablement of biological inventions, no modifications to the enablement requirement or how it is applied are necessary to enable AI inventions. Modifying the enablement requirement will do little to change how the public uses patent disclosures to learn how AI inventions work.

The following sections expand on the arguments set forth above. In addition, the last section reviews some proposals for modifying the enablement doctrine and explains why their adoption for AI inventions should be rejected.

### *A. Lack of Enablement and AI Inventions*

The enablement requirement is very favorable to patentees. The Patent Office presumes that the information included in the specification is accurate.[128] Unless the examiner is given a valid reason to question the specification, patentees do not have to prove that they have satisfied the enablement requirement during

125. *See* Chien, *supra* note 21, at 1862.

126. *See* NARD ET AL., *supra* note 17, at 46 (explaining the two functions of the enablement requirement).

127. *See* Brian S. Haney, *AI Patents: A Data Driven Appro*ach, 19 CHI.-KENT J. INTELL. PROP. 410, 477 (2020) (discussing recent growth in the AI patent market); Tabrez Y. Ebrahim, *Artificial Intelligence Inventions & Patent Disclosure*, 125 PENN ST. L. REV. 147, 190–91 (2020).

128. 35 U.S.C. § 282(a) ("A patent shall be presumed valid.").

patent prosecution.[129] Further, evidence suggests that lack of enablement is one of the least used grounds for rejecting patent claims.[130]

If raised, enablement issues generally arise in the context of a challenge to a patent.[131] However, patents are rarely invalidated on enablement grounds.[132] One study has found that lack of enablement was not a significant problem for patents at the district court level.[133]

Instead, one of the most important functions of the enablement doctrine is that it corrals the scope of patent claims. The claims in a patent must be commensurate in scope with what is disclosed in the patent's specification.[134] A patent's specification must enable a PHOSITA to make or use each and every claim of the patent.[135] The patentee cannot claim an invention that is different or beyond the scope of what has been disclosed in the patent's specification.[136] If a patent applicant wishes to obtain broad claims, then they must also include a broad and thorough disclosure in their specification.[137] Conversely, narrow claims require a more targeted disclosure.

The enablement requirement pushes patentees toward an "optimal claim scope."[138] A patentee may prefer broad patent claims because they allow for strong enforcement of the patent.[139] But, because broad disclosures may be costly or less desirable to

129. *See* Rantanen, *supra* note 26, at 1703 (arguing that enablement is only an issue when the patent is challenged).

130. *See* Chien, *supra* note 21, at 1862–63 (explaining that patents are rarely rejected on enablement grounds).

131. Rantanen, *supra* note 26, at 1703 ("[T]he only context in which enablement is at issue is when someone other than the inventor challenges the enablement of a claim.").

132. Chien, *supra* note 21, 1862.

133. *See id.* at 1863; Allison & Ouellette, *supra* note 80, at 674 ("District courts as a group were significantly more likely than the Federal Circuit to uphold patents against charges that they lacked an enabling specification or contained an indefinite claim.").

134. NARD ET AL., *supra* note 17, at 62 (explaining the commensurability requirement).

135. *See id.* at 62–63.

136. *See* Durham, *supra* note 48, at 1116 (explaining how courts interpret this requirement to mean that the scope of the claims must be equal to or less than the scope of enablement).

137. NARD ET AL., *supra* note 17, at 64.

138. *See id.* at 52–53 (discussing how the *Morse* case illuminates the policy issue of optimal claim scope in patent law).

139. *See id.* at 64 (discussing how broad claims allow for greater patent protection).

the patentee for other reasons, the enablement doctrine helps place upper limits on what patentees claim as their invention.[140]

In this way, the enablement requirement balances incentives that have an impact on *ex post* activities.[141] Both broad patents and narrow patents are beneficial to overall innovation and commercialization efforts. However, different stakeholders benefit from these two types of patents. The patentee benefits from acquiring broad claims because they give her bandwidth to participate in commercialization activities that will allow her to bring her invention to market. In contrast, follow-on innovators benefit from enabled patents with narrow claim scope. A narrow patent gives follow-on innovators more freedom to operate.[142] Because the scope of the patent is narrow, the cost and risk to follow-on innovators to build off of the invention is low.

### *B. The Future of Enablement for AI Inventions*

Traditionally, enablement has not been a significant impediment to acquiring a patent. It follows that, in the absence of significant evidence to the contrary, the enablement requirement should not be changed for AI inventions. This Article advocates for a wait-and-see approach. Two factors support this proposal. First, there seems to be a perception gap between the promise of AI and the current capabilities of AI applications. Patent doctrine should react to reality not theoretical technology. Second, the enablement analysis may continue to evolve for technologies that have traditionally been considered unpredictable.[143] Together, these factors commend a deliberate approach to the enablement doctrine and AI.

One assumption is that an enhanced enablement requirement will lead to greater dissemination of technical information about AI. However, modifying the enablement requirement will do little to increase the public's understanding of AI inventions. While knowledge dissemination seems like a worthy outcome and primary benefit to the public, many scholars have argued that the

140. *See id.* at 41, 46.

141. *See id.* at 55.

142. *See id.* at 52–53 (explaining the *ex post* and *ex ante* incentives of enablement).

143. *See* Amgen Inc. v. Sanofi, No. 21-757, 2022 WL 16703751, at *1 (U.S. Nov. 4, 2022) (granting the petition for writ of certiorari as to Question 2).

primary benefit received by the public via the patent system is that it incentivizes invention.[144]

The enablement doctrine does not require a specification to educate the reader on how an invention works. The level of detail that must be provided in a traditional scientific article is generally much greater than the information that must be conveyed in an enabling disclosure.[145] Further, the law does not require an inventor to fully understand their own invention.[146] Despite these views, one commentator has persuasively argued that patents are sources of useful information.[147] Professor Jason Rantanen has argued that despite limits on what patentees are required to disclose, patents still effectively disseminate information in areas other than the patent document.[148]

However, for a variety of reasons, the public does not read patents. Accordingly, Professor Jeanne Fromer has argued that with respect to disclosure of the invention, patent documents are irrelevant.[149] In several industries, scientists ignore the disclosure.[150] Technical personnel do not prioritize the reading of patents when searching for technical information.[151] Patents consistently rank below other forms of documents for useful technical information.[152] Some commentators argue that patent law discourages competitors from reading patents. Specifically, parties may seek to lower their risk of exposure in case of patent litigation by purposefully avoiding reading the patents of competitors.[153]

144. Anderson, *supra* note 41, at 1582.

145. *See* Seymore, *supra* note 46, at 379.

146. Fromson v. Advance Offset Plate, Inc., 720 F.2d 1565, 1570 (Fed. Cir. 1983); *see also* Seymore, *supra* note 46, at 387 (quoting Diamond Rubber Co. v. Consol. Rubber Tire Co., 220 U.S. 428, 435–36 (1911)).

147. *See* Lisa L. Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 585 (2012).

148. *See* Jason Rantanen, *Peripheral Disclosure*, 74 PITT. L. REV. 1, 39–41 (2012).

149. Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 560–62 (2009).

150. Anderson, *supra* note 41, at 1586 (claiming that disclosure is ignored by the electronics and computing industry).

151. *See* Chien, *supra* note 21, at 1859.

152. *See id.* at 1860 (discussing a survey ranking the usefulness of types of technical disclosures).

153. *See id.* at 1858 (arguing that U.S. patent law discourages the reading of a patent); *see also* Anderson, *supra* note 41, at 1586 (discussing why scientists ignore and/or don't read patents); Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 21–22 (arguing that scientists and innovators generally ignore patents).

Calls for increasing the amount and type of information included in a patent could cause less patents to be filed on AI.[154] Such a requirement will burden patentees because more detailed disclosures take more time to create and may cost more money to produce. In return, patentees will want broader claim scope. If patentees are not able to receive broader claims in return for more robust disclosures, they may be reluctant to seek patent protection. Further, if patentees are able to acquire broader claims, it could limit the entrance of follow-on innovators into the field.

Another argument for not changing the enablement standard for AI inventions is that the law concerning the enablement doctrine is rapidly developing. At the time of publication of this Article, an enablement question will be pending before the Supreme Court.[155] In the last two decades, courts have tried to apply enablement uniformly across technology areas.[156] That is, the enablement requirement has been applied to traditionally predictable arts with more emphasis.[157] Thus, there seems to be some evidence that in recent cases courts have attempted to abide by the TRIPS principal of not applying the law differently to different technologies.[158] Despite these efforts, as evidenced by the Supreme Court's willingness to hear *Amgen Inc. v. Sanofi, Aventisub LLC*, the framework for determining when an invention in an unpredictable field is enabled remains a source of debate.

According to the USPTO, some AI inventions may be characterized as unpredictable. However, whether an AI invention is unpredictable should not be the determinative factor as to how the test for enablement is applied. Instead, in ensuring that claims are commensurate in scope with the specification, the undue experimentation test seems to be a sufficient safeguard for enablement. The doctrinal trends seem to suggest a return to first principles—a close adherence to the statute.[159] Thus, even in a

154. *See* Anderson, *supra* note 41, at 1602 (arguing that prospect theory does not support a robust disclosure requirement).

155. Amgen Inc. v. Sanofi, No. 21-757, 2022 WL 16703751, at *1 (U.S. Nov. 4, 2022) (granting the petition for a writ of certiorari as to Question 2 presented by the petition).

156. *See* Durham, *supra* note 48, at 1113–15, 1127.

157. *See* Allison & Ouellette, *supra* note 80, at 623–24 (summarizing arguments from Chao and Seymore regarding the expansion of a strong enablement defense).

158. *See id.* at 620–23.

159. *See* Durham, *supra* note 48, at 1110.

landscape of predictable and unpredictable inventions, the enablement test as currently applied may be sufficient.

Although AI is a rapidly developing area, the reality of what AI can accomplish often falls short of the human imagination. In Part II, this Article described two types of AI. General AI refers to sentient-like capabilities often depicted in science fiction. Narrow AI is tailored to perform specific tasks, like play chess or drive a car. General AI is theoretical and does not exist in any practical form.[160] Some estimates predict general AI will exist within the next century, while some believe it will never exist.[161] In contrast, narrow AI is in use today.[162] Patent stakeholders should be careful not to advocate for policies based on technology that could be centuries away from development. Instead, the best course of action is to focus on how best to incentivize the development of nascent technologies. Thus, current patent policy should focus primarily on narrow AI.

There is little evidence that the enablement doctrine is a challenge for narrow AI inventions. AI inventions have existed for almost half a century. Nothing suggests that providing an enabling disclosure has been more of a challenge for inventors of AI applications than in any other field.[163]

### *C. Other Proposals for Reforming the Enablement Doctrine*

Throughout the enablement doctrine's long history, there have been several calls to change or reform patent disclosures.[164] These reforms generally take one of two approaches. First, there are calls to simply improve the amount and kind of information disclosed in a patent. Commentators have argued that applicants should be allowed to add supplemental information to a patent's specification after it has been filed to ensure that the known scope of the claims are enabled. In addition, several commentators have called for the law to require a patent applicant to include more

160. IBM Cloud Education, *What Is Artificial Intelligence?*, IBM (June 3, 2020), https://www.ibm.com/cloud/learn/what-is-artificial-intelligence [https://perma.cc/8REG-U7YA].

161. Ryan Abbott, *Everything Is Obvious*, 66 UCLA L. REV. 2, 26 (2019).

162. IBM Cloud Education, *supra* note 160.

163. Dan L. Burk, *AI Patents and the Self-Assembling Machine*, 105 MINN. L. REV. HEADNOTES 301, 312–14 (2021).

164. *See* Chien, *supra* note 21, at 1855, 1864 (listing various proposals for improving patent disclosures, including "better writing, working examples, the use of peer review, and the enhanced enforcement of existing standards").

technical details in the patent specification. Second, several suggestions exist to change how the enablement requirement is interpreted during a patent dispute. However, for reasons this section will explain, none of these proposals seem well suited to address the unique challenges posed by AI inventions.

A common suggestion to preemptively address enablement issues is to implement policies that improve the patent disclosure.[165] One strategy seeks to improve the patent disclosure to address temporal challenges unique to the patent process.[166] A claimed invention must be enabled on the date that the patent application is filed.[167] At least a year can pass between the time an application is filed and it is examined.[168] During this time, the applicant could have developed new insight as to the invention.[169] Some commentators argue that evidence that arises after the filing date of the invention should be considered in determining whether an invention is enabled.[170] Such "post filing evidence" would "incorporate advances that would make the disclosure presently enabling, even though it was not clearly enabled as of the filing date."[171] Thus, post-filing information could be used to prove an invention is enabled by supplementing the originally filed specification.[172]

However, this proposal is contrary to current doctrinal interpretation of the enablement requirement and should not be

165. *See* Burk, *supra* note 72, at 1606–07, 1612, 1614 (explaining that a common suggestion for dealing with the disclosure problem is to advocate for better disclosure in some way).

166. *See* Timothy R. Holbrook, *Patent Disclosures and Time*, 69 VAND. L. REV. 1459, 1461, 1516 (2016) ("[T]he nature of patent disclosures varies significantly based on the particular temporal context for which the disclosure is being considered.").

167. *Id.* at 1480–81 (describing the time at which adequacy of the disclosure is assessed).

168. *See* USPTO, PERFORMANCE AND ACCOUNTABILITY REPORT 65 (2021), https://www.uspto.gov/about-us/performance-and-planning/uspto-annual-reports-old [https://perma.cc/25ST-K85R] (explaining that the USPTO's goal is to mail a first office action fourteen months after a patent application has been filed).

169. *See* Sherkow, *supra* note 118, at 849, 872–73 ("These problems highlight the difference between science's dynamism—its continuous resolution of prior inconsistencies—and patents' static nature.").

170. *See* Holbrook, *supra* note 166, at 1462, 1486–87, 1505–06 ("What type of post-filing evidence can be used to demonstrate whether the disclosure is sufficient, particularly with respect to utility and enablement?").

171. Fei Sha, *supra* note 82, at 503.

172. *Id.* at 513–14 (proposing post-filing data as a way to make the enablement requirement less harsh); *see also* Sherkow, *supra* note 118, at 908–11 (arguing that enablement should take into account after-arising evidence).

adopted.[173] As stated above, an invention must be enabled at the time of filing.[174] Allowing post-filing evidence could lead to the premature filing of patent applications describing inventions that are not yet enabled. This would undermine the disclosure function of the patent system and potentially waste the time and resources of the applicant if they were not able to overcome an enablement challenge with later-acquired evidence. Instead, the current enablement requirement puts applicants on notice that they must be able to enable a PHOSITA to practice their invention.

Other proposals simply seek to encourage clarity and the inclusion of greater detail in a patent specification. For example, the USPTO's now defunct Glossary Pilot Program encouraged applicants to include a glossary in their specifications that clearly defined key terms used in the patent.[175] However, a longer disclosure does not guarantee a quality one.[176]

A second commonly proposed solution to the enablement problem is to enhance the level of disclosure required by a patentee.[177] Commentators argue that current patent disclosures do not provide the public with the information necessary to continuously stimulate innovation.[178] This problem is particularly acute for complex or murky inventions.[179] How can a patent specification convey information useful to the public when the inventor does not necessarily need to know how an invention works? Obviously, a robust disclosure supports the disclosure function of patents.[180] Commentators also argue that requiring more robust specifications would "allow follow-on innovators to more easily and quickly improve on current technologies and will foster the diffusion of knowledge and more creative innovation

173. *See* Holbrook, *supra* note 166, at 1502–03 (recommending against the use of post-filing generated evidence).

174. *Id.* at 1480–81.

175. *Glossary Initiative*, USPTO, https://www.uspto.gov/patents/initiatives/glossary-initiative [https://perma.cc/7YU6-GSGS] (last visited Nov. 22, 2022).

176. *See* Burk, *supra* note 72, at 1607.

177. *See* Seymore, *supra* note 46, at 396–98 (arguing that inventors should provide a more robust technical disclosure); *see also* Seymore, *supra* note 37, at 726–28 (proposing an optional mechanistic disclosure paradigm).

178. *See* Seymore, *supra* note 46, at 398 (concluding that patent disclosures currently have limited technical value).

179. *See* Seymore, *supra* note 37, at 723, 726.

180. *See* Seymore, *supra* note 46, at 396 ("[A] disclosure lacking in technical substance may add very little to the public storehouse for potential future innovators to build upon.").

within and across disciplines."[181] Further, Professor Sean Seymore has argued that enhanced disclosures that disclose "how or why the invention works" may also benefit the inventor and increase the quality of the patent examination.[182]

There have also been calls to broaden the type of information that is disclosed in a patent's specification. One proposal calls for patents to be updated with information such as whether the patent is being commercially exploited, being licensed, or being maintained for other reasons.[183] This information would provide useful context about how a particular invention is being used.[184]

But instead of incentivizing stronger patents, calls for enhanced disclosures may only disadvantage inventors by delaying or discouraging patent filings. Even proposals that call for the patentee to present additional evidence after the patent has been filed to support enablement place an additional burden on the patentee. Enhanced disclosures may also make it easier for applicants to obtain broader claims, which would reduce the opportunity for follow-on innovation.[185]

Other commentators have advocated for viewing the patent disclosure in a larger context. For example, in addition to technical information, the disclosure also provides useful nontechnical information.[186] This nontechnical information can communicate the value of an invention and advertise new technological approaches to interested parties.[187] The public receives these benefits currently without more robust disclosures.

Finally, several suggestions exist to change how the enablement requirement is interpreted or applied during a patent dispute or patent prosecution. These proposals recognize that lack of enablement generally arises if a third party questions the patent's validity.[188] Some argue that if courts and examiners did more to enforce the requirements under § 112, it would reduce the

181. *See id.* at 398.

182. Seymore, *supra* note 37, at 728–29, 745–46 (defining the term "mechanistic enablement").

183. *See* Chien, *supra* note 21, at 1873–76, 1880–81, 1884–85 (arguing for a broader view of patent disclosure to include context).

184. *Id.* at 1874.

185. *See* Seymore, *supra* note 37, at 726, 727–31 (explaining how mechanistic disclosures could result in patents with broader claims).

186. Anderson, *supra* note 41, at 1590–91 (defining "nontechnical" disclosure).

187. *Id.* at 1591.

188. *See* Rantanen, *supra* note 26, at 1703–04.

number of patents being asserted with overbroad claims.[189] For example, one proposal has called for requiring applicants to amend their patent claims to decrease their scope if they learn of an experimental failure relevant to the invention.[190] A separate proposal advocates for the use of post-filing evidence to help determine who was a PHOSITA at the time that the patent was filed.[191]

While these proposals may have merit, the prevalence of AI inventions do not necessitate their adoption. Enablement challenges are rare in patent disputes. When they do occur, courts seem to be able to navigate the application of the enablement doctrine with enough consistency to produce stable and predictable outcomes. As more AI patent applications are filed, this perspective may change. Given the prevalence of patent prosecution and litigation data, there is an opportunity to empirically study any changes in how the enablement doctrine is used in patent disputes.

## IV. CONCLUSION

Within the last fifteen years, technological breakthroughs have brought AI to the forefront of U.S. discussions about innovation. This Article has explored whether the enablement doctrine, a statutory requirement for obtaining a patent, poses any significant challenge to the patenting of AI inventions. This Article concludes that the doctrine poses minimal obstacles for AI inventions. Thus, calls for stimulating inventive activity in AI should not cause patent stakeholders to modify how the enablement doctrine is implemented.

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189. *See* Allison & Ouellette, *supra* note 80, at 611 ("Better enforcement of § 112 thus may be the best way to address the problem of 'patent trolls' asserting overbroad and unclear patents.").

190. *See* Seymore, *supra* note 54, at 1173.

191. *See* Fei Sha, *supra* note 82, at 510.