Disclose on the Dotted Line: Artificial Intelligence as an Inventor in the U.S. Patent System

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I. INTRODUCTION

For most of the history of patent law and intellectual property rights, the inventorship requirement has been relatively straightforward. Legal scholarship on inventorship issues dealt with what to do in the case of joint inventors[1] and what rights vest in an inventor

1. *See* Christopher McDavid, Comment, *I Want a Piece of That! How the Current Joint Inventorship Laws Deal with Minor Contributions to Inventions*, 115 PENN ST. L. REV. 449, 457 (2010) (analyzing the changes to joint inventorship with the 1984 amendments to the Patent Act).

when they are employed by a company.[2] A new issue has emerged in the struggle to assign inventorship rights—what to do about non-human inventors.[3]

The field of artificial intelligence (AI) has rapidly expanded in many directions. From research papers,[4] to news articles,[5] to general use by businesses around the globe,[6] AI has gone from a useful tool to an indispensable asset in a very short amount of time.[7] The increasing amount of work AI performs has caused some experts to question how we should treat inventions of novel technology when an AI has played a role.[8]

Several countries have recently addressed how to grant patents when AI plays a significant role and whom to list as the inventor. The most prominent case involves the use of the AI algorithm "Device for the Autonomous Bootstrapping of Unified Sentience"[9] (DABUS) to create a new beverage container and light beacon.[10] The team of humans behind the project sought patent protections and listed DABUS as the inventor rather than themselves.[11] The team did this because they felt that DABUS contributed the novel parts of the new invention, not the human creators.[12] The United States Patent and Trademark Office (USPTO), the United Kingdom Intellectual Property Office,[13] and the European

2. *See* Emily A. Sample, Note, *Assigned All My Rights Away: The Overuse of Assignment Provisions in Contracts for Patent Rights*, 104 IOWA L. REV. 447, 465–66 (2018) (explaining how employers have put automatic assignment clauses in employee contracts to vest patent rights in the employer corporation immediately after a patent is assigned to an inventor).

3. *See* W. Michael Schuster, *Artificial Intelligence and Patent Ownership*, 75 WASH. & LEE L. REV. 1945, 1964–65 (2018) (examining legal scholarship on patent rights and artificial intelligence before the court decisions discussed in this Note).

4. AI has been applied to many fields of research, including legal scholarship and higher education. For a general discussion on AI in higher education, see Olaf Zawacki-Richter et al., *Systematic Review of Research on Artificial Intelligence Applications in Higher Education – Where Are the Educators?*, INT'L J. EDUC. TECH. HIGH EDUC., Oct. 28, 2019, at 1.

5. Through September alone, the New York Times published more than 80 articles in 2021 on artificial intelligence. *Artificial Intelligence*, N.Y. TIMES, https://www.nytimes.com/topic/subject/artificial-intelligence [https://perma.cc/G7L6-HFAJ].

6. *See* Ida Merete Enholm et al., *Artificial Intelligence and Business Value: A Literature Review*, 24 INFO. SYS. FRONTIERS 1709, 1709 (2022) (discussing the growing interest of businesses to use artificial intelligence to improve business efficiency).

7. *See* Louis Columbus, *State of AI and Machine Learning in 2019*, FORBES (Sept. 8, 2019), https://www.forbes.com/sites/louiscolumbus/2019/09/08/state-of-ai-and-machine-learning-in-2019/?sh=57d163451a8d [https://perma.cc/N87Z-E7H8] (exploring the growing role of AI in different business sectors).

8. Schuster, *supra* note 3, at 1981 (discussing patent rights for innovations that, in part, AI created).

9. Rahul Matthan, *The Awkward Grant of Patents to Artificial Intelligence*, LIVEMINT (Oct. 26, 2021), https://www.livemint.com/opinion/columns/the-awkward-grant-of-patents-to-artificial-intelligence-11635267216589.html [https://perma.cc/VL78-HAAG].

10. Matthew Bultman, *Can a Robot Invent? The Fight Around AI and Patents Explained*, BLOOMBERG LAW (Sept. 9, 2021), https://news.bloomberglaw.com/ip-law/can-a-robot-invent-the-fight-around-ai-and-patents-explained [https://perma.cc/9C9B-CLHC].

11. *Id.*

12. *Id.*

13. James Nurton, *UK Judge Upholds Refusal of DABUS Patents*, IPWATCHDOG (Sept. 24, 2020), https://www.ipwatchdog.com/2020/09/24/uk-judge-upholds-refusal-dabus-patents/id=125584 [https://perma.cc/WY99-VL4T].

Patent Office denied the application.[14] However, both South Africa and Australia allowed the AI to be listed as the inventor.[15] While the South African system differs from the U.S. system in how inventors are treated and patents are examined,[16] the Australian system is similar to the countries and unions that denied the DABUS application.[17]

These recent decisions caused debate over the best approach for fairly granting patent rights.[18] Although U.S. courts have, so far, disallowed non-humans to be listed as inventors, that conclusion has caused disagreement.[19] Part II recounts the historical treatment of inventors and how courts have treated inventors with the advancement of AI. Part III analyzes the failures of current statutes to credit and disclose the role of AI in the development of new technology. Lastly, Part IV argues that Congress should amend the relevant statutes to both acknowledge the role AI provides in new inventions and allow for the humans responsible for creating and maintaining the AI to receive intellectual property rights in the newly created inventions.

II. BACKGROUND

"Inventor" is only vaguely defined in the context of patent law. The term "inventor" means "the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention."[20] Another definition of "inventor" is the party "who finds out or contrives some new thing; one who devises some new art, manufacture, mechanical appliance, or process; one who invents a patentable contrivance."[21] This definition has worked well for much of the history of intellectual property rights, but it is unclear what should happen when an AI independently creates a patentable invention with little to no input from humans.[22]

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14. *USPTO Says AI Can't Be Named Inventor on Patent*, AM. INTELL. PROP. L. ASS'N (Apr. 28, 2020), https://www.aipla.org/detail/news/2020/04/28/uspto-says-ai-can-t-be-named-inventor-on-patent [https://perma.cc/ZTJ3-DFXC]; *EPO Publishes Grounds for Its Decision to Refuse Two Patent Applications Naming a Machine as Inventor*, EUR. PAT. OFF. (Jan. 28, 2020), https://www.epo.org/news-events/news/2020/20200128.html [https://perma.cc/E6A7-GSPF].

15. Daniel Schwartz, *South Africa and Australia Break from U.S. and U.K. to Give DABUS Its First I.P. Breaks*, NIXON PEABODY (Aug. 10, 2021), https://www.nixonpeabody.com/en/ideas/blog/artificial-intelligence/2021/08/10/south-africa-and-australia-break-from-u-s-and-u-k-to-give-dabus-its-first-ip-breaks [https://perma.cc/3WGF-F7GV].

16. *See* James T. Pechacek, Note, *The Past, Present, and Future of South Africa's Patent System*, 3 CYBARIS 188, 200–01 (discussing South Africa's novelty requirement and patentability requirements in the public domain).

17. *See* Masaaki Kotabe, *Evolving Intellectual Property Protection in the World: Promises and Limitations*, 1 U. P.R. BUS. L.J. 1, 13–15 (discussing how the Patent Law Treaty adopted in 2000 streamlines procedures for obtaining a patent in the U.S., Australia, and other countries).

18. Mark Basanta & Robert E. Colletti, *A Split Develops: Can Artificial Intelligence Invent Stuff?*, HAUG PARTNERS LLP, JD SUPRA (Dec. 1, 2021), https://www.jdsupra.com/legalnews/a-split-develops-can-artificial-4424928 [https://perma.cc/U7BQ-SLKD].

19. *Id.*

20. 35 U.S.C. § 100(f).

21. *Inventor*, BLACK'S LAW DICTIONARY (6th ed. 1990).

22. *See* Rachel L. Schwein, Note, *Patentability and Inventorship of AI-Generated Inventions*, 60 WASHBURN L.J. 561, 569–70 (2021) (explaining that, in recent years, AI has contributed to inventions in scientific fields).

A. History of Intellectual Property Rights

1. Inventor and Inventorship Requirements

During the founding of the United States, the Framers wanted to reward innovation and creative works.[23] To accomplish this goal, the Patent and Copyright Clause was added to the Constitution.[24] This clause provides a basis for intellectual property rights in the United States. It states that Congress shall have the power "[t]o promote the Progress of Science and the useful Arts, by securing for limited Times to *Authors and Inventors* the exclusive Right to their respective Writings and Discoveries."[25] Since the ratification of the Constitution, various acts of Congress have further refined these rights.[26]

The current Patent Act states: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."[27] The Act also requires any patent application to include "the name of the inventor for any invention claimed in the application. Except as otherwise provided in this section, each individual who is the inventor or a joint inventor of a claimed invention in an application for patent shall execute an oath or declaration in connection with the application."[28] If an inventor believes they are the creator of the invention, the oath requires a statement that "such individual believes himself or herself to be the original inventor or an original joint inventor of a claimed invention in the application."[29] Courts have construed the use of "individual" and "himself or herself" to mean that an inventor must be a human—making an AI ineligible as a patent holder.[30]

B. Artificial Intelligence in Patent Law

1. Defining Artificial Intelligence

Artificial Intelligence can be defined in multiple ways, but a general definition is a technology that "can learn to autonomously make decisions and carry out actions on behalf

23. Alden Abbott, *The Constitutionalist and Utilitarian Justifications for Strong U.S. Patent and Copyright Systems*, HERITAGE FOUND. (June 21, 2016), http://report.heritage.org/lm179 [https://perma.cc/H3B2-J3VL].

24. U.S. CONST. art. 1, § 8, cl. 8.

25. *Id.* (emphasis added).

26. Various Patent Acts have been in effect throughout the history of the United States. The first that Congress enacted was in 1790, and Congress has amended the act several times, including in 1952 and 1984. Patent Act of 1790, 1 Stat. 109; Patent Law Amendments of 1952, Pub. L. No. 82-593, 66 Stat. 792 (1952); Patent Law Amendments of 1984, Pub. L. No. 98-622, 98 Stat. 3383 (1984).

27. 35 U.S.C. § 101.

28. 35 U.S.C. § 115(a).

29. 35 U.S.C. § 115(b)(2).

30. *See In re* Application No.: 16/524,350, 2019 Dec. Comm'r Pat. (finding that "Whoever" in 35 U.S.C. § 115 means a "natural person").

of a human being."[31] AI is used in self-driving cars,[32] internet search engines,[33] auto-generated artwork,[34] and computer-generated music.[35] Not all of these uses for AI are patentable,[36] but there are many fields where AI has been a vital tool for innovation.[37] Researchers have found that increase of AI use affects individuals that work in better-paid, higher-educated fields more than those that work in other fields with lower barriers to entry.[38] These highly affected fields include engineering, scientific research, and computer science-based jobs.[39]

2. Different Types of Artificial Intelligence

Although AI can be understood through the general definition used in Part II.B of this Note, experts use further definitions to specify the goal of AI.[40] This Note focuses on weak versus strong AI, as well as artificial general intelligence (AGI) versus artificial narrow intelligence (ANI).[41]

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31. Margaret Rouse, *What Does Artificial Intelligence (AI) Mean?*, TECHOPEDIA (Apr. 28, 2023), https://www.techopedia.com/definition/190/artificial-intelligence-ai [https://perma.cc/ALH9-QY2J].

32. Alyssa Schroer, *Artificial Intelligence in Cars: Examples of AI in the Auto Industry*, BUILT IN (Mar. 28, 2023), https://builtin.com/artificial-intelligence/artificial-intelligence-automotive-industry [https://perma.cc/585S-7S69].

33. Kevin Rowe, *How Search Engines Use Machine Learning: 9 Things We Know for Sure*, SEARCH ENGINE J. (Aug. 13, 2021), https://www.searchenginejournal.com/ml-things-we-know/408882 [https://perma.cc/AQ59-BZL3].

34. NIGHT CAFE STUDIO, https://nightcafe.studio [https://perma.cc/P2P4-UJQ7]. The amount of AI text and art generation tools have exploded in the last 2 years, with ChatGPT and Midjourney being 2 of the most well-known tools. This Note focuses on AI and inventorship, and not any potential copyright or artistic royalty issues that may arise from AI tools.

35. Katherine Bourzac, *A Neuromorphic Chip that Makes Music*, IEEE SPECTRUM (May 23, 2017), https://spectrum.ieee.org/a-neuromorphic-chip-that-makes-music [https://perma.cc/8E3S-5BCY]. Entire AI songs have also recently been created, which creates issues of rights of publicity and copyright. Joe Coscarelli, *An A.I. Hot of Fake 'Drake' and ''The Weeknd' Rattles the Music World*, N.Y. TIMES (Apr. 19, 2023), https://www.nytimes.com/2023/04/19/arts/music/ai-drake-the-weeknd-fake.html [https://perma.cc/L3B7-G4D4].

36. *See* Alice Corp. Pty. Ltd. v. CLS Bank Int'l., 573 U.S. 208, 217 (2014) ("Accordingly, in applying the § 101 exception, we must distinguish between patents that claim the 'buildin[g] block[s]' of human ingenuity and those that integrate the building blocks into something more, thereby 'transform[ing]' them into a patent-eligible invention." (alterations in original) (citations omitted) (quoting Mayo Collaborative Serv. v. Prometheus Lab'y, Inc. 556 U.S. 66, 66, 89 (2012))).

37. Columbus, *supra* note 7.

38. Mark Muro, Jacob Whiton & Robert Maxim, *What Jobs are Affected by AI? Better-Paid, Better-Educated Workers Face the Most Exposure*, BROOKINGS INST. (Nov. 20, 2019), https://www.brookings.edu/research/what-jobs-are-affected-by-ai-better-paid-better-educated-workers-face-the-most-exposure [https://perma.cc/43XJ-TDPE].

39. *Id.*

40. *See* Naveen Joshi, *7 Types of Artificial Intelligence*, FORBES (June 19, 2019), https://www.forbes.com/sites/cognitiveworld/2019/06/19/7-types-of-artificial-intelligence/?sh=7820b31b233e [https://perma.cc/3H3F-VHM4] (discussing the different types of AI).

41. *Infra* Part III.A.4.

Weak AI is AI with a narrow focus on one task or domain of research and often requires human direction to reach the desired result.[42] Experts classify all current AI as weak, and researchers are divided on whether a strong AI will ever be developed.[43] If innovators developed a strong AI, the AI would be an intelligence that rivals that of a human thinker—an intelligence that can apply its knowledge and experience to a general problem presented to it without requiring outside human influence to reach a solution.[44]

Because strong AI does not currently exist, the discussion among researchers has shifted away from weak versus strong to general versus narrow. AGI may be thought of as similar to strong AI, but not at the same cognitive level as humans. AGI researchers attempt to solve generalized problems with a specific AI that is not able to solve problems like humans; experts still consider even the strongest AI generally weak.[45]

ANI may be thought of as a traditional weak AI that performs a single task extremely well, such as a webpage crawler or a chess engine.[46] These ANIs are extremely competent at their trained task but cannot be asked to do much else by their human handlers.[47] Their definitions are important when considering whether an AI is capable of the level of intelligence needed to become an inventor.

Researchers may use ANI and AGI to define what an AI is capable of, but they also can be used in the debate over patent rights for AI. An ANI used to repeatedly help an inventor with a single task is easy to analogize to a tool. The use of tools in patent applications is discussed in Part II.B.3 below, and tool use does not generally affect how inventorship rights are vested: the human is the sole inventor.[48] This question becomes more difficult when an AGI is used without a specific end goal in mind.[49]

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42. Kathleen Walch, *Rethinking Weak Vs. Strong AI*, FORBES (Oct. 4, 2019), https://www.forbes.com/sites/cognitiveworld/2019/10/04/rethinking-weak-vs-strong-ai/?sh=2e02ded36da3 [https://perma.cc/U79Y-B5EL].

43. *See generally* Ragnar Fjelland, *Why General Artificial Intelligence Will Not Be Realized*, 7 HUMANS. & SOC. SCI. COMM'N, no. 10, 2020, at 1, https://www.nature.com/articles/s41599-020-0494-4 [https://perma.cc/D9K8-3P6J] (discussing arguments whether strong AI can be developed).

44. Walch, *supra* note 42.

45. Archil Cheisvili, *The Future of Artificial General Intelligence*, FORBES (July 16, 2021), https://www.forbes.com/sites/forbestechcouncil/2021/07/16/the-future-of-artificial-general-intelligence/?sh=75d939f63ba9 [https://perma.cc/5ZE7-SCS6].

46. *Id.*; *see also ANI: Artificial Narrow Intelligence*, EMPLIFI (Aug. 27, 2019), https://astutesolutions.com/ani/artificial-narrow-intelligence [https://perma.cc/3U2D-F7DM] (discussing AI bots websites commonly use).

47. *See* H. James Wilson & Paul R. Daugherty, *Collaborative Intelligence: Humans and AI Are Joining Forces*, HARV. BUS. REV. (July 2018), https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces [https://perma.cc/7QM7-T8DM] ("Humans need to perform three crucial roles. They must train machines to perform certain tasks; explain the outcomes of those tasks, especially when the results are counterintuitive or controversial; and sustain the responsible use of machines.").

48. See Part II.B.3 (addressing tools in patent applications).

49. Michael K. Henry, *Patent Ownership vs. Inventorship: Who Really Controls the Rights to a Patent?*, HENRY LAW (June 14, 2018), https://henry.law/blog/patent-ownership-vs-inventorship [https://perma.cc/EU3B-UW75].

3. Inventive Tools in Patents

Innovators have used tools to create new inventions and technologies throughout human history.[50] Tools allow inventors to see works in different lights, "improving those works more effectively than would be possible with the unaided human mind and body."[51] Tools have always been allowed to be used to create patent-eligible subject matter, and the inventor has been a human responsible for the tool. For example, inventors have used computer programs to help create patents since the invention of computers.[52] This rule is simple to apply when a human defines the problem and conditions to solve it; it becomes less simple with the advancement of AI and as the software performs more of the substantive, inventive work. Some scholars argue that open-ended problems that are given to computers and solved with machine learning or similar techniques amount to brute force trial and error—without any creativity or inventiveness.[53] Patent law is designed to disregard the "how" behind an invention—whether by thousands of hours of hard work or serendipity; patent rights may be granted in any invention that meets the statutory requirements.[54]

4. DABUS AI and Implications

As previously mentioned, DABUS is a creative neural system that employs neural networks to chaotically generate potential ideas.[55] A neural network is a "series of algorithms that endeavors to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates."[56] Stephen Thaler is one of the inventors behind DABUS.[57] Thaler claims that the machine performs most of the work without external human stimuli, although humans still provide some guiding principles to the computer.[58] Thaler applied for patent rights in several countries with DABUS as the listed inventor, including in the United States.[59]

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50. Charles Q. Choi, *Human Evolution: The Origin of Tool Use*, LIVESCIENCE (Nov. 11, 2009), https://www.livescience.com/7968-human-evolution-origin-tool.html [https://perma.cc/65H4-6FDF].

51. ROBERT PLOTKIN, THE GENIE IN THE MACHINE: HOW COMPUTER AUTOMATED INVENTING IS REVOLUTIONIZING LAW AND BUSINESS 87 (2009).

52. Gene Quinn, *The History of Software Patents in the United States*, IPWATCHDOG (Nov. 30, 2014), https://ipwatchdog.com/2014/11/30/the-history-of-software-patents-in-the-united-states/id=52256 [https://perma.cc/R52X-238E].

53. PLOTKIN, *supra* note 51, at 90.

54. Sean B. Seymore, *Serendipity*, 88 N.C. L. REV. 185, 191 (2009) (arguing patent law has a structural bias against accidental discoveries).

55. Matt Hamblen, *Team Seeks Patents for Inventions Created by DABUS, an AI*, FIERCE ELECTRONICS (Aug. 1, 2019), https://www.fierceelectronics.com/electronics/team-seeks-patents-for-inventions-created-by-dabus-ai [https://perma.cc/2YW9-CJC3].

56. James Chen, *Neural Network*, INVESTOPEDIA (Dec. 22, 2020), https://www.investopedia.com/terms/n/neuralnetwork.asp [https://perma.cc/DYW7-UCQB].

57. A background on Stephen Thaler, one of the researchers on DABUS and the named party in the court disputes, can be found on his company's website. *About*, IMAGINATION ENGINES INC., https://imagination-engines.com/founder.html [https://perma.cc/6M96-3ZED].

58. Ryan Abbott, *Imagination Engines Inc. Announces a New Patent that is Arguably the Successor to Deep Learning and the Future of Artificial Intelligence (AGI)*, ARTIFICIAL INVENTOR (2022), https://artificialinventor.com/dabus [https://perma.cc/A8FS-UAGT].

59. Bultman, *supra* note 10.

The USPTO denied two patent applications (U.S. Application Serial Nos. 16/524,350 (the "'350 application") and 16/524,532 (the "'532 application")) due to Thaler listing his AI algorithm DABUS as the inventor.[60] In the field to enter the inventor's first name, Thaler listed DABUS; in the last name field, he attached an explanatory statement that the applications were "Invention[s] generated by artificial intelligence."[61] The USPTO reviewed these initial applications and issued Plaintiff a "Notice to File Missing Parts of Non-Provisional Application" for failing to provide a first and last legal name of an inventor. Thaler filed a petition with the USPTO director again, insisting that DABUS should be listed as the inventor, not Thaler.[62] On December 17, 2019, the Director of the Patent and Trademark Office and the USPTO itself released a written decision dismissing Thaler's petition, citing two federal circuit decisions holding that an inventor could only be a natural person.[63] They also explained that Congress's pertinent statutory language on patent inventors used the terms "individual" and "himself or herself," terms that are typically reserved for describing human beings.[64]

On April 22, 2020, the USPTO denied Thaler's request for reconsideration in a final written decision,[65] and Thaler filed a civil action in federal district court in the Eastern District of Virginia.[66] Thaler argued that the two decisions cited by the Commissioner for Patents were distinguishable because those cases involved patents that listed a state or corporation as an inventor, not AI.[67] Thaler also argued that policy reasons should allow AI to be listed as the inventor.[68]

Thaler petitioned for an order compelling Defendants to reinstate the '350 and '532 applications and vacate the decision denying the applications.[69] Thaler alleged that the decision not to process his patent applications was "arbitrary, capricious, an abuse of discretion and not in accordance with the law; unsupported by substantial evidence, and in excess of the Defendants' statutory authority."[70] This language is typical of an administrative law challenge but had not been used in the context of patent inventorship before. The Eastern District of Virginia decided *Thaler v. Iancu* on September 2, 2021.[71] The court first addressed administrative law issues and the USPTO's authority to interpret

60. *In re* Application of Application No. 16/524,350, 2020 Dec. Comm'r Pat. 1.

61. *Id.* at 1.

62. *Id.* at 1–2 (discussing Thaler's petition and the procedural history of the USPTO case).

63. *Id.* at 1, 4–5 (first citing Univ. of Utah v. Max-Planck-Gesellschaft zur Forderung der Wissenschaften E.V., 734 F.3d 1315, 1318 (Fed. Cir. 2013); then citing Beech Aircraft Corp. v. EDO Corp., 990 F.2d 1237, 1240 (Fed. Cir. 1993)).

64. *In re* Application of Application 16/524,350, 2020 Dec. Comm'r Pat. at 4.

65. *Id.*

66. Memorandum Opinion, Thaler v. Iancu, No. 20-cv-00903 (E.D. Va. Sept. 2, 2021).

67. *Id.* at 5.

68. For example, Thaler argued that "allowing a machine to be listed as an inventor would incentivize innovation using AI systems, reduce the improper naming of persons as inventors who do not qualify as inventors, and support the public notice function by informing the public of the actual inventors of an invention. *In re* Application of Application No. 16/524,350, 2020 Dec. Comm'r Pat. at 7 (footnotes omitted).

69. Complaint for Declaratory and Injunctive Relief at 16–17, Thaler v. Iancu, No. 20-cv-00903 (E.D. Va. Aug. 6, 2020).

70. *Id.* at 16.

71. *Update: Federal Judge Rules That Only Natural Persons Can Be Inventors*, NAT'L L. REV. (Sept. 14, 2021), https://www.natlawreview.com/article/update-federal-judge-rules-only-natural-persons-can-be-inventors [https://perma.cc/7EZU-FUAD].

acts of Congress.[72] The opinion then focused on the construction of the patent statutes[73] and prior decisions such as *Mohamad v. Palestinian Authority*.[74] In *Mohamad*, the Supreme Court analyzed what the word "individual" meant in prior acts of Congress.[75] Under the *Mohamad* analysis, "individual"—in its ordinary meaning—refers to a human being or natural person, not any other entity or machine. The *Thaler* court found this to be consistent with the two past Federal Circuit decisions, holding that "inventors must be natural persons"[76] and also adopted the *Mohamad* interpretation of "individual."[77]

Finally, the court addressed the policy arguments Thaler raised. Thaler argued that allowing AI inventions would result in more innovation, which is a goal of allowing patent rights.[78] Further, Thaler argued that allowing people to take credit for work they have not themselves done would devalue human inventorship.[79] Instead, he proposed that AI should be awarded patent inventorship in order to uphold the integrity of humans that create new patent-eligible subject matter on their own.[80] The court did not think these policy arguments were persuasive enough to override the plain language of the statutes in question.[81] Thaler appealed the decision.[82] On August 5, 2022, the Court of Appeals for the Federal Circuit affirmed the District Court's opinion.[83] The Federal Circuit held that the statute in question directly bars anyone other than natural persons from being inventors.[84]

After *Thaler*, the law became more clear on who, or what, federal courts consider to be eligible as inventors. *Thaler* clarified the position taken in the two past Federal Circuit inventorship cases, *Max-Planck* and *Beech Aircraft*, that patent applicants may not list AI—as well as corporations and states—as inventors of new technology.[85] Unless Congress changes the statutes governing patent law, it seems unlikely we will see an AI listed as an inventor in the United States.

III. ANALYSIS

A. Substantive Patent Examination Limits AI Inventorship

Different patent examination systems cause AI patents, and patents in general, to endure greater scrutiny in different jurisdictions worldwide. In South Africa, for example,

72. *See generally* Memorandum Opinion, *supra* note 66, at 7–11.

73. 35 U.S.C. § 115.

74. Mohamad v. Palestinian Auth., 566 U.S. 449, 455 (2012).

75. *Id.* at 449.

76. Univ. of Utah v. Max-Planck-Gesellshaft zur Forderung der Wissenschaften E.V., 734 F.3d 1315, 1323 (Fed. Cir. 2013); Beech Aircraft Corp. v. EDO Corp., 990 F.2d 1237, 1248 (1993).

77. Memorandum Opinion, *supra* note 66, at 11.

78. Schwein, *supra* note 22, at 573.

79. Complaint for Declaratory and Injunctive Relief, *supra* note 69, at 9.

80. *Id.*

81. Memorandum Opinion, *supra* note 66, at 16–17.

82. Matthew Bultman, *Patents and Artificial Intelligence: An "Obvious" Slippery Slope*, BLOOMBERG L. (Oct. 8, 2021), https://news.bloomberglaw.com/ip-law/patents-and-artificial-intelligence-an-obvious-slippery-slope [https://perma.cc/B6KC-W6JZ].

83. Thaler v. Vidal, 43 F.4th 1207, 1213 (Fed. Cir. 2022).

84. *Id.* at 1211–12.

85. *Id.* at 1211–13.

any complete patent application will result in a patent being granted without any formal test to see if the legal requirements for protection are met.[86] This "formality examination only" (FEO) system results in invalid patents only if a third-party objects to "the novelty and/or inventiveness [of the patent]."[87] In other words, in an FEO system, patents will be valid if they meet the statutory filing requirements until a third party finds a reason to challenge the patent.

In contrast, some countries conduct a substantive patent examination of all patent applications.[88] In this type of system, a third party is not needed to challenge the novelty or inventiveness of the patent application.[89] Instead, government officials review and approve (or reject) submitted applications. This is the system used in the United States, and it results in AI patents (and patents in general) being challenged at a much earlier step in the process than is faced in an FEO system.[90]

1. Substantive Patent Examination Allows More Scrutiny

Substantive patent examination (SPE), while more costly to any government agency that adopts the practice, allows government examiners to catch and remove frivolous or substandard patents before granting a patent. Such a system is more common in developed countries that see a large number of patent applications.[91] It seems counterintuitive that countries with a larger number of patent applications would choose a system where an agency must hire technical experts to conduct a thorough screening of each and every patent application, but these developed countries often have a greater number of scientists and engineers available to vet the applications as they are submitted.[92] Countries without this surplus of people having the skills necessary to perform a technical review of all patent applications may not want to tie up a large portion of the workforce as examiners rather than inventors in their own right. There is an opportunity cost of employing skilled workers as patent examiners rather than research and development workers.[93] Instead of working in industry and creating new consumer products or doing research to advance their particular scientific field, patent examiners instead audit others' creations. To employ an adequate number of patent examiners, a country must already have a thriving research and industrial sector to convince would-be employees to instead become patent examiners.

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86. *See Patent Examination in South Africa*, SMIT & VAN WYK (Aug. 18, 2009), https://www.svw.co.za/patent-examination [https://perma.cc/M32W-XQ8Z] (advising potential clients on the importance of filling out the required forms).

87. *Id.*

88. WORLD INTELL. PROP. ORG., ALTERNATIVES IN PATENT SEARCH AND EXAMINATION 4 (2014).

89. *Id.* at 8–9.

90. *Id.* at 6–9.

91. *See IP Facts and Figures*, WORLD INTELL. PROP. ORG. (Feb. 2023), https://www.wipo.int/edocs/infogdocs/en/ipfactsandfigures [https://perma.cc/DWJ5-RHRP] (identifying countries with the highest patent activity).

92. *See generally The Ten Leading Countries in Natural-Sciences Research*, NATURE: NATURE INDEX (Apr. 29, 2020), https://www.nature.com/articles/d41586-020-01231-w [https://perma.cc/7L37-2UC2]; *Researcher in R&D (Per Million People)*, WORLD BANK GRP. (Oct. 2022), https://data.worldbank.org/indicator/SP.POP.SCIE.RD.P6 [https://perma.cc/9A6Q-KZNG] (displaying statistics in a line graph format for comprehension).

93. WORLD INTELL. PROP. ORG., *supra* note 88, at 4 (explaining the cost issue inherent in technical infrastructure without skilled scientists and engineers).

Countries have attempted to lower costs while still maintaining a substantive patent examination system by sharing requirements and examination infrastructure.[94] This structure can help improve both the quality of examination and efficiency as compared to countries attempting to build a system entirely on their own.[95] For example, several intellectual property organizations in Africa,[96] Europe,[97] and the Middle East[98] facilitate international cooperation to help bring about a more efficient patent system. Over 150 countries have joined the Patent Cooperation Treaty (PCT)[99] to help ease the duplicative costs involved in protecting intellectual property rights for the same invention around the world.[100] The treaty "assists applicants in seeking patent protection internationally for their inventions, helps patent offices with their patent granting decisions, and facilitates public access to a wealth of technical information relating to those inventions."[101] This standardization of patents worldwide seeks to help lower costs.

Cooperation between two countries' patent offices, however, does not always lead to better results due to outside factors. One of the most immediately obvious factors is language.[102] If inventors do not speak the same language as the patent examiner, examiners may struggle to interpret any patent claims made in the application. Legal professionals often advertise and tout their employees' foreign language skills[103] in order to meet the rigorous standards an SPE office employs. Language may not be important when resolving

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94. *See supra* notes 91–92 (listing several intellectual property organizations that attempt to standardize application materials).

95. *See id.*

96. WORLD INTELL. PROP. ORG., *supra* note 88, at 5 (listing other organizations that have signed on for patent regulations).

97. *Id.* at 5 n.2; *Member States of the European Patent Organization*, EUR. PATENT OFF., https://www.epo.org/about-us/foundation/member-states.html [https://perma.cc/S62B-WXM8] (listing specific European countries that are members of the European Patent Organization); *States Party to the Convention*, EURASIAN PAT. OFF, https://www.eapo.org/en/members.html [https://perma.cc/DP29-VAAD] (listing countries that signed on to the Eurasian Patent Convention).

98. *See* WORLD INTELL. PROP. ORG., *supra* note 88, at 5 n.2 (listing other organizations that have signed on for patent regulations); *Member States*, GULF COOP. COUNCIL, https://www.gcc-sg.org/en-us/AboutGCC/MemberStates/pages/Home.aspx [https://perma.cc/WN6J-3AD7].

99. *See The PCT Now Has 157 Contracting States*, WORLD INTELL. PROP. ORG., https://www.wipo.int/pct/en/pct_contracting_states.html [https://perma.cc/2U33-Q2NG] (listing each PCT member state and the date when the country became bound by the treaty).

100. *See PCT FAQs*, WORLD INTELL. PROP. ORG., https://www.wipo.int/pct/en/faqs/faqs.html [https://perma.cc/WK5H-N54S] (noting how only three standard fees totaling around 1500–3500 Swiss francs must be paid rather than a separate fee to each national and regional Patent Office).

101. *The International Patent System*, WORLD INTELL. PROP. ORG., https://www.wipo.int/pct/en [https://perma.cc/PXY2-CH5G].

102. Although not directly related to foreign languages, non-residents directly filed over 35% of U.S. patents in 2014. WORLD INTELL. PROP. ORG., *supra* note 88, at 12. In the European Union, there are 24 official languages, but a patent filed with the EPO must be translated into English, French, or German. *See, e.g.*, KATARZYNA ANNA ISKRA, LANGUAGE POLICY, EUROPEAN PARLIAMENT: FACT SHEETS ON THE EUROPEAN UNION (Mar. 2022), https://www.europarl.europa.eu/factsheets/en/sheet/142/language-policy [https://perma.cc/EWM4-8KT4] (describing the objectives and basis for such a language policy); *European Patent Guide*, EURO. PATENT OFF., https://www.epo.org/applying/european/Guide-for-applicants/html/e/index.html [https://perma.cc/5DPB-DXXK] (detailing the process of how to get a European patent).

103. Richard Acello, *Bilingual Lawyers Have a Leg up in Many Niche Practice Groups*, AM. B. ASSN. J. (Mar. 1, 2013), https://www.abajournal.com/magazine/article/bilingual_lawyers_have_a_leg_up_in_many_niche_practice_groups [https://perma.cc/M8AV-6XK2].

the question of whether an AI is an inventor or not, and the different standards and levels of scrutiny different patent offices employ may result in discrepancies in how AI is treated when it comes to inventorship rights.

Overall, for countries like the United States, the increased cost of a substantive patent examination system is thought to be worth it in exchange for the increased level of oversight and removal of substandard patents.[104] However, this increased level of scrutiny also made it harder for AI patents, allegedly invented to enter the U.S. patent system, to survive head-on challenges from the USPTO and federal courts.[105] In South Africa, these inventorship issues will only arise if a third party challenges the claim, which may not be possible due to what issues their legal system allow to be brought in court.[106] This more lax South African system allowed the DABUS patent to be accepted without undergoing any examination, such as the examination that happens in the United States.

2. Exclusive Formality Examination Allows Lower Costs and Faster Examination Times

In contrast to a substantive patent review system, an FEO system allows patents to be granted without any review of the technical merits behind the invention.[107] Rather than having scientists or engineers (or other qualified individuals) examine patents on their merits, FEO systems look to the form and content of the application and at whether applicants submit all required statements and documentation.[108]

This form of examination does not perform any prior art searches (conducted in SPE jurisdictions to prevent patents from being granted on an innovation that a prior inventor has already obtained rights over), nor is any analysis performed into other patent requirements like non-obviousness.[109] Prior art "constitutes those references or documents which may be used to determine novelty and/or non-obviousness of claimed subject matter in a patent application."[110] In other words, prior art is something that an unrelated inventor published in the past that is so similar to the new applicant's "claimed technology" that the unrelated inventor can bar the new applicant from gaining patent rights over their invention.

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104. *See generally* WORLD INTELL. PROP. ORG., *supra* note 88.

105. For an example of inventors challenging AI patents before the USPTO grants them, see Complaint for Declaratory and Injunctive Relief, *supra* note 69, at 7–11 (arguing in the *Thaler* case that AI patent law should change for policy reasons).

106. South African courts usually analyze patent infringement, and it is not clear if an improperly listed inventor would be brought before the court by a third party. *See* Janusz F. Luterek, *Patent Litigation in South Africa: Overview*, ¶ 9, THOMSON REUTERS: PRAC. L. (Dec. 1, 2021), https://content.next.westlaw.com/8-622-3967?__lrTS=20210601131208740&transitionType=Default&contextData=(sc.Default)&firstPage=true [https://perma.cc/9PH6-V9NJ] (explaining the grounds on which a patent can be invalidated).

107. WORLD INTELL. PROP. ORG., *supra* note 88, at 6.

108. *Id.*

109. *Id.*

110. *Understanding Prior Art and Its Use in Determining Patentability*, USPTO, https://www.uspto.gov/sites/default/files/documents/May%20Info%20Chat%20slides%20%28003%29.pdf [https://perma.cc/3G44-NSJ8].

The non-obviousness requirement bars a new applicant from patenting their invention (even if it is new) if the claimed invention would have been obvious to a person who has ordinary skill in the subject field of the patent at the time the patent is filed.[111]

As technology continues to advance, some jurisdictions that employ FEO systems have automated the entire examination process, and FEO systems use computer software to determine if inventors complete all required forms before approving a patent application.[112] Automation and AI have also been used from the inventor's side to efficiently draft patents with a higher probability of issuance.[113]

FEO systems have the enormous benefit of a much faster timeline from patent application to issuance, with the downside of less rigorous review.[114] This lower standard of review could result in AI inventorship not even being considered before approval is granted. In the United States SPE system, the average time from filing to either a granted patent or abandonment on the part of the inventor is 23.3 months.[115] In contrast, the utility model patents that are granted in China undergo FEO and have an average filing-to-grant time of six to twelve months.[116] This accelerated review period inherent in an FEO system allows inventors to utilize their intellectual property rights more efficiently.

In addition to time, countries can save large amounts of money by having an FEO system for examining patents.[117] Although the United States has one of the largest patent systems in the world based on the volume of applications,[118] one can glean information on the formal examination steps versus the substantive review from the USPTO annual budget.

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111. 35 U.S.C. § 103.

112. *Id.*; *see also* THOMAS Q. T. TSAI & CANDY KAI-YUN CHEN, WHAT A FOREIGN APPLICATION SHOULD KNOW ABOUT PATENT PROCUREMENT IN CHINA 26 (Oct. 19, 2004), https://ipo.org/wpcontent/uploads /2013/04/What_ForeignApplicants_Should_Know_Oct2004.pdf [https://perma.cc/J55J-CFY6].

113. *See generally* Tabrez Y. Ebrahim, *Automation & Predictive Analytics in Patent Prosecution: USPTO Implications & Policy*, 35 GA. ST. U. L. REV. 1185 (2019) (noting how the USPTO has gone from a system based on inventor-examiner interactions to machine-human interaction as automated drafting and responses have become more common).

114. *See infra* notes 109–11 (showing the lower processing times in an FEO system).

115. James Singer, *How Long Does a U.S. Patent or Trademark Application Take to Grant?*, JDSUPRA (Jan. 4, 2021), https://www.jdsupra.com/legalnews/how-long-does-a-u-s-patent-or-trademark-1519666 [https://perma.cc/ZP28-W3PZ]. Singer also included a breakdown of common industries, with "semiconductors, electrical systems and optical systems" (USPTO Technology Center 2700) having the shortest pendency of 21.1 months and "communications technologies" (USPTO Technology Center 2600) having the longest pendency of 29.2 months. *Id.*

116. *See* MEIRONG CAO & AARON WININGER, FILING UTILITY MODEL (UM) AND INVENTION PATENT APPLICATIONS SIMULTANEOUSLY IN CHINA (2018), https://www.chinaiplegalreport.com/2018/07/filing-utility-model-um-invention-patent-applications-simultaneously-china [https://perma.cc/L656-RAT8]; Daniel Gajewski, *Utility Model Examination in China Is Quietly Changing*, IPWATCHDOG (July 28, 2019), https://ipwatchdog.com/2019/07/28/utility-model-examination-china-quietlychanging/id=111451/#:~:text=In%20China%2C%20a%20utility%20model,than%20for%20regular%20invention%20patents [https://perma.cc/V9UV-23AX].

117. This Note uses the United States' breakdown of the substantive versus pre-examination steps to estimate the cost for each type of system. *See* Singer*, supra* note 115, and accompanying text.

118. *See* WORLD INTELL. PROP. ORG., *supra* note 88, at 1.

In the fiscal year 2023, the USPTO anticipates they will receive 607,200 patent applications when utility, plant, and reissue applications are all counted.[119] Even with such a large number of applications, the pre-examination processing costs are expected to be $56.2 million, or approximately $92.55 spent per application.[120]

The patent examination processing step, which is what is carried out in a substantive examination jurisdiction, is expected to cost $2.341 billion, or approximately $4,029 per application (of the 607,200 filed, only 580,900 patent applications are expected to be examined).[121] Although only a rough approximation, the above statistics on the U.S. patent budget suggest that formal examination is only approximately three percent of the total patent examination cost. It seems obvious why some countries, especially those with a very small amount of patent applications per year, would not want to pay the overhead costs to staff and maintain a competent substantive examination team.

3. Middle Ground Systems

FEO and SPE systems merely represent the two extremes on a spectrum of different patent examination systems. Some jurisdictions, for example, conduct an FEO before a prior art search.[122] Prior art searches also happen in SPE systems but are usually conducted alongside an analysis of the patent's merits. When only prior art is looked at without this analysis, a middle ground is struck between only examining if the proper forms are filled out and digging into the entire technical background of the invention. Patent offices of this nature still require the resources to maintain an up-to-date prior art database as well as employ examiners with technical skills capable of interpreting the patent claims and comparing them to prior art.[123]

These systems have pros and cons based on policy choices in the jurisdictions that adopt them, but none of them were designed with the question of AI inventorship in mind. On the strictest end of the spectrum, any of these systems may toss out AI patents based on the inventor field alone without examining the merits behind the underlying technology at all. This problem would be especially troublesome in an SPE system, where the patent requirements like non-obviousness and novelty would not even be ruled upon due to the listed inventor. On the other hand, a lax FEO system may allow for a patent applicator, including an AI, to simply fill out forms and be granted. Third parties could challenge this, but a patent system could easily be inundated with requests when no substantive examination is carried out. This makes addressing the question of AI inventorship, before being rejected on inventorship grounds, important because doing so can allow the process to proceed further to a non-obvious or novelty analysis or cut off all AI inventor applications before they carry out this costly work.

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119. U.S. PAT. & TRADEMARK OFF., FISCAL YEAR 2021 CONGRESSIONAL JUSTIFICATION 9 (2020), https://www.uspto.gov/sites/default/files/documents/fy21pbr.pdf [https://perma.cc/VDE9-HV3X] (displaying the patent performance outlook for fiscal years 2021 to 2027).

120. *Id.* at 31.

121. *Id.* at 144.

122. *See generally* WORLD INTELL. PROP. ORG., *supra* note 88, at 6–9.

123. WORLD INTELL. PROP. ORG., *supra* note 88, at 7.

4. AI Classification and Inventorship

A court analyzing an AI copyright claim need only address weak AI since strong AI does not currently exist. Weak AI can be analyzed similarly to any other software tool used to create a new invention. Even if a human inventor does not know exactly what innovation a weak AI is working on, the inventor must give the AI a narrow problem to work on and solve. For example, the best computer chess engines are vastly superior to even the greatest human players.[124] But playing chess is the extent of their ability—they are unable to perform virtually any other tasks. Google (under their parent company Alphabet's subsidy DeepMind) has been able to direct an AI to teach itself chess by playing games against itself repeatedly until it learns, discovers, or creates the optimal strategy.[125] Google was then able to make the algorithm more generalized to play both computer games and other board games without prior knowledge of the rules.[126]

Both of these algorithms were some of the most advanced in the world but were given a very specific set of parameters in which to work, even if the program did not know the ultimate end goal.[127] DeepMind can play several games but is still categorized as a narrow intelligence.[128] *Thaler* gives us a small glimpse into a world where humans do not set parameters.[129] Although DABUS is not categorized as general intelligence, it raises the question of whether a particular broad ANI system can have inventorship rights. Thaler filed Patent 10,423,875 in 2015, and his patent application describes DABUS as mimicking the cortical and thalamic functions in the human brain.[130] He describes this phenomenon in two separate units:

> The system operates similarly to the interaction between the cortex and thalamus in the human brain, with the monitoring sensor and thalamobot, tantamount to the reptilian brain, shifting its attention to newly emerging neural activation patterns appearing within the visual display. If multiple visual outputs are used, the system can serve in the detection of important spatial-temporal connections/correlations between emergent patterns in the various displays thus unifying them into more complex associations, achieving complex graph analysis without a super-computer.[131]

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124. *See generally* Jonathan Follett, *How 22 Years of AI Superiority Changed Chess: Notes from the Frontiers of Machine Perfection*, TOWARD DATA SCI. (Mar. 5, 2019), https://towardsdatascience.com/how-22-years-of-ai-superiority-changed-chess-76eddd061cb0 [https://perma.cc/MQ9R-DA8S] (explaining the evolution of chess machines to collaboration between human and AI).

125. David Silver et al., *A General Reinforcement Learning Algorithm That Masters Chess, Shogi, and Go Through Self-Play*, 362 SCI. 1140, 1140–44 (2018).

126. Julian Schrittwieser et al., *Mastering Atari, Go, Chess and Shogi by Planning with a Learned Model*, 588 NATURE 604, 604–09 (2020).

127. *Id.*

128. Sam Shead, *Computer Scientists Are Questioning Whether Alphabet's DeepMind Will Ever Make A.I. More Human-Like*, CNBC (June 18, 2021), https://www.cnbc.com/2021/06/18/computer-scientists-ask-if-deepmind-can-ever-make-ai-human-like.html#:~:text=In%20its%20quest%20for%20artificial,approach%20called%20%22reinforcement%20learning.%22 [https://perma.cc/UU88-SXAF].

129. Complaint for Declaratory and Injunctive Relief, *supra* note 69, at 3.

130. U.S. Patent No. 10,423,875B2, at [2] (filed Sept. 24, 2019).

131. *Id.* at [4].

Regardless of whether DABUS truly mimics a human brain or not, the *Thaler* case raises the question of why AI would not be allowed to hold patents if a human really did not provide any direction or guidance to it. The statutes that govern intellectual property may be written so that only natural persons may be inventors, but the policy questions raised in *Thaler* may warrant further congressional consideration.[132]

IV. RECOMMENDATION

This Note recommends making a policy change based on the questions raised in *Thaler v. Iancu*.[133] *Thaler* was correctly decided based on the statutes that are currently in place; inventors under the current statutory regime must be humans due to the plain language Congress enacted.

That decision may be correct under U.S. patent law, but the court did not address the policy implications Thaler argued. Thaler argued that allowing AI inventions would result in more innovation and that allowing people to take credit for work they have not themselves done would devalue human inventorship.[134] Although these policy arguments could not persuade the Virginia federal court to override the plain language of the statutes in question, Congress should address these policy concerns through a legislative fix.

A. A Legislative Fix Could Address Policy Considerations Without Unduly Increasing Patent Prosecution Costs

If experts are concerned about patent applications listing humans as inventors when AI does a greater share of the work, a possible fix could be adding a new requirement to disclose the use of AI when filing for a patent. Currently, when filing for a patent, applicants must fill out a Utility Patent Transmittal Form.[135] Among other things, this form requires applicants to check 17 different application elements.[136] The elements range from the claims of the patent to the drawings that help describe the invention to the amino acid sequence of a chemical patent.[137] It would be simple and virtually cost-free to amend this form to require an affirmative statement that asserts human inventors did or did not use AI to create the subject matter of the patent submission. Congress enacted similar changes in the America Invents Act (AIA) of 2011.[138] Before the AIA, less information was required on the cover sheet.[139] For example, chemical patents did not have to disclose the full nucleotide sequence (although an applicant likely disclosed this in the specification or drawings, the AIA does not formally require the full nucleotide sequence as a procedural step).[140]

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132. Complaint for Declaratory and Injunctive Relief, *supra* note 69, at 7.

133. *Id.*

134. *Id.*

135. U.S. PAT. & TRADEMARK OFF., DEP'T OF COM., UTILITY PATENT APPLICATION TRANSMITTAL FORM PTO/AIA/15 (10-17) (2023).

136. *Id.*

137. *Id.*

138. Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284, 293 (2011).

139. 37 C.F.R. § 3.31 (2005).

140. *Id.*

A similar change to disclose AI involvement could solve several policy concerns at a minimal increase in cost. As discussed, pre-examination processing costs on the USPTO only amounted to approximately 2.4% of the patent budget in the fiscal year 2023.[141] This total cost of pre-examination procedures has actually declined from $132.4 million in FY 2012[142] to $56.2 million in FY 2023.[143] This large decrease in a little over a decade is likely due to increased electronic filing since 2011. In 2011, approximately 80% of patents were filed electronically, increasing to 90% in 2012.[144] This number continues to rise, and in 2023 virtually all patents will be filed electronically.

This prevalence of electronic filing means that adding an additional checkbox to ascertain the use of AI would not increase costs while providing the benefit of transparency of the prevalence of AI in innovation.

B. Human Inventorship Is Not Devalued by AI

If this Note's recommended change is implemented to disclose the use of AI in new patents, the problem of humans not providing the innovation disclosed in the patent still persists. Some believe that allowing humans to take credit for an AI's innovation does not fall within the scope of the goal of patents.

This perceived problem does not actually present itself with AI in its current form. The debate of weak versus strong AI is a philosophical argument at our present technology level, and humans still have significant input into what computers "invent." Today's AI can solve semi-generalized problems but require a skilled human's input. This human input should be enough to satisfy the protestations of those who believe that humans are not the "true" inventors of a patented innovation—current AI still cannot truly decide or invent without human input. Because of the continued reliance on human input, it is recommended that merely disclosing AI's input should be the statutory requirement. AI would then be disclosed as used without inventorship rights vesting in an entity that cannot make autonomous decisions. Even if AI could autonomously make innovations and inventions, the rights of the AI would have to be assigned to a human or corporation because AI cannot make decisions regarding what should be done with an invention once accepted by the USPTO. To this end, the inventorship rights would largely be symbolic. Until (if ever) an AI is considered to be on the same intellectual level as a human, it should not have inventorship rights vested in it.

The solution of requiring the use of AI when patenting an invention does not change much on its face. However, it would allow other inventors to see what is possible to achieve with an AI and would allow other inventors to see how artificial intelligence affects their industry. A more forceful solution could require an inventor to disclose how the AI that helped with an invention works, but that would risk disallowing trade secrets from being exercised. A middle ground could be struck by requiring generalized disclosure (such as

141. *See supra* Part III.A.4.

142. U.S. PAT. & TRADEMARK OFF., FISCAL YEAR 2012 PRESIDENT'S BUDGET 42 (2011), https://www.uspto.gov/sites/default/files/about/stratplan/budget/fy12pbr.pdf [https://perma.cc/FR7T-7GAC].

143. U.S. PAT. & TRADEMARK OFF., FISCAL YEAR 2021 PRESIDENT'S BUDGET 31 (2020), https://www.uspto.gov/sites/default/files/documents/fy21pbr.pdf [https://perma.cc/28C6-2GTT].

144. U.S. PAT. & TRADEMARK OFF., FISCAL YEAR 2011 PRESIDENT'S BUDGET 31 (2010), https://www.uspto.gov/sites/default/files/about/stratplan/budget/fy11pbr.pdf [https://perma.cc/TWG9-3PGB].

the use of neural networks or disclosure of what training data the AI used, without disclosing how the AI actually used the training data). Whatever potential path is chosen, an AI's overall influence on a patent should be a required disclosure for those who use AI to produce patentable inventions. Adding this disclosure requirement would require a definition of AI to be chosen, and Congress should hold hearings in order to decide what level of AI needs to be present to be disclosed. This Note proposes that any use of neural networks would meet the requirement for disclosure, as humans do not directly control the reinforcements the networks use. A policy of additional disclosure costs inventors nothing, as it will simply require them to check an additional box when drafting their patent application. The disclosure would allow researchers to see the evolution of AI and would allow the public to discover to what extent AI is "creating" new inventions.

V. CONCLUSION

As AI continues to advance as computers and technology grow more powerful, the debate on what constitutes inventorship changes to encompass the differences between computers as a tool and as inventors in their own right. The use of DABUS and its inventor's fight to have DABUS's contributions recognized at the same level as a human inventor helped bring the issue of AI inventorship to the mainstream.

The court in *Thaler* made the correct decision when it found that AI could not be considered an inventor under the current statutory regime. 35 U.S.C. § 115 uses terms that have historically only been applied to humans, and it should not be extended to cover non-human inventors. Policy considerations do not override the plain meaning of the statutes.

The policy concerns raised should still be addressed. The simple change of requiring disclosure of the use of AI would allow the public to know when AI is used as a tool, but also not give up historical property rights to entities that are currently unable to operate on the same intellectual level as humans. This proposed policy change would require a generalized definition of AI, but this solution is more workable than allowing an AI (at least at the level of intelligence that exists today) to have property rights. The question of the extent of rights for AI will continue to evolve as humans continue to advance the frontier of new technologies.