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Innovation and Own Prior Art

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This Article analyzes a conflict between innovation and the patent system: innovation is a dynamic, iterative process, but a patent reflects only a single snapshot in time. Despite extensive scholarly and judicial discussion of when an invention is ready for patenting, there is rarely a perfect time to file a patent application. Instead of filing a single perfect application, companies and others engaged in innovation typically build a portfolio of patents by filing a series of applications over the course of research and development. Yet this is an imperfect strategy because each patent application sets up a potential barrier for an innovator's future applications. The barrier arises because future applications must be both new and nonobvious as compared to most of the innovator's existing patent applications.

This Article examines the interaction between patent applicants' own earlier-filed applications and patentability requirements. This interaction shapes how innovators seek patent rights, and it affects disclosure and innovation. Despite its significance, the legal treatment of successive patent filings by the same innovator developed haphazardly. The resulting statutory framework, built by the layering of various provisions, is not well-tailored to the original policy goals. Moreover, in its current form, the law has unintended effects that can hamper innovation. This Article proposes a statutory amendment that would provide a better mechanism for directly tailoring the statutory framework, and it illustrates how its parameters can be adjusted to reflect the balancing of competing concerns.

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INTRODUCTION

In contrast to the fabled "Eureka!" moment, innovation is more commonly a drawn-out, iterative process. Even when an innovation as a whole is pioneering, it may be achieved not in a flash of genius, but rather through a series of carefully planned steps forward.[1] And once the outlines of an invention are clear, making an idea actually work in practice takes time and effort; the "best" version is usually the result of a series of refinements. But one of the key legal mechanisms for protecting the result of innovation—a patent—reflects only a single snapshot in time.[2] The content of a patent application cannot be changed after filing,[3] and much of patent law hinges on the particular date on which the application was filed.[4] Moreover, various aspects of patent law discourage an inventor from waiting to file a patent application until the innovation process is complete. Indeed, patent law often pushes an inventor to file well before this.[5]

As a result, patents are in most cases an inherently imperfect mechanism for disclosing and protecting innovation. Others have identified and discussed variations of this problem, particularly by considering the optimal moment in the innovation process that balances this tension.[6] But the fundamental problem remains that even the optimal moment to file a patent application will rarely be a perfect one.

The practical result of this tension between innovation and the patent system is that companies and others engaged in research and development typically rely not on a single patent, but rather on a series of patents filed over time.[7] This approach allows companies to account for innovation trajectories, not only in the narrow sense of iterative improvements to a particular invention,

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1. *In re* Bass, 474 F.2d 1276, 1304 (C.C.P.A. 1973) (Baldwin, J., concurring); *see* Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 347–54 (2010).

2. Timothy R. Holbrook, *Patent Disclosures and Time*, 69 VAND. L. REV. 1459, 1460 (2016); *see* Jeanne C. Fromer, *Dynamic Patent Disclosure*, 69 VAND. L. REV. 1715, 1716–22 (2016).

3. *See* 35 U.S.C. § 132(a) (2018); 37 C.F.R. § 1.53(b) (2018). The claims can be changed after filing but only within the bounds of what was originally disclosed. *See* Gentry Gallery, Inc. v. Berkline Corp., 134 F.3d 1473, 1480 (Fed. Cir. 1998); Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523, 534–36 (2010). Nonsubstantive changes to the specification and figures are permitted.

4. *See* Holbrook, *supra* note 2, at 1468–81. This is particularly true after the transition to a first-to-file system in 2013 with implementation of the Leahy-Smith America Invents Act ("AIA"). *See id.* at 1471–73; Robert P. Merges, *Priority and Novelty under the AIA*, 27 BERKELEY TECH. L.J. 1023, 1024 (2012).

5. *See infra* notes 23–29 and accompanying text.

6. *See, e.g.*, Christopher A. Cotropia, *The Folly of Early Filing in Patent Law*, 61 HASTINGS L.J. 65 (2009); Paul R. Gugliuzza, *Early Filing and Functional Claiming*, 96 B.U. L. REV. 1223 (2016); Dmitry Karshtedt, *The Completeness Requirement in Patent Law*, 56 B.C. L. REV. 949 (2015); Mark A. Lemley, *Ready for Patenting*, 96 B.U. L. REV. 1171 (2016); Dotan Oliar & James Y. Stern, *Right on Time: First Possession in Property and Intellectual Property*, 99 B.U. L. REV. 395 (2019); Lisa Larrimore Ouellette, Pierson*, Peer Review, and Patent Law*, 69 VAND. L. REV. 1825 (2016); *see also* Fromer, *supra* note 2 (discussing the limitations of "early and static" patent disclosure and arguing for post-filing disclosure of patentees' and licensees' covered commercialized products). Considerations of this tension sometimes focus (with more or less emphasis) on the effects of timing on the balance of rights between multiple parties.

7. *Cf.* Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 27–43 (2005) (discussing patent portfolios and their benefits, including benefits for a firm's subsequent innovation due to broader scope of protection).

but also to track interrelated research and development projects with different but overlapping timelines.

But relying on a series of patents over time is an imperfect solution. Innovators face constraints in using successive patents to track innovation. Although there is no formal barrier to *filing* new patent applications as frequently as desired, innovators are unlikely to successfully *obtain* patent rights from all of these filings. This is because patent law enforces a certain amount of spacing between patent rights—that is, each set of patent rights must typically be sufficiently different from the last. Suppose that a company files a first patent application on an invention and then makes improvements to the invention. If the improved invention is too similar to the original one, the company may not be able to patent the improvements, even when those improvements are important—for example, they make the invention commercially successful or fix a problem discovered in the original design.

The doctrinal basis for this spacing between patent rights originates from the requirement that patentable inventions be not only new but also "nonobvious."[8] The nonobviousness requirement has been described as "the cornerstone of the patent bargain" and "indispensable for maintaining an optimal balance between incentivizing new innovation and providing public access to existing innovation."[9] That is, patents are designed to protect—and thus promote—only innovation that is different enough from what came before it that its benefit to society outweighs the social cost of exclusivity. The nonobviousness doctrine sets the boundary between what is sufficiently different to merit patent protection and what is not.[10] This prevents the patent system from channeling innovation incentives toward trivial inventions.[11]

Without the nonobviousness doctrine, different patentees would each be able to obtain rights to slight modifications of the same invention. The requirement that patentable inventions be "novel" similarly prevents different patentees from each obtaining rights to the same invention. Without these patentability requirements, many similar patent rights could be held by many different patentees, and as such it would be difficult to navigate these rights in

8. *See* 35 U.S.C. § 103 (2018). This Article focuses on U.S. patent law, but a requirement similar to nonobviousness is present in nearly every country's patent laws. *See* John F. Duffy, *Inventing Invention: A Case Study of Legal Innovation*, 86 TEX. L. REV. 1, 1–2 (2007).

9. Laura G. Pedraza-Fariña & Ryan Whalen, *A Network Theory of Patentability*, 87 U. CHI. L. REV. 63, 63–65 (2020); *see also* Christopher A. Cotropia, *Patent Law Viewed Through an Evidentiary Lens: The "Suggestion Test" as a Rule of Evidence*, 2006 BYU L. REV. 1517, 1526 (2006) ("[The nonobviousness doctrine's] effective and proper enforcement is crucial to maintaining the social cost-benefit balance the patent system attempts to implement."); ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 608 (6th ed. 2013).

10. *See* MERGES & DUFFY, *supra* note 9, at 608; Cotropia, *supra* note 9, at 1524; Pedraza-Fariña & Whalen, *supra* note 9, at 65.

11. *Cf.* MERGES & DUFFY, *supra* note 9, at 609 (describing that "granting patents to obvious developments may compromise the incentives that the patent system provides to develop nonobvious inventions").

order to bring an invention to market. Thus, these thickets would hinder rather than promote innovation.[12]

But this theoretical basis for the patentability requirements is based on a scenario in which there are *two different* patentees. In the context of a *single* patentee, the considerations are different and complex.[13] One of the effects of these patentability requirements as applied to a single patentee is a limitation on the ability to obtain a series of patent rights tracking the innovation process.

To account for the particular considerations in the case of a single patentee, the Patent Act[14] has been amended over time to include provisions giving limited preferential treatment to original patent applicants when they file patent applications on later improvements.[15] This preferential treatment allows the original applicant to patent otherwise unpatentable innovation. This is a notable exception to two basic principles of patent law: that the "right to patent improvements on a technology is a common right"[16] and that slight variations of inventions already described in patents are dedicated to the public domain.[17]

This Article sets out the first in-depth analysis of the law that creates this preferential treatment, and more broadly, its effects on innovation and disclosure. These effects are pervasive and complex, and they shape patent applicant strategy. Yet, their scholarly analysis is limited,[18] likely in part because

12. *See* MERGES & DUFFY, *supra* note 9, at 609–10; Pedraza-Fariña & Whalen, *supra* note 9, at 65.

13. John Duffy has said that improvement patents granted to "a pioneer patentee may present issues different from the canonical situation in which many similarly situated inventors are seeking patents conferring immediate market exclusivity," and have "unique aspects" that "seem sufficiently great as to demand more detailed treatment." John F. Duffy, *A Timing Approach to Patentability*, 12 LEWIS & CLARK L. REV. 343, 366 (2008).

14. 35 U.S.C. (2018).

15. Inventors or entities applying for patents are termed "applicants." *See* 37 C.F.R. § 1.42 (2018). This is new under the AIA; previously, only inventors could be "applicants" for U.S. patents. *See* 37 C.F.R. § 1.41 (2010). As Parts II and IV describe, the preferential treatment discussed in this Article is not based on the identity of the "applicant" in a strict sense. However, for lack of a better term, this Article uses "original patent applicant" or "original applicant" throughout.

16. John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 488 (2004).

17. *See* Pedraza-Fariña & Whalen, *supra* note 9, at 63, 65 ("Patent law is built upon a fundamental premise: only significant inventions receive patent protection while minor improvements remain in the public domain."); *see also* MARTIN J. ADELMAN, RANDALL R. RADER & JOHN R. THOMAS, CASES AND MATERIALS ON PATENT LAW 307 (5th ed. 2019) (describing that the nonobviousness doctrine "creates a 'patent-free' zone around the state of the art"); Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 1008 (1997) (describing "minor improvers" as others whose improvements are too small to be patentable as compared to the original patent owner).

18. There is some discussion of this preferential treatment in the literature on "secret prior art," since the preferential treatment is an exception to the general rule that an earlier-filed ("secret") and subsequently published patent application is retroactively effective as prior art as of its filing date. There, the preferential treatment has been referred to as a limitation on "self-collision." *See, e.g.*, Kate H. Murashige, *The Hilmer Doctrine, Self-Collision, Novelty and the Definition of Prior Art*, 26 J. MARSHALL L. REV. 549, 556–57 (1993); C. Douglass Thomas, *Secret Prior Art—Get Your Priorities Straight!*, 9 HARV. J.L. & TECH. 147, 160–64 (1996).

I have identified three instances of scholars touching on the theory or strategic role of the particular preferential treatment upon which this Article focuses. *See* Duffy, *supra* note 8, at 16 (discussing the nonobviousness requirement's role in allocating rewards among inventors, and how if both applications are owned by a single entity, the earlier application is not prior art for obviousness analysis because "[t]he same

they operate in the background to influence patent applicant behavior with little external evidence.

This Article proceeds in four Parts. Part I discusses the difficulty of mapping innovation processes to the patent system and sets forth a taxonomy of the types of innovation that cannot be easily captured. Part I also situates this Article within related scholarship. Part II analyzes how preferential treatment for original patent applicants developed piecemeal over time through targeted amendments in response to this mapping problem, as well as through amendments to seemingly unrelated portions of the Patent Act. Part III then explores and evaluates the effects of preferential treatment. In particular, I argue that preferential treatment can promote certain disclosure and innovation. Part IV begins by describing today's complex statutory framework for preferential treatment and the limitations of that framework. Part IV concludes by offering an alternative approach.

I. MAPPING INNOVATION ONTO PATENTS

A. THE SHORTCOMINGS OF A SINGLE PATENT

Innovation is rarely a simple process. Transforming an initial idea into a completed, perfected, or commercially viable invention often involves long timelines, many iterations, and extensive collaboration.[19] James Dyson, for example, has written that creation of his bag-less vacuum cleaner took 5,127 prototypes and fifteen years.[20] He describes his company as "develop[ing]

party will receive the rewards from both patents in such cases, so allocating rewards among parties is not a concern. The law thus eliminates the nonobviousness requirement in those circumstances and allows the granting of patents, provided that at least mere novelty exists over the prior commonly owned invention."); Douglas L. Rogers, *Double Patenting: Follow-on Pharmaceutical Patents that Suppress Competition*, 14 NW. J. TECH. & INTELL. PROP. 317, 375–79 (2017) (arguing that double patenting doctrine should be expanded to prevent the same inventor or employer from patenting a species within the scope of its existing genus patent, and discussing how this can compensate for the expanded exceptions to prior art under the Leahy-Smith America Invents Act); Benjamin N. Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 TEX. L. REV. 503, 522 n.98 (2009) (describing that researchers who submit an original patent application rejected by the U.S. Patent and Trademark Office (USPTO) for lacking utility can, unlike a different set of researchers, file another application with additional evidence of utility within twelve months of publication of the original application).

Scholarship on obviousness-type double patenting is also related to the preferential treatment I consider here. *See, e.g.*, Emily A. Evans & Jill A. Jacobson, *Double Patenting Recapitulated*, 87 J. PAT. & TRADEMARK OFF. SOC'Y 625 (2005); Christopher M. Holman, *The Federal Circuit's Ongoing Expansion of Obviousness-Type Double Patenting Creates Patent Prosecution Pitfalls*, 33 BIOTECHNOLOGY L. REP. 94 (2014); Daniel Kazhdan, *Obviousness-Type Double Patenting: Why It Exists and When It Applies*, 53 AKRON L. REV. 1017 (2019). Obviousness-type double patenting doctrine also addresses the conditions under which a patentee can have two patents claiming obvious variants of an invention. It is, however, a special *limitation* on original patent applicants' ability to obtain patents, even when those patents are not unpatentable under the novelty and nonobviousness requirements.

19. *See* Sichelman, *supra* note 1, at 347–54 (describing the many steps in a "stylized overview of the innovation path from conception to a marketable good").

20. James Dyson, *No Innovator's Dilemma Here: In Praise of Failure*, WIRED (Apr. 8, 2011, 8:00 PM), https://www.wired.com/2011/04/in-praise-of-failure/; *see also* How I Built This with Guy Raz, *Dyson: James Dyson*, NPR (Feb. 12, 2018, 12:01 PM), https://www.npr.org/2018/03/26/584331881/dyson-james-dyson.

technology iteratively—making the smallest changes, building prototype after prototype until we have got it as close to perfect as we can muster. Testing and prototyping is at the heart of the most successful technologies."[21] This is true across industries; in pharmaceutical innovation, for example, drug discovery and pre-clinical testing of compounds take on average six and a half years, and this process usually involves numerous research teams building upon each other's work.[22]

Innovation that happens in this way cannot be easily captured by a single patent application. It is usually unreasonable to expect a patent applicant to wait for the completion of the innovation process to file for a patent. This is because the patent system permits, incentivizes, and sometimes forces inventors to file before its completion.[23]

The patent system permits early filing because inventors do not need to have actually made the invention ("actual reduction to practice") at the time of filing, nor do they need to know that the invention works. They must only "constructively reduce to practice" their invention by describing it in the patent application.[24]

The patent system also incentivizes early filing by providing an advantage to earlier filers.[25] This is particularly true after the transition to a first-to-file system in the United States in 2013, which makes patentability a function of the date on which the application was filed.[26]

Finally, activities in the normal course of innovation may force applicants to file before the end of the innovation process. Certain activities can render an invention unpatentable unless a patent application is filed within the following year.[27] For example, clinical trial activities, grant proposals, and discussions with potential investors can create enough risk of starting this one-year clock that cautious applicants will file before it expires.[28]

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21. Stephen Dowling, *Frustration and Failure Fuel Dyson's Success*, BBC: FUTURE (Mar. 13, 2013), https://www.bbc.com/future/story/20130312-failure-is-the-best-medicine.

22. U.S. GOV'T ACCOUNTABILITY OFF., GAO-07-49, NEW DRUG DEVELOPMENT: SCIENCE, BUSINESS, REGULATORY, AND INTELLECTUAL PROPERTY ISSUES CITED AS HAMPERING DRUG DEVELOPMENT EFFORTS 6 (2006), https://www.gao.gov/assets/260/253726.pdf.

23. *See* Cotropia, *supra* note 6, at 72–82; Lemley, *supra* note 6, at 1172–85.

24. Falkner v. Inglis, 448 F.3d 1357, 1366–67 (Fed. Cir. 2006); Cotropia, *supra* note 6, at 69–70, 73–75; Lemley, *supra* note 6, at 1177–78; Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 628–30 (2010).

25. *See* Cotropia, *supra* note 6, at 78–80; Lemley, *supra* note 6, at 1179.

26. *See* Lemley, *supra* note 6, at 1180–82; Merges, *supra* note 4, at 1024.

27. *Cf.* 35 U.S.C. § 102 (2018).

28. *Cf.* Janet Freilich, *Prophetic Patents*, 53 U.C. DAVIS L. REV. 663, 685 (2019) (describing that whether clinical trials involve public disclosure is a "particularly contentious issue," and that "[t]hough appropriate confidentiality agreements can prevent clinical trials of a drug from blocking later patenting of the drug, it is a sufficiently problematic issue that the question is frequently litigated"); Brenda M. Simon, *Patents, Information, and Innovation*, 85 BROOK. L. REV. 727, 765 (2020) (describing the importance of having patents on file for self-revealing inventions before disclosing them to investors to avoid expropriation and the risk of "likely los[ing] the ability to obtain patent protection later"); E.I. Du Pont de Nemours & Co. v. Cetus Corp., No. C-89-

The result is that an applicant's first-filed patent application will typically fail to reflect a large portion of the innovation process.[29] Yet, once the patent application is filed, its content cannot be updated to describe new developments.[30] New developments can be described in a *new* patent application, but not in the original one.[31]

A number of scholars have addressed the difficulty of mapping innovation onto a single patent application. Some of these scholars consider the optimal timing for the application to be filed, and how patent practices or doctrines can be adjusted to achieve this timing.[32] Many have critiqued the current system for both allowing and encouraging innovators to file too early, reducing patents' socially beneficial functions.[33] Some have proposed reforms to push inventors to file later in the innovation process, including new or heightened patentability or disclosure requirements or better enforcement of current requirements.[34]

2860 MHP, 1990 WL 305551, at *8 n.7 (N.D. Cal. Dec. 3, 1990) (suggesting that a National Science Foundation grant proposal was a "printed publication" under 35 U.S.C. § 102(b)).

Applicants interested in patent protection outside the United States will usually file before the potential disclosure, rather than relying on the one-year grace period, because many foreign patent laws do not provide a grace period. *See* Merges, *supra* note 4, at 1046 ("[T]he AIA diverges from the international norm which approximates an 'absolute novelty' standard."); *see, e.g.*, Convention on the Grant of European Patents art. 54, Oct. 5, 1973, 1065 U.N.T.S. 199 ("(1) An invention shall be considered to be new if it does not form part of the state of the art. (2) The state of the art shall be held to comprise everything made available to the public . . . before the date of filing of the European patent application.").

29. *See* Dan L. Burk, *Patent Silences*, 69 VAND. L. REV. 1603, 1621–22 (2016); Colleen V. Chien, *Contextualizing Patent Disclosure*, 69 VAND. L. REV. 1849, 1852 (2016); Cotropia, *supra* note 6, at 88–96; Fromer, *supra* note 2, at 1715–16; Sichelman, *supra* note 1, at 355–56.

30. *See supra* note 3 and accompanying text.

31. Patent law does provide a type of application that is in between an original and new patent application: a "continuation-in-part." A continuation-in-part is an application that adds additional disclosure to an earlier-filed application (the so-called "parent" application). *In re* Wertheim, 646 F.2d 527, 536 (C.C.P.A. 1981). Despite the nomenclature, claims based on the additional disclosure in a continuation-in-part are treated no differently than an entirely new application when patentability is assessed. *Cf.* Litton Sys., Inc. v. Whirlpool Corp., 728 F.2d 1423, 1438 (Fed. Cir. 1984) ("New matter in a C-I-P application has the filing date of *that* C-I-P application. The earlier filing date of the parent application pertains to material in the C-I-P application also disclosed in the prior application."); *see also* Robert Paradiso & Elizabeth Pietrowski, *Think Twice Before Filing that CIP Application*, 196 N.J. L.J. 1, 1–2 (2009); Catherine M. Polizzi, *Kicking the CIP Habit: The Perils of Continuation-In-Part Practice*, INTELL. PROP. TODAY, Feb. 2006, at 10, 10–12. Nonetheless, applicants often file continuations-in-part to disclose subject matter that builds upon their existing patent applications, and some applicants—and even some patent practitioners—believe that such filings avoid the parent applications as prior art. *See* Paradiso & Pietrowski, *supra*, at 2; Polizzi, *supra*, at 11–12.

32. *See, e.g.*, Cotropia, *supra* note 6, at 119–28 (proposing requiring actual reduction to practice before examination); Karshtedt, *supra* note 6, at 992–1013 (proposing codifying a "completeness" requirement for patentability); Lemley, *supra* note 6, at 1191–95 (suggesting several ways to correct patent law's increasing bias "towards encouraging ideas at the expense of those who take the time to develop and test their inventions"); Ouellette, *supra* note 6, at 1842–47 (arguing for experimenting with a peer review system to help patent examiners assess whether the enablement requirement is met); Seymore, *supra* note 24, at 621, 641–57 (proposing "a new examination protocol which gives the U.S. Patent Office the ability to request working examples when the disclosure's teaching appears dubious," effectively requiring actual reduction to practice for complex inventions).

33. *See, e.g.*, Cotropia, *supra* note 6, at 72–82, 87–119; Fromer, *supra* note 2, at 1716–21; Lemley, *supra* note 6, at 1180–91; Ouellette, *supra* note 6, at 1826–36; Seymore, *supra* note 24, at 628–32.

34. *See supra* note 32.

Other scholars propose reforms to promote disclosure of new developments after a patent application is filed. Scholars have suggested, for example, encouraging updates to include the results of experiments,[35] requiring patentees and licensees to disclose information about commercialized products covered by the patentees' patents,[36] and encouraging patent applicants to disclose experimental failure.[37]

This scholarship focuses on optimizing a single patent application's ability to capture dynamic innovation. In contrast, when scholars consider the alternative approach of an innovator using multiple patent applications to capture innovation, that approach is often described as undesirable, and even a result of improper behavior.[38] Some scholarship suggests that filing multiple applications is a symptom of patent applicants filing too early in the innovation process.[39] Other scholarship raises concerns about follow-on patents for pharmaceuticals, which can result in patents on small, and sometimes clinically insignificant, variations in order to extend patent protection and delay generic versions.[40] Others critique companies' extensive patenting driven by the strategic value of a large portfolio (not by the value of any particular patent) and argue that this creates patent thickets that hurt innovation.[41]

All of these concerns are worth raising. But applicants seeking multiple patents during the course of innovation are often acting neither frivolously nor improperly. Any applicant pursuing patent protection must make hard decisions about when to file one or more patent applications and what to include in those applications. This is particularly true when research and development includes

35. *See* Freilich, *supra* note 28, at 722–23 (proposing "creating a mechanism to encourage updating of hypothetical examples").

36. *See* Fromer, *supra* note 2, at 1722–31 ("Whenever a patentee or a licensee releases a new product or version of an existing product that the patentee perceives, or should perceive, to be covered by one or more of the patentee's patents, the patentee would have a legal obligation to file information expeditiously with the Patent and Trademark Office . . . on the existence of the commercialized product and its coverage by the relevant patents. The PTO would make this information available to the public, linking it directly to the relevant patents.").

37. *See* Sean B. Seymore, *Patenting Around Failure*, 166 U. PA. L. REV. 1139, 1177–86 (2018) (proposing disclosure of experimental failures in applications' prosecution histories and discussing strategies for incentivizing this disclosure).

38. *But cf.* Parchomovsky & Wagner, *supra* note 7, at 27–43 (discussing the value of patent portfolios, including "eas[ing] subsequent in-house innovation" and "adjust[ing] for changing technology as [a firm] attempts to navigate the path of a research and development effort").

39. *See, e.g.*, Cotropia, *supra* note 6, at 69, 96–97, 101, 103.

40. *See, e.g.*, Robin Feldman, *May Your Drug Price Be Evergreen*, 5 J.L. & BIOSCIENCES 590 (2018); Aaron S. Kesselheim, Michael A. Fischer & Jerry Avorn, *Extensions of Intellectual Property Rights and Delayed Adoption of Generic Drugs: Effects on Medicaid Spending*, 25 HEALTH AFFS. 1637, 1638, 1643 (2006). *But see* Christopher M. Holman, Timo Minssen & Eric M. Solovy, *Patentability Standards for Follow-On Pharmaceutical Innovation*, 37 BIOTECHNOLOGY L. REP. 131, 137–39 (2018) (arguing that "the concern over such so-called evergreening is . . . to a large extent illusory").

41. *See, e.g.*, Gregory R. Day & W. Michael Schuster, *Patent Inequality*, 71 ALA. L. REV. 115 (2019) (arguing that powerful firms with large patent portfolios hurt innovation, and surveying other scholarship in this area).

a web of interrelated projects with overlapping and shifting scope as well as different, often unpredictable, timelines.

B. THE SHORTCOMINGS OF MULTIPLE PATENTS

Although the realities of research and development often push applicants to rely on multiple patent applications, this strategy also has its limitations. When innovation that happens after the filing of an initial patent application—what this Article refers to as "post-filing innovation"—is sufficiently different from what is described in the initial application to be novel and nonobvious in comparison, multiple patent applications are a reasonable strategy for capturing that innovation.

A more complex situation arises when post-filing innovation is *not* sufficiently different. As a general rule, slight variations of inventions already described in patents are dedicated to the public domain.[42] This means that, without an exception to that general rule, an innovator's initial patent application can prevent the innovator from patenting certain post-filing innovation. This Article refers to this unpatentable post-filing innovation as "supplementary innovation." Supplementary innovation often includes the small steps that characterize much of day-to-day research and development; the Subparts that follow provide examples of supplementary innovation and suggest a taxonomy with three dimensions.

1. Minor and Deepening Supplementary Innovation

The first of these dimensions relates to the statutory basis for supplementary innovation's unpatentability. Some supplementary innovation is different from what is described in an original applicant's existing patent application, but not sufficiently different to be nonobvious in comparison. This Article terms this kind of innovation "minor" supplementary innovation.[43] Other supplementary innovation is different from what is described in an existing patent application, yet is rendered not novel ("anticipated") by it. This Article terms this "deepening" supplementary innovation.[44]

Post-filing research and development efforts often result in minor supplementary innovation when the original patent applicant seeks to improve

42. *See* Pedraza-Fariña & Whalen, *supra* note 9, at 63, 65; *see also* ADELMAN ET AL., *supra* note 17, at 307; Lemley, *supra* note 17, at 1008.

43. Others have used similar terminology for follow-on innovation by others. For example, Mark Lemley has used the term "minor improver" in the context of patent law for others whose improvements are too small to be patentable as compared to the original patent owner, and in the context of copyright law for others who make small improvements to original work that receive no special protection under copyright law. *See* Lemley, *supra* note 17, at 1007–08, 1019–20; *see also* Dennis S. Karjala, *Distinguishing Patent and Copyright Subject Matter*, 35 CONN. L. REV. 439, 471 n.128 (2003) (using the terms "minor improver" and "small improver" in the context of copyright law).

44. This term is borrowed from Nicholson Price, who uses it to describe "innovation that tells us more about existing technology." W. Nicholson Price II, *The Cost of Novelty*, 120 COLUM. L. REV. 769, 769 (2020).

or optimize the technology. The facts of *In re Chu* provide an example:[45] Babcock & Wilcox, an energy and environmental technology company,[46] developed a device for reducing pollutant emissions from coal-fired electric power plants. The device had a "baghouse" containing components that chemically reacted with the pollutants to remove them from the waste gases created during combustion of fossil fuels.[47] A little over a year after filing a patent application on the device, Babcock & Wilcox filed another application on a device in which the location of the catalyst had been adjusted to improve performance.[48] The new location was not described in the first application,[49] but it would likely be obvious under current law and would thus be minor supplementary innovation.[50]

Deepening innovation, on the other hand, often results when the original patent applicant seeks to better understand how its existing invention works. An innovator need not understand how or why an invention works at the time of filing the original application.[51] Thus, this understanding often comes from post-filing innovation. For example, the drug company Schering Corporation originally patented loratadine, the active ingredient in Claritin®.[52] Several years after filing the original application,[53] Schering patented a compound (a "metabolite") that it had found was created during digestion of loratadine. But the metabolite claims were later invalidated based on Schering's own loratadine patent: the metabolite necessarily formed when patients took loratadine and was thus "inherently" disclosed by the loratadine patent.[54] Because the loratadine

45. *In re* Chu, 66 F.3d 292 (Fed. Cir. 1995).

46. *See Explore B&W*, BABCOCK & WILCOX, https://www.babcock.com/en/about (last visited Feb. 4, 2021).

47. *See* U.S. Patent No. 4,871,522, at [57], col. 2 (filed July 25, 1988).

48. *Chu*, 66 F.3d at 295–99; U.S. Patent No. 5,567,394, at [63], [73] (filed Oct. 2, 1990). The new application was a continuation-in-part of the original application. *See* '394 Patent, at [63] (describing the application as a continuation of abandoned U.S. Patent Application No. 404,153, filed September 7, 1989, which was a continuation-in-part of the '522 Patent).

49. *Chu*, 66 F.3d at 295–99.

50. The USPTO found the catalyst location obvious. *Id.* at 296. On appeal, the Federal Circuit held the location of the catalyst to be nonobvious, in part because there was no "teaching or suggestion" in the prior art leading to the new location. *Id.* at 299. Since the decision, however, the U.S. Supreme Court has rejected rigid application of the "teaching or suggestion" test for obviousness; under the new standard, many more claimed inventions are obvious. *See* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 415–23 (2007); Harold C. Wegner, *Making Sense of* KSR *and Other Recent Patent Cases*, 106 MICH. L. REV. FIRST IMPRESSIONS 39, 41 (2007). A detailed analysis of post-*KSR* nonobviousness doctrine and its application to the facts of *In re Chu* is beyond the scope of this Article; I describe the facts of the case only as an example of innovation likely to be minor supplementary innovation.

51. Sean B. Seymore, *Patenting the Unexplained*, 96 WASH. U. L. REV. 707, 719–26 (2019).

52. Schering Corp. v. Geneva Pharm., Inc., 339 F.3d 1373, 1375 (Fed. Cir. 2003).

53. *Compare* U.S. Patent No. 4,282,233, at [22] (filed June 19, 1980), *with* U.S. Patent No. 4,659,716, at [22] (filed Mar. 12, 1986).

54. *Schering*, 339 F.3d at 1375, 1382. Under the inherency doctrine, a claimed invention is anticipated if it was "necessarily present" in the prior art, regardless of whether the prior art recognized or appreciated it. *Id.* at 1377. Inherency can also play a role in obviousness analysis. *See* Par Pharm., Inc. v. TWi Pharm., Inc., 773 F.3d 1186, 1194–96 (Fed. Cir. 2014).

patent anticipated the metabolite claims, the metabolite is an example of deepening innovation.

2. Encompassed and Broadening Supplementary Innovation

Supplementary innovation can also be classified as "encompassed" or "broadening." This Article terms supplementary innovation "encompassed" when, although the supplementary innovation is not described in the original patent application, the original application can still be used to protect the supplementary innovation. This is the case when supplementary innovation is within the scope of patentable claims of the original application. For example, imagine that Babcock & Wilcox's first patent for reducing pollutant emissions claimed "an apparatus for controlling emissions of a fossil fuel fired boiler, comprising: a flue gas duct; a fabric baghouse; and a catalyst." With this claim, the particular location of the catalyst is not specified. Thus, an improved device with a relocated catalyst would still be "covered" by the claims.

But in other instances, supplementary innovation is not within the scope of patentable claims of the original patent application. Thus, the original patent applicant cannot protect the supplementary innovation using a patent resulting from the original application.[55] This Article terms this type of supplementary innovation "broadening." Suppose instead that Babcock & Wilcox's first patent claimed "an apparatus for controlling emissions of a fossil fuel fired boiler, comprising: a flue gas duct; a fabric baghouse; and a catalyst *located outside the fabric baghouse*." This claim would not cover an improved device in which the catalyst had been relocated *into* the fabric baghouse. Because broadening supplementary innovation cannot be protected by the original application,[56] and because it is not patentable as compared to the original application, it will be dedicated to the public domain absent some form of special treatment for the original applicant.

3. No-Fault and At-Fault Supplementary Innovation

Thus far, this Article has described supplementary innovation as a natural result of the iterative and complex nature of research and development; most innovators will carry out at least some post-filing innovation after filing a patent application. That said, supplementary innovation can also be classified based on the extent to which the original patent applicant is "at fault" for its post-filing innovation being rendered unpatentable by its original application.

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55. The original patent applicant can protect certain innovation that is *slightly* outside the bounds of its original patent's claims. Under the doctrine of equivalents, "a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is 'equivalence' between the elements of the accused product or process and the claimed elements of the patented invention." Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 21 (1997).

56. This example assumes that Babcock & Wilcox could not obtain another, broader claim covering a catalyst relocated into the fabric baghouse based on the first patent application.

One way the original applicant can be at fault for supplementary innovation is by filing the original patent application too early—that is, before the applicant is far enough along in the innovation process to obtain valid patent claims. For example, to be patentable, an invention must have "utility."[57] The threshold for satisfying the utility requirement is very low for many areas of technology, but the requirement can be meaningful for some innovation, particularly in the life sciences.[58] If the original application discloses an invention but fails to establish its utility—for example, the application describes a new drug compound but does not include sufficient preclinical evidence of its therapeutic effect—the invention will not be validly patentable in the original application.[59] If the original patent applicant then carries out new research that establishes utility and tries to file a new application claiming the same invention, the original application will anticipate the new claims.[60] In this scenario, the original patent applicant is at fault for rendering the deepening supplementary innovation unpatentable.

A similar situation arises when an original application fails to meet the "enablement" requirement—the requirement that a patent application must enable a person skilled in the art to make and use the invention.[61] If the original application discloses the broad strokes of an invention but does not provide enough information to adequately enable it, the invention will not be validly patentable in that original application. But if the original applicant later figures out the enabling details and files a new patent application, the new application's claims are likely to be rejected as anticipated by the original application's disclosure.[62]

In both of these examples of at-fault supplementary innovation, the supplementary innovation should not have been post-filing innovation at all; the original patent applicant should have waited to file its first application. In

57. *In re* Fisher, 421 F.3d 1365, 1369–72 (Fed. Cir. 2005). The utility requirement is based in 35 U.S.C. § 101's language that inventors can obtain patents for "useful" inventions. *See id.* at 1370; 35 U.S.C. § 101 (2018). For more extensive discussion of the utility requirement, see, for example, Michael Risch, *Reinventing Usefulness*, 2010 BYU L. REV. 1195 (2010), and Sean B. Seymore, *Making Patents Useful*, 98 MINN. L. REV. 1046 (2014).

58. *See* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1644–46 (2003).

59. *See* Roin, *supra* note 18, at 522–23.

60. *See In re* Hafner, 410 F.2d 1403, 1405 (C.C.P.A. 1969) ("[A] disclosure lacking [utility] is . . . entirely adequate to anticipate a claim . . . and, at the same time, entirely inadequate to support the allowance of such a claim."); Roin, *supra* note 18, at 522.

61. *In re* Wands, 858 F.2d 731, 735 (Fed. Cir. 1988).

62. A prior art application's nonenabling disclosure should not, in theory, have this effect because anticipating prior art must not only disclose the claimed invention but also enable it. Schering Corp. v. Geneva Pharm., 339 F.3d 1373, 1380–81 (Fed. Cir. 2003). However, during examination by the USPTO, the burden is on the applicant to rebut a presumption of enablement. Amgen Inc. v. Hoechst Marion Roussel, Inc., 314 F.3d 1313, 1355 (Fed. Cir. 2003). This presumption is hard to overcome, *see* Sean B. Seymore, *Reinvention*, 92 NOTRE DAME L. REV. 1031, 1059–60 (2017), and especially so for the original patent applicant. In practice, an applicant will usually avoid arguing that its own application is nonenabling. *Cf.* Nathan T. Lewis, Scott W. Hackwelder & Peter D. Siddoway, *Considerations for Handling Closely Related Subject Matter in Patent Portfolios in Light of* Therasense *and the America Invents Act of 2011*, 53 IDEA 63, 91 (2013) ("[A] patent prosecutor should take all reasonable measures to avoid arguing against a client's own prior art.").

contrast, in "no-fault" supplementary innovation, there is no clear error by the original patent applicant in its first application; the first application describes its claimed invention sufficiently to be validly patentable. The exact line between at-fault and no-fault supplementary innovation is blurry. But it is nonetheless worth recognizing that the original patent applicant may be more or less culpable for post-filing innovation's unpatentability.

For each type of supplementary innovation, whether minor or deepening, encompassed or broadening, no-fault or at-fault, a new patent application specifically claiming the supplementary innovation should as a general rule be unpatentable in view of the original application. But concerns about the resulting limitations on innovators have driven changes to the patent system. These changes grant preferential treatment to original patent applicants such that they can sometimes—but not always—patent this otherwise unpatentable innovation. I turn to the historical development of these changes next.

II. THE HISTORICAL DEVELOPMENT OF PREFERENTIAL TREATMENT

The law creating preferential treatment for original patent applicants has developed piecemeal over time. As Congress has sought to adapt the patent system to better accommodate collaborative research and development, the law has gradually shifted toward favoring original patent applicants over other follow-on innovators, while also expanding who qualifies as an original patent applicant.

A. PATENT ACT OF 1952

The Patent Act of 1952[63] provided the basic statutory structure for novelty and nonobviousness until the passage of the Leahy-Smith America Invents Act (AIA) in 2011.[64] Section 102 of the 1952 Act set forth categories of "prior art" that rendered an invention unpatentable.[65] Most importantly for the discussion here, the invention was rendered unpatentable if it was "patented . . . [(a)] before the invention thereof . . . [or (b)] more than one year prior to the date of the application for patent," "(e) . . . described in a patent granted on an application for patent *by another* filed . . . before the invention thereof," or "(g) . . . before [the] invention thereof . . . made . . . *by another* who had not abandoned, suppressed, or concealed it;" or if the person applying for the patent "(f) . . . did not himself invent the subject matter sought to be patented."[66] Section 103 of the Act then specified that even if "the invention is not identically disclosed or

63. Patent Act of 1952, Pub. L. No. 593, 66 Stat. 792 (1952).

64. *Cf.* Merges, *supra* note 4 (describing priority and novelty under the AIA as compared to under the Patent Act of 1952).

65. *See In re* Harry, 333 F.2d 920, 924 n.2 (C.C.P.A. 1964) (discussing the term "prior art"). While statute forms the basis of what is prior art, many of the nuances are created by courts and are not discernable from the statute. *See* Mark A. Lemley, *Does "Public Use" Mean the Same Thing It Did Last Year?*, 93 TEX. L. REV. 1119, 1134 (2015); Merges, *supra* note 4, at 1033–34.

66. 35 U.S.C. § 102 (1958) (emphasis added).

described as set forth in section 102 of this title," it was not patentable if it was obvious in light of the prior art.[67]

In this early form, a narrowly defined group of original patent applicants received some preferential treatment allowing them to patent supplementary innovation. This preferential treatment arose from the language "by another" in § 102(e).[68] As a result of this language, original patent applicants, but not others, could patent supplementary innovation that occurred before the original application was issued as a granted patent, as long as the original applicant filed the new application within a year of the original application's issuance and there was no other prior art rendering the new application's claims unpatentable.[69]

Because of this favored treatment for original patent applicants, where the line was drawn between them and others by the language "by another" was significant. The Court of Customs and Patent Appeals (CCPA), the Federal Circuit's predecessor court,[70] grappled with where to draw this line in a pair of cases in the 1960s. The cases stemmed from a series of applications on film technology owned by Polaroid Corporation, "all flow[ing] from the same research out of the same laboratory."[71] Three different inventors' work was reflected in the applications; on some applications they were solo inventors, and on some applications two of the three were joint inventors.[72] At issue in both cases was whether the earlier-filed solo-inventor patents were "by another" with respect to the later-filed joint-inventor applications. If they were, the solo-inventor patents would be prior art against the joint-inventor applications.[73]

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67. *Id.* § 103.

68. Section 102(g) was also limited to "by another," but that subsection was originally only invoked in particular disputes between rival applicants both claiming the same invention, called "interferences." The text accompanying notes 81–92 addresses § 102(g)'s role in preferential treatment.

69. This was because under § 102(e), an earlier-filed and ultimately granted application "by another" was prior art to a later-filed application if the earlier-filed application was *filed* before the invention of the later-filed application's invention. In contrast, the original applicant's own earlier-filed application (that is, not "by another") did not quality as prior art under § 102(e). Therefore, the original applicant's own earlier-filed application was prior art to its later-filed application only if the earlier-filed application *issued* as a granted patent before the later-filed application's invention (§ 102(a) prior art); or if the earlier-filed application was issued as a granted patent more than a year before the later-filed application was filed (§ 102(b) prior art). *See* 35 U.S.C. § 102 (1958).

Because § 102 contained various geographic restrictions with respect to the origin of prior art, see 35 U.S.C. § 102 (1958), preferential treatment was more complex when applications were filed and/or innovation originated outside the United States. These complexities, in their original form and as they were amended over time, go beyond the scope of this Article. This Article assumes throughout that original and later patent applications are filed in the United States, and that innovation takes place in the United States.

70. Marion T. Bennett, *The United States Court of Appeals for the Federal Circuit—Origins*, *in* THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT: A HISTORY 1982–1990, at 1, 7 (1991). The Federal Circuit now has exclusive appellate jurisdiction of appeals from "a final decision of a district court . . . in any civil action arising under, or in any civil action in which a party has asserted a compulsory counterclaim arising under, any Act of Congress relating to patents or plant variety protection" and from "a decision of the Patent Trial and Appeal Board of the United States Patent and Trademark Office with respect to a patent application." 28 U.S.C. § 1295(a) (2018).

71. *In re* Land, 368 F.2d 866, 878 (C.C.P.A. 1966).

72. *See id.* at 868; *In re* Blout, 333 F.2d 928, 929–30 (C.C.P.A. 1964).

73. *See Land*, 368 F.2d at 875–81; *Blout*, 333 F.2d at 931.

In *In re Blout* in 1964, the CCPA held that one of the earlier-filed solo-inventor patents was "not 'another' to" a later-filed joint-inventor application.[74] Yet, two years later, in *In re Land*, the court held the opposite: that two of the earlier-filed solo-inventor patents were both "by another" with respect to a later-filed joint-inventor application.[75] The decision in *Land* meant that the innovator team from an original patent application could patent its own supplementary innovation that occurred before the original patent application issued (subject to any other prior art).[76] But if the supplementary innovation involved any new individual, or if it did not involve even a single original team member, the supplementary innovation was unpatentable.[77]

This required companies to be very careful about the timing and content of their patent applications. A contemporary commentator described:

> With the increasing complexity of modern research and development, it frequently happens that a single project spawns several inventions. Such projects usually require a group effort, and the resulting inventions are not all contributed by the same "inventive entity." . . . If the attorney proceeds in what would seem to be a normal manner, and files several applications over a period of time, then the provision of 35 USC 102 (e) is likely to be used to

74. *See Blout*, 333 F.2d at 931.

75. *See Land*, 368 F.2d at 881. The court addressed the apparent inconsistency with *Blout* in a footnote, stating that "[o]n reconsidering our opinion in [*Blout*], wherein it was remarked that 'Rogers is not 'another' to Blout and Rogers,' we now think that remark to have been unfortunate." *Id.* at 879 n.10. The court explained that the "true basis" of its decision in *Blout* was that the solo-inventor Rogers patent included description of joint work by Blout and Rogers. *Id.* The description of the joint work, contained within Rogers' solo patent, was not "by another" with respect to the Blout and Rogers joint-inventor patent. *See id.*

A different but related fact pattern was recently addressed in *Duncan Parking Technologies, Inc. v. IPS Group, Inc.*, in which the Federal Circuit held that an earlier-filed patent naming King and Schwarz as inventors anticipated a later-filed patent naming King and three others as inventors. *See* Duncan Parking Tech., Inc. v. IPS Group, Inc., 914 F.3d 1347, 1352–53, 1357–58 (Fed. Cir. 2019). There the Federal Circuit, like the CCPA's reconsideration of *Blout* in *Land*, considered the origin of the specific anticipating disclosure in the earlier-filed patent. *See id.* at 1357–59. The court stated, citing *Land*, that "[i]f Schwarz is a joint inventor of the anticipating disclosure, then it is 'by another' for the purposes of § 102(e)." *Id.* at 1357 (citing *Land*, 368 F.2d at 879).

76. *Cf. Land*, 368 F.2d at 877 ("There appears to be no dispute as to the law that A is not 'another' as to A, B is not 'another' as to B, or even that A & B are not 'another' as to A & B.").

77. As the Federal Circuit made clear in *Duncan Parking*, the analysis under pre-AIA law is not simply a comparison of listed inventors, but rather a comparison of the inventors of the later-filed application with the innovators making sufficient contributions to the relevant content in the original application. *See Duncan Parking*, 914 F.3d at 1358 ("[T]o decide whether a reference patent is 'by another' for the purposes of 35 U.S.C. § 102(e), the Board must (1) determine what portions of the reference patent were relied on as prior art . . . , (2) evaluate the degree to which those portions were conceived 'by another,' and (3) decide whether that other person's contribution is significant enough, when measured against the full anticipating disclosure, to render him a joint inventor of the applied portions of the reference patent."). A discrepancy between *inventorship* and *contribution to the disclosure* of a patent application can occur because inventorship is based the application's claims. *Cf.* 35 U.S.C. § 116(a) (2018) ("Inventors may apply for a patent jointly even though . . . each did not make a contribution to . . . every claim."); 37 C.F.R. § 1.48 (2018) (describing the procedures for correcting or changing inventorship, for example due to "cancelation of claims in the application"); Ethicon, Inc. v. U.S. Surgical Corp., 135 F.3d 1456, 1460 (Fed. Cir. 1998) ("A contribution to one claim is enough."). Thus, an individual can contribute to the original patent application's disclosure without being an inventor, and conversely, an inventor may not have contributed to all of the disclosure in the application.

> reject the later filed applications on the disclosure of a patent issued on one or more of the earlier filed applications.[78]

The constraints on patenting team-based research and development increased considerably in 1973, when the CCPA held in *In re Bass* that the invention of a company's earlier-filed patent "by another" was available as prior art against the company's later-filed application for demonstrating obviousness if the patent's invention was invented before the application's invention—even if the patent was filed after the application's invention.[79] *Bass* thus suggested that delaying the first application's filing would no longer prevent that application from potentially rendering later innovation unpatentable.[80]

In reaching this conclusion, the court in *Bass* relied on § 102(g), which precluded a patent on an invention that had been "made . . . by another who had not abandoned, suppressed, or concealed it" before the applicant's invention.[81] Previously, the CCPA had only considered § 102(g) in the context of particular disputes between rival applicants both claiming the same invention.[82] Yet the court in *Bass* departed from this limitation on § 102(g) and allowed it to be considered in a context unrelated to such a dispute.[83]

These decisions set up a challenging situation for companies engaged in team-based research and development. Under the "all-claims" rule applied by some courts, companies were required to file different teams' inventions in

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78. Bernard E. Franz, *Prosecution Problems with a Plurality of Inventions from a Single Project*, 51 J. PAT. OFF. SOC'Y 559, 559 (1969) (footnote omitted); *see also* Donald G. Daus, *New and Unobvious Changes to U.S. Patent Law*, 3 INTELL. PROP. J. 71, 78 (1987) (stating, with respect to "the concept of 'another'," that "[p]roblems arise most frequently with rejection under section 102(e)," and that to "avoid the pitfalls the word 'another' caused, solicitors would file applications for closely related inventions with different entities on the same day").

79. *See In re* Bass, 474 F.2d 1276, 1277, 1281, 1286–87 (C.C.P.A. 1973).

80. The *Bass* court was split such that the tiebreaking opinion "established the court's narrow precedent and essentially limited *Bass*' approval of a § 102(g) / § 103 rejection to the facts of that case," Andrew C. Michaels, *Pot Calls the Kettle Dictum: Expanded Secret Prior Art in Obviousness*, 26 FED. CIR. B.J. 93, 95 (2016), circumstances "which include the disclosure of such invention in an issued patent." *Bass*, 474 F.2d at 1307 (Lane, J., concurring).

81. 35 U.S.C. § 102(g) (1958).

82. *See Bass*, 474 F.2d at 1283; Peter J. Shurn III, *Is the Invention of Another Available as Prior Art?* In Re Bass *to* In re Clemens *and Beyond*, 63 J. PAT. OFF. SOC'Y 516, 518–19 (1981). This particular type of dispute was called an "interference." *See* 35 U.S.C. § 135 (1958); *Bass*, 474 F.2d at 1283. The limitation to interferences was consistent with legislative history. *See Bass*, 474 F.2d at 1298–99 (Baldwin, J., concurring); Shurn, *supra*, at 518–19.

83. *See Bass*, 474 F.2d at 1283–87. Three years earlier, the Seventh Circuit had similarly concluded that an earlier-invented but later-filed patent could be prior art under § 102(g), and could be used to establish obviousness, outside the context of an interference. *See* Sutter Products Co. v. Pettibone Mulliken Corp., 428 F.2d 639, 644–46 (7th Cir. 1970); *see also Bass*, 474 F.2d at 1286.

The CCPA later in *In re Clemens* appeared to limit *Bass* to situations in which one of the application's inventors or the public had knowledge of the earlier invention when making the application's later invention. *See In re* Clemens, 622 F.2d 1029, 1039–40 (C.C.P.A. 1980). The Federal Circuit subsequently dismissed *Clemens*' discussion of a knowledge requirement as dictum, *see* Tyco Healthcare Grp. v. Ethicon Endo-Surgery, 774 F.3d 968, 976 (Fed. Cir. 2014); E.I. Du Pont De Nemours & Co. v. Phillips Petro. Co., 849 F.2d 1430, 1437 (Fed. Cir. 1988), although it is not clear that the characterization as dictum was correct. *See* Michaels, *supra* note 80.

separate patent applications.[84] Yet, filing a patent application on an invention by one team could undermine the patentability of an invention by another team. Indeed, one of the concurring opinions in *Bass* critiqued its result, arguing that it was at odds with collaborative, iterative innovation, and that it could push companies to rely on trade secrets instead of patents.[85] A contemporary article in the *Journal of the Patent Office Society* similarly described that "it is not surprising that *Bass* has evoked a loud cry from industry, especially the larger corporations whose typical research and development situation involves a group of technical people working on the same general program."[86]

B. PATENT LAW AMENDMENTS ACT OF 1984

In 1984, Congress enacted amendments to the Patent Act in response to the problems that had developed over the preceding decades.[87] The Senate Committee on the Judiciary's report described that the bill changed "a complex body of case law which discourages communication among members of research teams working in corporations, universities or other organizations."[88]

First, the amendments allowed for joint inventorship of a patent application even when not every joint inventor had contributed to every claim.[89] This allowed a single application to contain claims invented by different groups of inventors.[90]

Second, in response to *Bass*, 35 U.S.C. § 103 was amended to add the following language:

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84. Gregory N. Mandel, *Left-Brain versus Right-Brain: Competing Conceptions of Creativity in Intellectual Property Law*, 44 U.C. DAVIS L. REV. 283, 293 (2010); *see, e.g.*, *In re* Sarett, 327 F.2d 1005, 1010 n.7 (C.C.P.A. 1964).

85. *See Bass*, 474 F.2d at 1304 (Baldwin, J., concurring) ("Most [inventions] are the result of carefully planned scientific research, often with numerous persons working on various aspects of a given problem. Invention is often reached via a large number of small steps forward. Given the possibility that the special knowledge of the inventor's coworkers developed during the pursuance of the invention would be usable against any patent based on the invention which is the end result of the research effort, investors and corporate management would, or should, be most wary of using the patent system to protect any commercially valuable invention, rather than following the trade secret route.").

86. Harris A. Pitlick, *A Proposed Compromise to the "Prior Art" Controversy Surrounding* In Re Hellsund *and* In Re Bass, 56 J. PAT. OFF. SOC'Y 699, 708–09 (1974). The outcome of *Bass* was also particularly objectionable to American companies because § 102(g) prior art was limited to earlier inventions "made in this country." *See* 35 U.S.C. § 102(g) (1958). *Bass* thus advantaged foreign companies over domestic ones; the same commentator suggested that "[i]t is thus foreseeable that if *Bass* is rigorously followed, those American companies in industries where patents are important which are wealthy enough to move all or part of their research and development capabilities outside the United States may well do so." Pitlick, *supra*, at 709.

87. *See* Patent Law Amendments Act of 1984, Pub. L. No. 98-622, 98 Stat. 3383 (1984).

88. S. REP. NO. 98-663, at 7 (1984); *accord* Patent Law Amendments Act of 1984, H.R. 6286, 98th Cong., 130 CONG. REC. 28071 (1984) (enacted).

89. *See* Patent Law Amendments Act § 104, 98 Stat. at 3384–85 (amending 35 U.S.C. § 116); Daus, *supra* note 78, at 73–74; Mandel, *supra* note 84, at 293–94.

90. The Senate Report described that the amendment "recognizes the realities of modern team research. A research project may include many inventions. Some inventions may have contributions made by individuals who are not involved in other, related inventions." S. REP. NO. 98-663, at 8; *accord* H.R. 6286, 98th Cong., 130 CONG. REC. 28071.

> Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.[91]

Thus, overriding *Bass*, the amendment excluded commonly owned § 102(g) prior art from analysis under § 103.[92] The result was that a company could avoid having its earlier invention render its later invention unpatentable by waiting to file a patent application on the earlier invention until after the later invention took place.[93] The Senate Report described that the amendment would "encourage communication among members of research teams, and lead to more public dissemination through patents."[94]

In creating this safe harbor, however, Congress made clear that it intended a *quid pro quo* of patent scope for term through the expansion of double patenting doctrine.[95] Double patenting was an existing doctrine that prevented (and still prevents) a patentee from "obtaining a time-wise extension of patent for the same invention or an obvious modification thereof."[96] The doctrine predated the Patent Act of 1952,[97] but its core elements were filled in largely during the 1960s and early 1970s.[98] In this period, the CCPA first approved of allowing a patent applicant to overcome obviousness-type double patenting—double patenting in which the claims of one patent are obvious in view of the claims of the other—by filing a "terminal disclaimer."[99] In a terminal disclaimer, the patentee agrees that one patent will expire no later than the other.[100]

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91. *See* Patent Law Amendments Act § 103, 98 Stat. at 3384; S. REP. NO. 98-663, at 7 (referring to *Bass* and *Clemens*). The USPTO's guidelines interpreted "person" to include "organization," and "owned by the same person" to require that "the same person, persons, or organization own 100% of the subject matter (prior art) and 100% of the claimed invention." *PTO's Initial Guidelines as to Implementation of Patent Law Amendments*, *reprinted in* 29 BNA'S PAT., TRADEMARK & COPYRIGHT J. 214, 214 (1984).

92. See *infra* Part II.C.1 addressing the inclusion of § 102(f) in the amendment.

93. If the company filed the patent application on the earlier invention before the later invention took place, the earlier-filed application would be prior art under § 102(e) upon issuance unless it was not "by another." *See* 35 U.S.C. § 102(e) (1988).

94. S. REP. NO. 98-663, at 7; *accord* H.R. 6286, 98th Cong., 130 CONG. REC. 28071.

95. Donald G. Daus, *Double Patenting: More Is Not Always Better*, 73 J. PAT. & TRADEMARK OFF. SOC'Y 740, 740 (1991) (describing double patenting rejections as the "*quid pro quo*" for the new safe harbor).

96. *In re* Lonardo, 119 F.3d 960, 965 (Fed. Cir. 1997). More specifically, it bars a patentee from receiving two patents claiming identical subject matter ("statutory" double patenting) or two patents where the claims of one are obvious in view of the claims of the other ("non-statutory" or "obviousness-type" double patenting). Miller v. Eagle Mfg. Co., 151 U.S. 186, 196–97 (1894); Sun Pharm. Indus., Ltd. v. Eli Lilly & Co., 611 F.3d 1381, 1384–85 (Fed. Cir. 2010).

97. *See Eagle Mfg.*, 151 U.S. at 196–97; U.S. PATENT OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE §§ 801–02 (1st ed. 1949).

98. *See* Daus, *supra* note 95, at 741.

99. *See Sun Pharm.*, 611 F.3d at 1384–85; *In re* Robeson, 331 F.2d 610, 613–15 (C.C.P.A. 1964); Daus, *supra* note 95, at 744.

100. *Cf. In re* Longi, 759 F.2d 887, 894 (Fed. Cir. 1985) (describing that a terminal disclaimer "guarantee[s] that the second patent . . . expire[s] at the same time as the first patent"). Section 253 of the Patent Act allows a patentee or patent applicant to "disclaim or dedicate to the public the entire term, or any terminal part of the

With the 1984 amendments, Congress conveyed its expectation that the U.S. Patent and Trademark Office (USPTO) would expand double patenting doctrine to apply to claims in commonly owned applications to prevent "an organization from obtaining two or more patents with different expiration dates covering nearly identical subject matter."[101] Congress further conveyed its expectation that "double patenting rejections [resulting from the new safe harbor] can be overcome in certain circumstances by disclaiming the terminal portion of the term of the later patent, thereby eliminating the problem of extending patent life."[102] The USPTO subsequently issued guidance for examiners, and then promulgated rules, such that a double patenting rejection could be made based on a commonly owned patent with different or partially overlapping inventorship, and that when the rejection was an obviousness-type double patenting rejection, it could be overcome by filing a terminal disclaimer.[103]

Thus, the 1984 amendments and accompanying expansion of double patenting set out two important policy positions with respect to preferential treatment. The first was that, to accommodate collaborative innovation, some preferential treatment should be based on ownership, rather than being restricted to specific groups of inventors. The amendments made some preferential treatment available for different groups of inventors within a single organization, as well as for collaborations between different organizations, provided that the organizations put the appropriate assignment agreements in place.[104] The second was that preferential treatment should be limited to additional patent scope but not term: that is, the amendments allowed an original patent applicant to receive multiple patents on similar inventions, as long as this did not result in longer patent protection.

C. AIPA OF 1999 AND CREATE ACT OF 2004

Preferential treatment for original patent applicants was further changed by amendments to the Patent Act in 1999 and 2004. Some of the changes were the result of amendments specifically intended to expand eligibility; others were the result of amendments to other provisions that had indirect effects.

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term, of the patent granted or to be granted." 35 U.S.C. § 253 (1958); 35 U.S.C. § 253 (2018). See *supra* Part IV.B.1 for further discussion of terminal disclaimers to overcome obviousness-type double patenting.

101. S. Rep. No. 98-663, at 8 (1984); *accord* Patent Law Amendments Act of 1984, H.R. 6286, 98th Cong., 130 CONG. REC. 28071 (1984) (enacted).

102. S. Rep. No. 98-663, at 8; *accord* H.R. 6286, 98th Cong., 130 CONG. REC. 28071.

103. *Longi*, 759 F.2d at 895; *PTO's Initial Guidelines*, *supra* note 91, at 214; 37 C.F.R. § 1.78(d) (1985); Final Rules for Miscellaneous Patent Provisions, 50 Fed. Reg. 9368, 9381 (Mar. 7, 1985) (to be codified at 37 C.F.R. pt. 1).

104. H.R. REP. NO. 108-425, at 3–4 (2004).

1. Expanding the Safe Harbor under § 103

The 1999 and 2004 amendments to the Patent Act further broadened the scope of applicants falling into the favored group. First, the American Inventors Protection Act of 1999 (AIPA) expanded the 1984 safe harbor (which in 1995 had been designated as § 103(c)[105]) to include § 102(e) prior art.[106] That is, the amended language of the § 103(c) safe harbor read:

> Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.[107]

After the amendment, the original patent application's owner could patent its own minor supplementary innovation that occurred while the original patent application was still secret, regardless of inventorship (subject to any other prior art).[108] As a result, the difficulties associated with *In re Land*'s interpretation of "by another" were eliminated for minor supplementary innovation (but not deepening supplementary innovation) when research and development took place within a single organization, or across multiple organizations with appropriate assignment agreements.[109] This change was significant; at the time, some practitioners counseled clients to refile certain pending applications to take advantage of the broadened eligibility for preferential treatment.[110]

Eligibility for preferential treatment was further expanded in 2004. The expansion was in response to the Federal Circuit's decision in *OddzOn Products, Inc. v. Just Toys, Inc.*,[111] in which the court held that confidential disclosures to

105. *See* Pub. L. No. 104-41, § 1, 109 Stat. 351, 351 (1995).

106. *See* American Inventors Protection Act of 1999, Pub. L. No. 106-113, § 4807(a), 113 Stat. 1501A-552, 1501A-591 (1999).

107. *Id.*

108. That is, a commonly owned, earlier-filed application could only be a basis for nonobviousness if it became publicly available before the invention of the later-filed application's claimed invention, or more than a year before the later application's filing. Once the earlier-filed application was publicly available, it became prior art under § 102(a) or § 102(b) as "patented or described in a printed publication." *See* 35 U.S.C. § 102(a)–(b) (2000).

109. Under U.S. law, inventors generally initially own the patent rights in their inventions, *Bd. of Trs. of the Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc*., 563 U.S. 776, 785–86 (2011), but inventors who generate inventions in the course of their employment will typically assign those inventions to their employer, as required under their employment agreement. *Cf. id.*

110. *See, e.g.*, Gregory J. Maier & Philippe Signore, *Pardon Our Dust: US Patent Law under Renovation*, MANAGING INTELL. PROP., May 2001, at 23, 26; Michael R. McGurk, Rebecca M. McNeill & Charles E. Van Horn, *Report: The American Investors Protection Act of 1999*, FINNEGAN (Dec. 1999) (on file with author). By filing a continuing application based on the pending application, a patent applicant could take advantage of the broadened eligibility without losing the pending application's priority date. *See* American Inventors Protection Act of 1999, Pub. L. No. 106-113, § 4807(b), 113 Stat. 1501A-552, 1501A-591 (1999) ("The amendment made by this section shall apply to any application for patent filed on or after the date of the enactment of this Act."); *infra* note 180 and accompanying text.

111. OddzOn Prods., Inc. v. Just Toys, Inc., 122 F.3d 1396 (Fed. Cir. 1997); H.R. REP. NO. 108-425, at 2 (2004).

the inventor were available as prior art to render an invention obvious.[112] The court concluded that the confidential disclosures were prior art under § 102(f), which prevented granting a patent to a person who "did not himself invent the subject matter sought to be patented," and that § 102(f) prior art was available for establishing obviousness under § 103.[113]

The Federal Circuit felt the outcome was "inescapable" given the statutory language, but it invited Congress to correct it.[114] The outcome was viewed as "a significant potential threat to inventors who engage in collaborative research and development projects," and its "potential 'chilling effect' for communication and open collaboration . . . troubled many academics and researchers."[115] It was particularly problematic for public-private research partnerships.[116] Collaborative research and development efforts across multiple organizations could rely on the safe harbor as long as common ownership was established ahead of time.[117] Public-sector organizations, however, were typically restricted in their ability to assign ownership; thus, public-private partnerships were disadvantaged as compared to private-private partnerships.[118]

In 2004, Congress responded to *OddzOn* with the Cooperative Research and Technology Enhancement (CREATE) Act.[119] The CREATE Act added language to § 103 specifying that work under joint research agreements would be treated as commonly owned.[120] Structuring the amendment in this way meant that although *OddzOn* had related to § 102(f) prior art, eligibility for the safe harbor under § 103 was broadened for all three types of prior art it specified—

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112. *See OddzOn*, 122 F.3d at 1401–04. Two designs had been confidentially disclosed to the inventor of a design patent on a football-like ball. *Id.* at 1400.

113. *See id.* at 1402–04.

114. *See id.* at 1403. In *Bass*, the CCPA had stated in dicta that "[o]f course . . . [§ 102](f) ha[s] no relation to § 103 and no relevancy to what is 'prior art' under § 103." *In re* Bass, 474 F.2d 1276, 1290 (C.C.P.A. 1973). In *OddzOn*, however, the Federal Circuit reasoned that the Patent Law Amendments Act of 1984 had amended § 103 to exclude § 102(f) prior art if it was commonly owned. Thus, § 103's exclusion of § 102(f) prior art "under limited circumstances clearly implies that it is prior art otherwise." *OddzOn*, 122 F.3d at 1403. The USPTO had taken a similar position in its initial guidelines for implementation of the 1984 amendments and in its regulations. *PTO's Initial Guidelines*, *supra* note 91, at 214; 37 C.F.R. § 1.106(d) (1985).

115. H.R. REP. No. 108-425, at 5.

116. *Id.*

117. *See id.* at 3–4.

118. *See id.* at 5; *cf.* Joe Matal, *A Guide to the Legislative History of the America Invents Act: Part I of II*, 21 FED. CIR. B.J. 435, 489 (2012) (describing that the CREATE Act was "enacted principally for the benefit of universities, many of whom face legal and institutional barriers to assigning their inventions to other entities").

119. Cooperative Research and Technology Enhancement (CREATE) Act of 2004, Pub. L. No. 108-453, 118 Stat. 3596; *see* H.R. REP. NO. 108-425, at 2 (describing the act as responding to *OddzOn*).

120. *See* CREATE Act § 2. A literal reading of the amendment seemed to say that *any* subject matter developed by another person (even if not a party to the joint research agreement) qualified for the safe harbor if the claimed invention was made under the agreement. *See id.* ("(2) . . . subject matter developed by another person and a claimed invention shall be deemed to have been owned by the same person or subject to an obligation of assignment to the same person if—(A) the claimed invention was made by or on behalf of parties to a joint research agreement that was in effect on or before the date the claimed invention was made; [and] (B) . . . was made as a result of activities undertaken within the scope of the joint research agreement . . . ."); Matal, *supra* note 118, at 487–88. However, the corrective language was read into the statute until it was added by the AIA. Matal, *supra* note 118, at 488.

that is, § 102(e), (f), and (g) prior art. The amendment thus expanded who could patent minor supplementary innovation. After the amendment, inventors working on commonly assigned projects or under joint research agreements could patent minor supplementary innovation that occurred while original applications were still secret (subject to any other prior art).

As in 1984, Congress called upon double patenting to prevent any extension of patent term. The House Report stated that "[b]y enacting this legislation, Congress intends to extend this exemption . . . again subject to the same double patenting principles."[121] The Report specified that the doctrine of obviousness-type double patenting should apply to patents issued as a result of the CREATE Act, and that a terminal disclaimer could overcome such double patenting when appropriate.[122] Again, the USPTO issued guidance and promulgated rules expanding the application of double patenting and terminal disclaimers accordingly.[123]

2. Pre-Grant Publication

A second major change occurred as part of the AIPA in 1999. Though this change was not specifically intended to affect an original patent applicant's ability to patent supplementary innovation, it ended up doing so indirectly.

Before the AIPA, U.S. patent applications were secret until issuance as a granted patent.[124] The AIPA amended 35 U.S.C. § 122 such that patent applications began to be published eighteen months from their priority date, subject to certain exceptions.[125] Section 102(e) was correspondingly amended to include as prior art not only "a *patent* granted on an application for patent by another" filed before invention, but also "an *application* for patent, published under section 122(b), by another" filed before invention.[126]

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121. H.R. REP. NO. 108-425, at 6.

122. *See id.*

123. *See* OFF. OF PAT. LEGAL ADMIN., EXAMINER CHECKLIST FOR PRIOR ART EXCLUSIONS UNDER 35 U.S.C. § 103(C) AS AMENDED BY THE COOPERATIVE RESEARCH AND TECHNOLOGY ENHANCEMENT (CREATE) ACT 2 (2005), https://www.uspto.gov/sites/default/files/documents/exrchecklist.pdf; Changes to Implement the Cooperative Research and Technology Enhancement Act of 2004, 70 Fed. Reg. 1818, 1820–21, 1823–24 (Jan. 11, 2005) (to be codified at 37 C.F.R. pt. 1, 3) (interim rule); Changes to Implement the Cooperative Research and Technology Enhancement Act of 2004, 70 Fed. Reg. 54,259, 54,261–62 (Sept. 14, 2005) (to be codified at 37 C.F.R. pt. 1, 3) (final rule). The interim rule added 37 C.F.R. § 1.109 setting forth guidelines for double patenting rejections, but the final rule removed § 1.109, and the double patenting guidelines were instead added to the Manual of Patenting Examining Procedure. *See* Changes to Implement the Cooperative Research and Technology Enhancement Act, 70 Fed. Reg. at 54,261. Section 1.321 setting forth terminal disclaimer requirements remained in the final rule. *See id.* at 54,262.

124. John R. Thomas, *The American Inventors Protection Act of 1999: Overview and Analysis*, *in* 6 INT'L INTELL. PROP. L. & POL'Y 13-1, 13-5 (Hugh C. Hansen ed., 2001); H.R. Rep. 106-287, at 32 (1999).

125. *See* American Inventors Protection Act of 1999, Pub. L. No. 106-113, § 4502, 113 Stat. 1501A-552, 1501A-561 (1999). The change took effect for applications filed on or after November 29, 2000. *See id.* § 4508; Press Release, USPTO, USPTO Will Begin Publishing Patent Applications (Nov. 27, 2000), https://web.archive.org/web/20150905092115/https://www.uspto.gov/about-us/news-updates/uspto-will-begin-publishing-patent-applications.

126. *See* American Inventors Protection Act of 1999 § 4505 (emphasis added).

Amendments to the Patent Act had, to this point, been toward expanded preferential treatment for original patent applicants, by excluding certain of their existing applications from obviousness analysis, and by broadening who was eligible. But application publication had the indirect—and seemingly overlooked[127]—effect of reduced preferential treatment. When patent applications were secret until issuance, an earlier-filed application only became prior art if it issued as a patent. If it was abandoned and never became a granted patent, it did not become prior art at all.[128] Moreover, the original patent applicant could patent supplementary innovation invented before the original application *issued* (subject to any other prior art).[129] After the institution of pre-grant publication, this period for inventing supplementary innovation that could be patented, which this Article terms the "supplementation grace period," ended with *publication*.[130] Many supplementation grace periods were thus shorter than they would have been pre-AIPA.[131] The practical impact, however, was attenuated by the pre-existing practice of patent application publication outside

127. My research has not revealed any discussion of this issue. Contemporary commentary discussed that publication would lead to earlier public disclosure of innovation, and that this was valuable to competitors, but not specifically that it was valuable to competitors because it put them on more equal ground with respect to supplementary innovation. *See, e.g.*, John F. Duffy, Hayden Gregory, Robert Rines, Herbert Wamsley & Douglas Wyatt, *Early Patent Publication: A Boon or Bane? A Discussion on the Legal and Economic Effects of Publishing Patent Applications after Eighteen Months of Filing*, 16 CARDOZO ARTS & ENT. L.J. 601, 620 (1998). One explanation for the lack of contemporary discussion is that the practical effect of the amendment was limited for innovators who filed patent applications internationally. *See infra* note 133 and accompanying text.

128. *See* 37 C.F.R. § 1.108 (1988); MANUAL OF PATENT EXAMINING PROCEDURE § 901.02 (5th ed., rev. 9, 1988). Exceptions applied when an abandoned application was defensively published or was incorporated by reference into an issued patent; in those cases, the abandoned application was available to the public and could be prior art. *See* 37 C.F.R. § 1.108; MANUAL OF PATENT EXAMINING PROCEDURE, *supra*.

129. Since eligibility for preferential treatment differed between deepening and minor supplementary innovation, unless the innovation was not "by another," only minor supplementary innovation, not deepening supplementary innovation, could be patented in this window (subject to any other prior art). *See* 35 U.S.C. §§ 102–103 (1994).

130. Again, unless the innovation was not "by another," only minor supplementary innovation, but not deepening supplementary innovation, could be patented in this window (subject to any other prior art). *See* 35 U.S.C. §§ 102–103 (2000).

131. Whereas publication was generally eighteen months from the priority date, 35 U.S.C. § 122(b)(1) (2000), the average time from *filing* to issuance or abandonment in fiscal year 2000 was twenty-five months. U.S. PAT. & TRADEMARK OFF., PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2000, at 104 (2000), https://www.uspto.gov/sites/default/files/about/stratplan/ar/USPTOFY2000PAR.pdf. The average time from *priority date* to issuance was likely significantly longer: the Uruguay Round Agreements Act had created provisional applications in 1995; as such, up to one year could elapse between a priority date based on a provisional application and the filing date for the first nonprovisional application in a patent family. Uruguay Round Agreements Act, Pub. L. 103-465, §§ 532, 534, 108 Stat. 4809, 4985–86, 4990 (1994). USPTO data also understated the relevant application pendencies in certain ways. *See* Dennis Crouch, *Average Patent Application Pendency*, PATENTLY-O (Dec. 12, 2011), https://patentlyo.com/patent/2011/12/average-patent-application-pendency.html (discussing the treatment of requests for continued examination and the inclusion of continuing applications in USPTO pendency data). Average application pendency increased through the 2000s but has been decreasing since. *See* Dennis Crouch, *Pendency of US Patent Applications*, PATENTLY-O (Nov. 6, 2016), https://patentlyo.com/patent/2016/11/pendency-patent-applications.html.

the United States[132] and the ability of some patent applicants to opt out of publication.[133]

D. AMERICA INVENTS ACT OF 2011

The passage of the AIA in 2011 significantly altered the structure of §§ 102–103 of the Patent Act.[134] At a high level, it maintained the preferential treatment for original patent applicants that had developed over the preceding years. But the restructuring under the AIA introduced several changes to the patentability of original patent applicants' post-filing innovation.

Post-AIA § 102 does not have provisions corresponding to pre-AIA § 102(f) and (g),[135] but it does contain a provision analogous to pre-AIA § 102(e). Post-AIA § 102(a) states that "[a] person shall be entitled to a patent unless":

> (1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention; or
>
> (2) the claimed invention was described in a patent issued . . . or in an application for patent published or deemed published . . . in which the patent or application, as the case may be, *names another inventor* and was effectively filed before the effective filing date of the claimed invention.[136]

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132. International applications and most foreign applications were already being published before 1999. The original Patent Cooperation Treaty, signed in 1970, included a provision that international applications filed under the treaty would publish shortly after eighteen months from their earliest priority dates. *See* Patent Cooperation Treaty art. 21(2)(a), June 19, 1970, 28 U.S.T. 7645. Almost all other countries also already published patent applications eighteen months after the priority date. *See* Duffy et al., *supra* note 127, at 602–03. An application corresponding to a U.S. patent application filed in one of these jurisdictions would thus result in a publication eligible as prior art, even though the U.S. application was not itself published. *See* 35 U.S.C. § 102(a)–(b) (1994). One contemporary commentator estimated that about eighty percent of patents filed in the United States in the early 1990s were available as publications (not necessarily in English) at eighteen months after the priority date. *See* Carlos J. Moorhead, *Improving Our Patent System for a Stronger America*, 11 ST. JOHN'S J. LEGAL COMMENT. 465, 476 (1996). A more recent study found that about half of U.S. applications filed in 1996 through 1999 that ultimately became patents had corresponding foreign applications. *See* Stuart J.H. Graham & Deepak Hegde, Do Inventors Value Secrecy in Patenting? Evidence from the American Inventor's Protection Act of 1999, at 22 (Dec. 2, 2014) (unpublished manuscript), http://ssrn.com/abstract=2170555.

133. Section 122 allowed (and still allows) nonpublication requests if no corresponding application was filed in a jurisdiction publishing applications after eighteen months. *See* 35 U.S.C. § 122(b)(2)(B) (2000); 35 U.S.C. § 122(b)(2)(B) (2018). Thus, an applicant who was eligible to and did file a nonpublication request was able to maintain the same supplementation grace period as before the implementation of pre-grant publication.

134. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011). As before the AIA, post-AIA § 102 describes different categories of prior art and establishes the novelty requirement, and post-AIA § 103 establishes the nonobviousness requirement. *See* 35 U.S.C. §§ 102–103 (2018).

135. Dennis Crouch, *With 102(f) Eliminated, Is Inventorship Now Codified in 35 U.S.C. 101? Maybe, but Not Restrictions on Patenting Obvious Variants of Derived Information*, PATENTLY-O (Oct. 4, 2012), https://patentlyo.com/patent/2012/10/with-102f-eliminated-is-inventorship-now-codified-in-35-usc-101.html (discussing outstanding questions with respect to the elimination of section 102(f)); MANUAL OF PATENT EXAMINING PROCEDURE § 2151 (9th ed., rev. 2020) (discussing the elimination of sections 102(f) and (g)).

136. 35 U.S.C. § 102(a) (2018) (emphasis added).

Post-AIA § 102(a)(2) is thus analogous to pre-AIA § 102(e) in that earlier-filed, published applications and patents are prior art if they name "another inventor."[137] The Federal Circuit has not addressed the meaning of "names another inventor," but the USPTO's examination guidelines interpret "another inventor" to mean any difference in inventorship.[138] Post-AIA § 102(a)(1) is analogous to pre-AIA § 102(a) in that applications and patents become prior art once published, regardless of whether they are the work of the original inventor(s) or not.

The AIA also contains a provision analogous to pre-AIA § 103(c) that provides a safe harbor for commonly owned inventions and work under joint research agreements (which this Article refers to as the "common control" safe harbor). More specifically, post-AIA § 102(b)(2)(C) provides a carve-out from prior art under § 102(a)(2) when "the subject matter disclosed and the claimed invention, not later than the effective filing date of the claimed invention, were owned by the same person or subject to an obligation of assignment to the same person."[139] Post-AIA § 102(c) extends this carve-out to work under a joint research agreement.[140]

Although these provisions are similar to their pre-AIA counterparts, there are several important differences. First, under pre-AIA law, the common control safe harbor was part of § 103, and thus applied only to minor supplementary innovation.[141] In contrast, under the AIA, the common control safe harbor is found in § 102, thus applying to both deepening and minor supplementary innovation.[142]

Second, under the AIA, the common control safe harbor applies if common control exists when the second application is filed.[143] This is later than under pre-AIA law, where the safe harbor only applied if common control existed at the time of the second invention.[144] These two differences expand preferential treatment for original patent applicants.[145]

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137. Because the AIA converted the U.S. patent system to a first-to-file system, the relevant date for the claimed invention is its "effective filing date," not its date of invention. *Cf.* Merges, *supra* note 4, at 1027–30 (discussing these short-hand descriptors and explaining the complexities that are not captured by them).

138. *See* MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 135, § 2154.01(c) ("[I]f there is any difference in inventive entity . . . the U.S. patent document satisfies the 'names another inventor' requirement . . . . [I]n the case of joint inventors, only one joint inventor needs to be different for the inventive entities to be different.").

139. 35 U.S.C. § 102(b)(2)(C) (2018).

140. *See id.* § 102(c).

141. *See* 35 U.S.C. § 103(c) (2006).

142. *See* 35 U.S.C. § 102(b)(2)(C)–(c) (2018).

143. *See id.* § 102(b)(2)(C) (requiring common ownership or an obligation of assignment "not later than the effective filing date of the claimed invention").

144. *See* 35 U.S.C. § 103(c) (2006).

145. *Cf.* Rogers, *supra* note 18, at 377–78 (describing that post-AIA § 103(c) "increases the ability of pharmaceutical companies to prevent existing information from being considered prior art"); Dennis Crouch, *Our Expanded Regime of Submarine Prior Art*, PATENTLY-O (Apr. 22, 2015), https://patentlyo.com/patent/2015/04/expanded-regime-submarine.html (describing the new exception as "more powerful" due in part to expansion to novelty).

A third difference increases the complexity of the supplementation grace period's duration. This increased complexity derives from the differences between the pre-AIA and post-AIA one-year grace periods. Both pre-AIA and post-AIA §§ 102–103 provide(d) forms of a one-year grace period after a disclosure to file a patent application.[146] Pre-AIA law provided the one-year grace period regardless of the disclosure's origin, but the extra year was only for *filing* the later application; the *invention* still needed to occur before the disclosure.[147] The one-year grace period thus did not change the supplementary innovation that could be patented (assuming timely filing). For a patent applicant qualifying for preferential treatment, any supplementation grace period extended until publication of the original application (or issuance if there was no pre-grant publication) and was unaffected by the one-year grace period.[148]

Under post-AIA law, in contrast, when the one-year grace period applies, it can extend the supplementation grace period. Yet, the availability of the one-year grace period is more limited: the AIA only provides it if there is a disclosure originating from an inventor.[149] As a result, the supplementation grace period can have two possible lengths when it exists: it can extend until the original application's publication (or issuance if there is no pre-grant publication); or, when the one-year grace period applies, the supplementation grace period can extend a year after the original application's publication (or issuance). Notably, even when there is common control, the length of the supplementation grace period is variable depending on inventors' contributions.[150] This variability reintroduces dividing lines between inventor groups, even within common control, reminiscent of *In re Land* that had been largely eliminated for minor innovation through the amendments of 1984, 1999, and 2004.[151]

Where does all of this historical layering of provisions regarding preferential treatment and reorganization under the AIA leave us? Broadly speaking, when a different party innovates beyond an original patent application, that innovation must almost always be both novel and nonobvious as compared

146. *See* 35 U.S.C. § 102(a)–(b) (2006); 35 U.S.C. § 102(b)(1) (2018). This grace period is relatively unique to U.S. patent law. *See supra* note 28 and accompanying text.

147. *See* 35 U.S.C. § 102 (2006).

148. When the original patent application was not "by another," it did not qualify as prior art under § 102(e). *See id.* § 102(e). In that case, the original patent application was prior art against deepening and minor supplementary innovation that was invented after the original application's publication or issuance (that is, a supplementation grace period until publication or issuance for both deepening and minor supplementary innovation). *See id.* § 102(a).

When the original patent application was "by another" but there was common control, it qualified as prior art under § 102(e), but the safe harbor of § 103(c) applied. *See id.* §§ 102(e), 103(c). The original application was thus prior art against deepening supplementary innovation that was invented after the original application's filing (that is, no supplementation grace period for deepening supplementary innovation), *see id.* § 102(e), and against minor supplementary innovation that was invented after the original application's publication or issuance (that is, a supplementation grace period until publication or issuance for minor supplementary innovation). *See id.* § 102(a).

149. *See* 35 U.S.C. § 102(b)(1) (2018); Holbrook, *supra* note 2, at 1466–67.

150. See *infra* Part IV.A for a more detailed discussion of the supplementation grace period under the AIA.

151. *See supra* Part II.B, II.C.

to the original patent application to be patentable. The original patent applicant, however, is favored, such that it has the opportunity to protect post-filing innovation that a different party could not patent. In particular, the preferential treatment manifests as a supplementation grace period after the original application's filing. During the supplementation grace period, a second application (which this Article refers to as a "supplementary application"[152]) does not need to be novel or nonobvious over the original application. Thus, during this period, eligible applicants can patent supplementary innovation that would otherwise be unpatentable.

III. PREFERENTIAL TREATMENT'S EFFECTS

Though at least some form of preferential treatment for original patent applicants has long been a feature of the U.S. patent system, preferential treatment need not exist. Indeed, its scope varies around the world,[153] and its existence has been the subject of international debate. In efforts to harmonize international patent laws beginning in the 1980s,[154] one of the questions posed to the World Intellectual Property Organization committee tasked with writing a draft treaty was whether "pending patent applications of the same applicant [should] be excluded from the state of the art,"[155] but no consensus was reached.[156]

As Part II described, much of U.S. patent law's expansion of preferential treatment for original patent applicants was driven by attempts to accommodate collaborative research and development. Put another way, the expansion was driven by the interests of innovators and organizations. But here I consider its

152. I have found one prior usage of this term in the same context. *See* Murashige, *supra* note 18, at 557 n.32 (describing an earlier scholarly article as "discussing the self-collision rule and proposals regarding the time limit to file supplementary applications") (citing Jochen Pagenberg, *The WIPO Patent Harmonization Treaty*, 19 AIPLA Q.J. 1, 1 (1991)).

153. For example, European patent law has no preferential treatment for original patent applicants. However, European patent law excludes any unpublished application (regardless of whether it is the original applicant's) for inventive step analysis. *See* EURO. PAT. OFF., GUIDELINES FOR EXAMINATION § 5.1 (2019) ("The state of the art also comprises the content of other European applications filed or validly claiming a priority date earlier than—but published . . . on or after—the date of filing . . . . Such earlier applications are part of the state of the art only when considering novelty and not when considering inventive step."). Japanese patent law also excludes all unpublished applications from prior art for inventive step. But Japan has preferential treatment for original applicants: unpublished applications are also excluded from prior art for novelty if the inventor(s) or applicant(s) are identical between the two applications. *See* Japanese Patent Act, art. 29-2 ("Where an invention claimed in a patent application is identical with an invention or device (*excluding an invention or device made by the inventor of the invention* . . .) . . . of another application . . . which has been filed prior to the date of filing . . . and published after . . . a patent shall not be granted . . . provided that *this shall not apply where, at the time of the filing . . . the applicant . . . and the applicant of the other application . . . are the same person*.") (emphasis added).

154. Many parts of this effort ultimately stalled, but some harmonization was implemented, such as related to patent term and patentable technology areas. *See Patent Law Harmonization*, WORLD INTELL. PROP. ORG., https://www.wipo.int/patent-law/en/patent_law_harmonization.htm (last visited Feb. 4, 2021).

155. Thomas, *supra* note 18, at 160.

156. *See id.* at 162–63.

effects more broadly—can preferential treatment be justified as increasing innovation?

Preferential treatment for original patent applicants creates the opportunity for original applicants to receive more exclusivity than they would otherwise. This exclusivity can be in the form of scope or term. Under current law, the term of a patent is a fixed period from the application's filing date, subject to certain adjustments.[157] Because a supplementary application will have a later filing date than the original application, any resulting supplementary patent will typically expire later.[158] Thus, patenting supplementary innovation can delay the end of patent exclusivity. And when the innovation is broadening supplementary innovation,[159] the additional exclusivity is also in the form of scope.

Unlike most follow-on innovation, where the "right to patent improvements on a technology is a common right,"[160] the additional term and/or scope of exclusivity available to the original patent applicant through a supplementary application is not available to others. Others can prevent the original patent applicant from obtaining the additional exclusivity by creating intervening prior art, but they cannot obtain patent rights to supplementary innovation.[161]

Theories proposed to justify patent exclusivity generally can provide a framework for analyzing whether the additional exclusivity created by preferential treatment is likely to contribute to innovation. Two theories (both subject to much debate) are most commonly put forth to justify the patent system: the disclosure theory and the incentive theory.[162] Under the disclosure theory, patents promote further innovation by disseminating existing innovation upon which the further innovation can be built.[163] Under the incentive theory,

157. *See* 35 U.S.C. § 154 (2018). The term is twenty years from the application's effective filing date, excluding provisional applications—that is, from the earliest nonprovisional application to which the application claims priority. *See id.* § 154(a). The twenty-year term is sometimes lengthened to account for delays within the USPTO ("patent term adjustment") or premarket regulatory review ("patent term extension"), and/or shortened by terminal disclaimers. *See id.* § 154(b) (patent term adjustment); *id.* § 156 (patent term extension); *id.* § 253 (disclaimers). Patents issuing from applications filed before June 8, 1995, had a term of seventeen years from issuance. *See* 35 U.S.C. § 154 (1988); Mark A. Lemley, *An Empirical Study of the Twenty-Year Patent Term*, 22 AIPLA Q.J. 369, 370 (1994).

158. *See infra* Part IV.B.1.a.

159. *See supra* Part I.B.2.

160. Duffy, *supra* note 16, at 488.

161. Another party who did not create intervening prior art but who used supplementary innovation commercially could have prior user rights. 35 U.S.C. § 273 provides a defense to infringement of a patent for a person who commercially used the invention in the United States at least a year before the patent's filing date or a public disclosure by the patentee. *See* 35 U.S.C. § 273(a) (2018).

162. Kevin Emerson Collins, *The Structural Implications of Inventors' Disclosure Obligations*, 69 VAND. L. REV. 1785, 1786 (2016); Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 554–61 (2012).

163. *See* J. Jonas Anderson, *Nontechnical Disclosure*, 69 VAND. L. REV. 1573, 1585–86 (2016); Ouellette, *supra* note 162, at 546. The benefit to others from patent disclosure has been widely questioned; some scholars critique disclosure theory itself, whereas others defend it but point to reasons why patent disclosures are not useful in their current form. *See, e.g.*, Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401 (2010); Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539 (2009); Timothy

patent-based exclusivity incentivizes innovation. There are divergent views on how this works: one view is that the possibility of a patent as a reward incentivizes innovation occurring before the patent is awarded—what Mark Lemley has termed an "ex ante" justification for patents; another view is that patents incentivize later development or commercialization of inventions—what Professor Lemley has termed an "ex post" justification.[164] Both the disclosure and incentive theories can frame considerations of the potential effects on innovation of the additional patent exclusivity generated by preferential treatment.

A. DISCLOSURE THEORY

1. Increased Disclosure of Supplementary Innovation

Preferential treatment increases the disclosure of supplementary innovation via the patent system. Most patent applicants are incentivized to disclose their innovation via the patent system only if it is likely to be patentable. If they disclose unpatentable innovation in a patent application, the application's publication will disclose the innovation to the public without the applicant receiving any exclusivity in return. Supplementary innovation is thus likely to be disclosed only when the original application is not prior art. Without any preferential treatment for original patent applicants, then, supplementary innovation would rarely be disclosed.[165] Thus, preferential treatment encourages

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R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123 (2006); Seymore, *supra* note 24. Common criticisms include that the quality of patent disclosure is too low to be useful to other innovators and that innovation disclosed by patents would have been disclosed anyway—for example, through reverse engineering of the associated product. Ouellette, *supra* note 162, at 558, 560. Professor Ouellette has argued that the evidence that innovators use patent disclosures is stronger than others have suggested, and she and others have provided additional evidence of patents' use as a source of technical information and of their role in cumulative innovation. *See, e.g.*, *id.* at 561–80; Jeffrey L. Furman, Markus Nagler & Martin Watzinger, *Disclosure and Subsequent Innovation: Evidence from the Patent Depository Library Program* (Nat'l Bureau of Econ. Rsch., Working Paper No. 24660, 2018). Other scholars have argued that the value of patent disclosure is broader than as a source of technical information, and that patents allow for other valuable forms of disclosure. *See, e.g.*, Anderson, *supra*; Chien, *supra* note 29; Jason Rantanen, *Peripheral Disclosure*, 74 U. PITT. L. REV. 1 (2012).

164. *See* Mark A. Lemley, *Ex Ante versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 130 (2004). The terminology for these theories varies. Some scholars, for example, use "incentive" theory to describe only the ex ante view and describe the ex post view as "commercialization" theory. *See, e.g.*, Anderson, *supra* note 163, at 1581–89 (describing the three main patent theories as "the incentive to invent theory, the incentive to disclose theory, and the prospect or commercialization theory"); Camilla A. Hrdy, *Commercialization Awards*, 2015 WIS. L. REV. 13, 26 (2015) (describing the three traditional justifications for patents as generating incentives to "invent," "disclose," and "commercialize").

165. *Cf.* Burk, *supra* note 29, at 1622 ("[T]he inventor's understanding will likely advance, not just during the lifetime of the patent, but during the course of the patent application process. The best that can be done with incremental changes to the technology is to file continuations in part ('CIPs') . . . . But if the new discoveries or understanding are not themselves patentable, they will not be reflected in CIPs and will go undisclosed."). But a valid patent is not the goal of every patent applicant. Some applicants hope simply to obtain a patent, regardless of whether it would likely be invalidated if later challenged. Even an invalid patent can still provide a competitive advantage, *see infra* note 176, and the USPTO regularly grants patents that could not or do not survive challenges. *See* Joseph Farrell & Robert P. Merges, *Incentives to Challenge and Defend Patents: Why Litigation*

original patent applicants to disclose this post-filing innovation in exchange for patent rights.

Information about supplementary innovation can be valuable to other innovators. Because original patent applications are filed early in the innovation process, they usually do not describe complete, optimized inventions,[166] often use "vague and general" language,[167] and may not contain any explanation of how inventions work.[168] Later innovation, including supplementary innovation, can fill in the details. This information can help others understand or successfully implement the invention and can help put others on more equal footing with original patent applicants with respect to developing subsequent innovation.[169]

Disclosure of this information through supplementary applications can be particularly valuable when information about supplementary innovation is costly for others to obtain in other ways.[170] For instance, deepening supplementary innovation explaining how an existing invention works may be costly for others to recreate, but also particularly valuable for fostering subsequent innovation.[171] Moreover, without the possibility of patent protection afforded by preferential treatment, original patent applicants may choose to protect supplementary innovation through trade secrecy when they can.[172] As

Won't Reliably Fix Patent Office Errors and Why Administrative Patent Review Might Help, 19 BERKELEY TECH. L.J. 943, 944–46 (2004); Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1500 (2001); R. Polk Wagner, *Understanding Patent-Quality Mechanisms*, 157 U. PA. L. REV. 2135, 2145–46 (2009). Other patent applicants' primary goal may not even be to obtain a patent. For example, filing a patent application can serve a signaling function to potential investors or acquirers. *Cf.* Simon, *supra* note 28, at 763 (describing the importance of patent protection to medical device startups in seeking investments, including "providing a useful signal to investors about . . . resource allocation and the experience and sophistication of the executive team"). Applicants may also file patent applications to create prior art against competitors' inventions. *See* Gideon Parchomovsky, *Publish or Perish*, 98 MICH. L. REV. 926, 927–29 (2000) (arguing that firms sometimes engage in "preemptive publication" to adversely "affect the patentability of their rivals' inventions by altering the state of the prior art"). *But see* Rebecca S. Eisenberg, *The Promise and Perils of Strategic Publication to Create Prior Art: A Response to Professor Parchomovsky*, 98 MICH. L. REV. 2358, 2370 (2000) (arguing that "[i]t is implausible that rival pharmaceutical firms . . . would utilize preemptive publication," and "[a]bsent evidence that commercial rivals are actually deploying the strategy that Parchomovsky attributes to them, it seems premature to fine-tune doctrine to take such a possibility into account").

166. *See supra* notes 23–30 and accompanying text.

167. Cotropia, *supra* note 6, at 116–19.

168. *See* Seymore, *supra* note 51, at 719–21.

169. *Cf. id.* at 710 ("[I]t is easier to develop new drugs when researchers understand how old ones work.").

170. Professor Ouellette has argued that "few inventions are 'self-disclosing' at zero cost," pointing to the work of other scholars, including Jeanne Fromer and Alan Devlin. Ouellette, *supra* note 162, at 560–61.

171. *See* Seymore, *supra* note 51, at 710, 723–24 (discussing how disclosure of information about how an invention works would be "an enormous" public benefit, and how in cases of inventions with "opaque" mechanisms, "elucidating this information through reverse engineering is difficult, if not impossible (at least without considerable effort or expense)" and could involve experimentation that might require a license).

172. *Cf.* Duffy, *supra* note 13, at 366 ("[I]f pioneering patentees are denied improvement patents, the improvements may be maintained as trade secrets in situations where disclosure would be more socially beneficial.").

others have noted, for example, post-filing innovation regarding the "best mode" of carrying out an invention is often held as a trade secret.[173]

2. *Effects on Original Applications: Timing and Content*

Preferential treatment also affects the timing and content of the original application. This is because its timing and content are not fixed—they are influenced by an applicant's knowledge that a later supplementary application can be filed.

In particular, preferential treatment can encourage the original patent applicant to file its first application earlier, since the applicant knows that there is the opportunity for later supplementation. This can benefit others by leading to earlier public access to information about the innovation, as well as earlier expiration of the original patent.[174]

But filing the original patent application earlier also shifts its content earlier along the innovation timeline. As a result, the original application's disclosure may be less useful than it would have been without preferential treatment. Some of the information disclosed in a supplementary application may be information that, absent preferential treatment, would have been disclosed in the original application itself. Because the availability of preferential treatment does not differ between at-fault and no-fault supplementary innovation,[175] in some cases preferential treatment may even encourage applicants to file their original applications before it is clear that the utility and disclosure requirements are met, in order to establish an early filing date. Relying on a supplementary application to correct any defects in an original application is risky but may still be a valuable strategy for some applicants.[176]

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173. *See* W. Nicholson Price II, *Expired Patents, Trade Secrets, and Stymied Competition*, 92 NOTRE DAME L. REV. 1611, 1618 (2017) (describing, with respect to keeping the best mode, including a subsequently discovered best mode, as a trade secret, that "[i]nventors know about and use this complementarity; law firms encourage it"). Patent applicants are required to disclose what the inventor believes is the "best mode" of carrying out the invention, 35 U.S.C. § 112 (2018), but only as of the date the patent application is filed. *See* Spectra-Physics, Inc. v. Coherent, Inc., 827 F.2d 1524, 1535 (Fed. Cir. 1987). The best mode requirement has been substantially weakened under the AIA: failure to disclose the best mode is not a basis for invalidity as a defense to patent infringement. *See* 35 U.S.C. § 282(b)(3)(A) (2018); Brian J. Love & Christopher B. Seaman, *Best Mode Trade Secrets*, 15 YALE J.L. & TECH. 1, 8–11 (2012); Ryan Vacca, *Patent Reform and Best Mode: A Signal to the Patent Office or a Step Toward Elimination?*, 75 ALB. L. REV. 279, 290–93 (2012).

174. John Duffy has argued with respect to the prospect theory of patents, which favors early, broad patent rights, *see infra* notes 189–195 and accompanying text, that the "prospect features of the patent system are useful . . . because they channel rent-seeking behavior into . . . early patenting—which is socially desirable because it dissipates private but not social rents." Duffy, *supra* note 16, at 464. As a result of early patenting, "the patent will expire sooner and, accordingly, more of the benefits associated with the invention will be captured by consumers rather than by the patentee." *Id.* at 467.

175. *See infra* Part IV.A.

176. The supplementary application will have a later priority date. The risks thus include that the supplementary application's patentability will be subject to others' intervening prior art and the original applicant's own non-patent disclosures; and that patent rights could be lost completely in foreign jurisdictions with absolute novelty rules. *See supra* note 28 and accompanying text. But filing an early original application can nonetheless play a strategic role, especially for patent applicants for whom the appearance of potential patent rights is more meaningful than valid granted rights. For example, even pending claims (that is, claims not

On the other hand, preferential treatment may also improve the quality of the original patent application's disclosure. When original applicants cannot file patentable applications on post-filing innovation, they may try to use their existing applications to draft new claims covering the post-filing innovation. This is possible because the claims of a patent application define the boundaries of the exclusivity being sought by the patent applicant,[177] but the application generally describes much more in its complete disclosure than the claims.[178] After filing, the disclosure cannot be changed, but the claims can be changed within the bounds of the disclosure.[179] They can be changed either in the original application itself, or in a subsequent "continuing" application, which is treated as having the same filing date as the original.[180]

Original patent applicants can thus use their existing applications to draft new claims to patent post-filing innovation, as long as the claims are sufficiently supported.[181] Although commentators have critiqued such "mining" of claims (primarily in the context of claims to cover competitors),[182] the Federal Circuit has made clear that applicants are free to pursue any claim with sufficient support in the disclosure as filed, even if the real genesis of the claim post-dates filing.[183]

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approved by the USPTO) can be valuable to the applicant and detrimental to a competitor when seeking funding. *Cf.* Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 699 (1998) ("[F]irms raise capital on the basis of the inchoate rights preserved by patent filings. In effect, each potential patent creates a specter of rights that may be larger than the actual rights, if any, eventually conferred by the PTO. Worked into the calculations of both risk-taking investors and risk-averse product developers, these overlapping patent filings may compound the obstacles to developing new products."). Similarly, if a patent is listed in the *Orange Book* as covering a drug product or method of using it—regardless of whether the claims are valid—approval from the FDA for generic versions can be delayed. *See* 21 U.S.C. § 355(j)(5)(B)(iii) (2018); Feldman, *supra* note 40, at 600; Dmitry Karshtedt, *The More Things Change: Improvement Patents, Drug Modifications, and the FDA*, 104 IOWA L. REV. 1129, 1145 (2019).

177. Markman v. Westview Instruments, Inc., 517 U.S. 370, 372–73 (1996).

178. *See* Chiang, *supra* note 3, at 527. The disclosure is made up of a description of the invention (the "specification"), figures if necessary, and one or more claims. *See* 35 U.S.C. § 111 (2018); *id.* § 112 (specification); *id.* § 113 (drawings); *id.* § 111(a)(3) (claims).

179. *See supra* note 3 and accompanying text.

180. *See* 35 U.S.C. § 120 (2018); Chiang, *supra* note 3, at 533–34; Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63, 68 (2004).

181. *See* Cotropia, *supra* note 6, at 96, 101–02. Sufficient support requires that the application's disclosure enable a person skilled in the art to make and use the claimed invention, *see In re* Wands, 858 F.2d 731, 735 (Fed. Cir. 1988), and that it conveys to that hypothetical person that the inventor had "possession" of the claimed invention at the time of filing. "Possession" can be established merely by writing down the invention in the patent application at filing. *See* Ariad Pharm., Inc. v. Eli Lilly & Co., 598 F.3d 1336, 1351–52 (Fed. Cir. 2010); Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991).

182. *See, e.g.*, Chiang, *supra* note 3, at 544–45 (describing it as leading to "very little" increase in incentives to invent or disclose, while increasing social costs of the patent monopoly); Herbert Hovenkamp, *Notice and Patent Remedies*, 88 TEX. L. REV. ONLINE 221, 228–31 (2011) (describing it as "threaten[ing] to deliver broader patent protection" than needed to incentivize innovation and increasing notice problems for potential infringers); Lemley & Moore, *supra* note 180, at 78–79 (describing it as seeming "fundamentally unfair" and inconsistent with incentive theory).

183. *See* Kingsdown Med. Consultants, Ltd. v. Hollister Inc., 863 F.2d 867, 874 (Fed. Cir. 1988). Tun-Jen Chiang has written that, while "virtually never invoked," there is a doctrine of "dishonest claiming" that renders

To facilitate later mining of the disclosure for post-filing innovation, original patent applicants are incentivized to use broad, vague language[184] and include undeveloped, speculative post-filing innovation in the original patent application.[185] This can obscure the actual invention and contribute to the opacity of patent disclosures, making their content less informative for other innovators. Moreover, these broad, vague, speculative disclosures can reduce incentives for future innovation by preventing others from patenting similar innovation later.[186]

Supplementation grace periods relieve some of the pressure on applicants to try to capture post-filing innovation through their original patent applications. This, in turn, can improve the quality of the original applications' disclosures. That said, much of the pressure to predict post-filing innovation in original applications remains, even with preferential treatment. An original patent application that successfully predicts post-filing innovation will have an earlier filing date than any supplementary application would; this can be advantageous both for improving the original applicant's own exclusivity position (by antedating more prior art) and for thwarting others' exclusivity (by creating more prior art against follow-on innovators' would-be patentable innovation).

B. INCENTIVE THEORY

As described briefly above, incentive-based theories of patent law broadly divide into those focused on patents' influence on innovator behavior before patent rights are awarded ("ex ante" theories) and those focused on patents' influence on innovator behavior after patent rights are awarded ("ex post" theories).[187] The classic justification for patents is based on an ex ante theory: patents encourage innovation by rewarding innovation after it is created.[188]

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a claim invalid when a patentee is "being manifestly dishonest, and does not regard the new claim as being part of his invention." *See* Chiang, *supra* note 3, at 531 n.37.

184. *See* Cotropia, *supra* note 6, at 116–17 ("The need to file early also prompts the inventor to intentionally draft the patent application . . . in vague and general terms. The specification needs to be intentionally general so that it can support later-filed continuations.").

185. *Cf.* Tom Brody, *Categories of Anti-Obviousness Case Law: (1) Laundry Lists; (2) Redundant Advantages; and (3) Advantage Not Needed and Not Relevant*, 17 J. MARSHALL REV. INTELL. PROP. L. 395, 408–59 (2018) (discussing case law relating to laundry lists in prior art references).

186. For example, Benjamin Roin has described in the context of drugs:

> Not knowing which compound they will end up developing, the pharmaceutical companies draft their initial patent applications broadly to disclose . . . as many of the compounds under consideration as possible. As their research progresses . . . they narrow their patent claims and allow many of the originally disclosed compounds to fall into the public domain. . . . [T]heir prior disclosure will likely defeat any later claim of novelty, thus preventing them from being patented.

Roin, *supra* note 18, at 529 (footnotes omitted). Sean Seymore has described more generally that patents claiming "undeveloped or underdeveloped subject matter" can "create roadblocks for subsequent inventors who *can* enable the claimed subject matter." Seymore, *supra* note 62, at 1045. Janet Freilich has similarly described how the speculative disclosures in prophetic examples may create "an innovation dead zone." Freilich, *supra* note 28, at 669.

187. *See* Lemley, *supra* note 164, at 130.

188. *See* Duffy, *supra* note 16, at 439–40; Lemley, *supra* note 164, at 129–30.

Others take an ex post view: patent exclusivity allows inventions to be developed and commercialized.[189] The prominent early articulation of an ex post theory was the "prospect" theory set forth by Edmund Kitch in 1977, according to which broad, early rights would encourage later innovation by coordinating resources and effort.[190]

Ex ante and ex post theories suggest different roles for patents in supplementary innovation. Under ex ante theories, the line between patentable and unpatentable innovation should be drawn between innovation requiring and not requiring patent-based reward incentives. To the extent that the nonobviousness doctrine approximates this line, patent-based exclusivity is not justified for minor supplementary innovation because the innovation should come about naturally without a patent reward.[191] To the extent that anticipated innovation should already exist, there is similarly no reason to promote deepening supplementary innovation via patents.[192]

Under many ex post theories, however, patent rights ought to have greater scope.[193] These broad rights would protect follow-on innovation, including innovation—like supplementary innovation—that would, under ex ante theories, be unpatentable standing alone. Professor Kitch argued that patentees should be given these broad rights early in the innovation process to encourage the patentee's development of the technology "without fear that the fruits of the investment will produce unpatentable information appropriable by competitors."[194] He argued that "[i]n the case of many patents, extensive development is required before any commercial application is possible . . . . The investments may be required simply to apply existing technology to the manufacture and design of the product and be so mechanical in their application as to be unpatentable."[195]

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189. Lemley, *supra* note 164, at 130; *see generally* Hrdy, *supra* note 164, at 27–41 (describing commercialization theories).

190. Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977); *see* Duffy, *supra* note 16, at 440–41; Hrdy, *supra* note 164, at 27–28; Lemley, *supra* note 164, at 132–33.

191. *See* MERGES & DUFFY, *supra* note 9, at 608–09; Michael B. Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1594, 1596 (2011) (explaining that "despite its apparent promise as the theoretical basis" for the nonobviousness doctrine, the inducement standard "has achieved only a modicum of influence," and arguing that it should be "the touchstone for understanding and refining the obviousness doctrine").

192. *See* Seymore, *supra* note 62, at 1033; *accord* Roin, *supra* note 18, at 518 (describing this rationale as "so widely accepted" as to be "almost canonical").

193. *See* Lemley, *supra* note 164, at 131 ("The new ex post justifications, by contrast [to ex ante justifications], endorse a greater and perhaps unlimited duration and scope of intellectual property rights."). However, not all ex post theories support broad patent rights. *See* Hrdy, *supra* note 164, at 31 (describing post-Kitch commercialization theories and stating that "[n]one necessarily turns on the importance of broad, early patents held by single firms, and some directly contradict prospect theory's assumptions").

194. Kitch, *supra* note 190, at 276; *see* Duffy, *supra* note 16, at 440.

195. Kitch, *supra* note 190, at 276. There are limitations regarding prospect theory's explanatory power regarding the treatment of more significant follow-on innovation. John Duffy has argued that Kitch's articulation of the prospect theory failed to adequately address the fact that others can acquire rights to patentable improvements within the patent's claims. As such, granting the pioneer patentee broad, early rights would not allow complete control and coordination of development. Duffy, *supra* note 16, at 455–58, 483–91; *see also*

Preferential treatment for original patent applicants creates overlap between the ex ante and ex post perspectives because, in effect, it allows patent rights to be awarded over a period of time, rather than at a single moment. Patent rights on supplementary innovation have an "ex post" effect relative to the original patent application, and an "ex ante" effect relative to the supplementary patent application. That is, viewed in ex ante terms, preferential treatment creates a patent reward for the original applicant for supplementary innovation where there otherwise would not have been one, since it transforms unpatentable innovation into patentable innovation. Viewed in ex post terms, preferential treatment creates an option (subject to any other prior art) when an original patent application is filed. That option can be exercised later by the original patent applicant to protect supplementary innovation that would have been unpatentable absent the preferential treatment.

The effect of the reward or option depends on whether the supplementary innovation is within the scope of the original application's patentable claims. When the supplementary innovation is within the scope of patentable claims of the original application—that is, the innovation is encompassed supplementary innovation[196]—the potential effect is smaller because the original patent applicant can already capture the value even without specific patent rights.[197] An effect due to scope of exclusivity is thus limited, but the added term may give value to the reward or option.[198] When, on the other hand, the supplementary innovation is not within the scope of patentable claims of the original application—that is, when the innovation is broadening supplementary innovation[199]—the potential effect of the reward or option is larger, since there can be additional term and scope.

1. An Ex Ante View

By providing a patent reward for anticipated or obvious innovation, preferential treatment appears inconsistent with the classic ex ante justification for patents.[200] But the novelty and nonobviousness doctrines do not perfectly divide innovation that would and would not come about naturally without a patent reward. Preferential treatment's rewards for supplementary innovation

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Lemley, *supra* note 17, at 1008–10 (discussing the relationship between the original patentee's and later improver's rights when the improvement is "significant").

196. *See supra* Part I.B.2.

197. *See* Duffy, *supra* note 16, at 484–87 (illustrating how broad patents that encompass improvements allow pioneer patentees to capture the full value of unpatentable improvements that can be freely appropriated, and allow pioneer patentees to coordinate investment in unpatentable improvements that cannot be freely appropriated); Lemley, *supra* note 17, at 1008 (describing how "[t]he law offers no protection to . . . minor improvers," and "if the minor improvement does turn out to be infringing . . . the patent owner captures the value of the improvement").

198. But a supplementary patent's claims covering narrower, encompassed supplementary innovation can have some value deriving from their scope. For example, narrower claims can serve as insurance in case of later invalidation of the original patent's claims.

199. *See supra* Part I.B.2.

200. *See supra* notes 191–192 and accompanying text.

can be desirable when socially valuable innovation is deemed unpatentable but will not come about naturally.

Other scholars have argued for providing corrective patent incentives for anticipated or obvious innovation in this situation. For example, Benjamin Roin has described that without patent protection (or the expectation of patent protection), drug companies are unlikely to invest in post-discovery development.[201] Yet, he argues, "the nonobviousness requirement withholds patent protection from the drugs that seem most promising before they have been developed."[202] He thus proposes rewards in the form of FDA-administered exclusivity periods to "fill the gaps left by the novelty and nonobviousness requirements."[203] Sean Seymore has similarly argued that "the current novelty rules prevent many socially valuable inventions from reaching the public."[204] He has proposed another form of corrective reward: he suggests allowing a "reinventor" to receive a period of exclusivity for inventions anticipated by earlier expired patents but not adequately disclosed.[205]

Preferential treatment offers another approach to incentivizing supplementary innovation. Rather than targeting a corrective patent reward to a particular type of supplementary innovation (as Professors Roin and Seymore suggest), preferential treatment targets the corrective reward to a particular innovator—the original applicant. This targeting makes sense when the original applicant is best situated to pursue the post-filing innovation.[206] Limiting exclusivity for supplementary innovation to original applicants can also avoid innovation-hampering patent thickets that patentability requirements prevent,[207] depending on how original applicants are defined.[208] But because the patent rewards are not targeted to a particular type of supplementary innovation, they may not only incentivize socially valuable innovation, but also push original

201. *See* Roin, *supra* note 18, at 545–47. For a discussion of other, non-patent incentives for pharmaceuticals, see Daniel J. Hemel & Lisa Larrimore Ouellette, *Innovation Policy Pluralism*, 128 YALE L.J. 544, 593–601 (2019).

202. Roin, *supra* note 18, at 531. He argues that "because the nonobviousness test focuses on whether the therapeutic properties of a drug are expected and not on whether the drug is socially valuable, the PTO and courts have rejected patent applications on drugs even though they are expected to be superior to known treatments and thus are expected to have great social value if developed." *Id.* at 536.

203. *Id.* at 564.

204. *See* Seymore, *supra* note 62, at 1031.

205. *See id.* at 1034.

206. In the context of drugs, Dmitry Karshtedt has argued that typically "the original drug's sponsor will control both the pioneering drug and its improvements" not simply because it owns the pioneer patent, but also because of its "immense head start" due to undisclosed know-how and data. Karshtedt, *supra* note 176, at 1158.

207. *See supra* note 12 and accompanying text; *cf.* Duffy, *supra* note 8, at 16 (describing, with respect to the pre-AIA system, that the nonobviousness requirement serves to allocate rewards among inventors, but when there is common ownership between applications, "allocating rewards among parties is not a concern," so the "law thus eliminates the nonobviousness requirement in those circumstances and allows the granting of patents").

208. See *infra* Part IV.C.4 for a discussion of how to define original applicants eligible for preferential treatment.

patent applicants to channel resources toward insignificant incremental innovation.[209]

2. An Ex Post View

Preferential treatment's offer of greater exclusivity on later stages of research, development, and commercialization is more obviously consistent with many ex post theories. Preferential treatment can give original patent applicants broader and longer patent rights, while also promoting early acquisition of original patent rights, consistent with prospect theory. But unlike the broad, early rights envisioned under prospect theory, preferential treatment for original patent applicants does not grant the full scope of rights up front. Rather, it permits the original applicant to subsequently broaden its rights in exchange for disclosing the supplementary innovation (and subject to any other prior art). This contributes to patents' role in disclosing innovation to other innovators in a way that early broad patent rights cannot.[210]

IV. RECONSIDERING PREFERENTIAL TREATMENT

Although preferential treatment for original applicants can help the patent system accommodate dynamic innovation processes and can increase disclosure and innovation incentives for post-filing innovation, the current complex and haphazardly developed statutory framework is not well-tailored to achieving these potential benefits. This Part first explains in more detail the current AIA framework for when supplementary innovation is patentable. It then considers the framework's limitations and how the piecemeal formation of preferential treatment has departed from the original policy goals and reintroduced problems that had been mitigated by earlier statutory amendments. Finally, it offers an alternative approach.

A. PREFERENTIAL TREATMENT UNDER THE AIA

Whether supplementary innovation can be patented in any particular circumstance (subject to any other prior art) under the AIA depends on four factors. The first of these is ownership or control of the original and supplementary applications: Is there common control?[211] The second and third relate to the individuals involved in the innovation: How much overlap is there, if any, between the inventors of the original and supplementary applications?

209. *Cf.* MERGES & DUFFY, *supra* note 9, at 609 ("[G]ranting patents to obvious developments may compromise the incentives that the patent system provides to develop nonobvious inventions.").

210. Prospect theory has been described as generally "discount[ing] much of the teaching function of the patent system," with disclosure being "less about teaching follow-on innovators and more about creating legal entitlements." Anderson, *supra* note 163, at 1587–89 (discussing the relationship between prospect theory and disclosure).

211. *See supra* notes 139–140 and accompanying text. When there is common control, an original application that would be prior art under § 102(a)(2) is excluded under the safe harbor of § 102(b)(2)(C)–(c). *See* 35 U.S.C. § 102 (2018).

Does the relevant disclosure in the original application originate from an inventor of the supplementary application?[212] These first three factors determine whether a supplementation grace period exists, and if so, its duration. The fourth factor is timing: What is the delay between the filing of the original and supplementary applications? Put another way, does the supplementary application fall within the original application's supplementation grace period?

Broadly speaking, the closer the relationship between the original and supplementary applications as defined by the first three factors, the longer the supplementation grace period. When the relationship between the original and supplementary applications is strongest, supplementary innovation is patentable (subject to any other prior art) as long as it is filed within a year of the publication of the original application—that is, the supplementation grace period extends a year beyond publication of the original application.[213] This is the case when the relevant disclosure in the original application originates from an inventor of the supplementary application, whether or not the applications are commonly controlled, and regardless of inventorship.[214]

In other instances, the supplementary innovation is patentable (subject to any other prior art) as long as it is not filed after publication of the original application—that is, the supplementation grace period extends to the publication of the original application. This is the case when the relevant disclosure in the original application does not originate from an inventor of the supplementary application, but the applications are commonly controlled, regardless of inventorship.[215] This is also the case when the relevant disclosure in the original

212. When the inventorship is identical between the original and supplementary applications, the original application is not prior art under § 102(a)(2) as naming "another inventor." *Id.* § 102(a)(2). When the relevant disclosure in the original application originates from an inventor of the supplementary application, the original application is excluded from § 102(a)(1) and/or § 102(a)(2) prior art under the exceptions of § 102(b)(1)(A) and § 102(b)(2)(A), respectively. *See id.* Because inventorship is based on the claims, it is possible for disclosure in the original application to originate from someone who is not named as an inventor on that application. *See supra* note 77.

213. The discussion in this and the following paragraphs assumes that the original application publishes in pre-grant form before it becomes a granted patent. If the original application becomes a granted patent without publishing in pre-grant form, the supplementation grace period is tied to the date of grant.

214. When the inventorship is identical between the two applications, the original application is not prior art under § 102(a)(2) because it does not name "another inventor." 35 U.S.C. § 102(a)(2). As such, the original application is prior art only if it qualifies under § 102(a)(1). If the supplementary application is filed within a year of the original application's publication, the exception of § 102(b)(1)(A) applies. *See id.* § 102(b)(1)(A).

When the inventorship is not identical between the two applications, the original application is not prior art under § 102(a)(2) because the exception of § 102(b)(2)(A) applies. *See id.* § 102(b)(2)(A). (And, if the applications are commonly controlled, the exception of § 102(b)(2)(C)–(c) also applies. *See id.* § 102(b), (c).) Thus, again, the original application is only prior art if it qualifies under § 102(a)(1).

215. When the inventorship is identical between the two applications, the original application is not prior art under § 102(a)(2) because it does not name "another inventor." *See id.* § 102(a)(2). When the inventorship is not identical, the original application is not prior art under § 102(a)(2) because the common control exception of § 102(b)(2)(C)–(c) applies. *See id.* §102(b), (c). In either case, the original application is typically prior art under § 102(a)(1) when it publishes, since the exception under § 102(b)(1)(A) for disclosure originating from an inventor of the supplementary application does not apply. *See id.* § 102(a), (b). In some cases, however, another exception under § 102(b)(1)(B) may apply. *See id.* § 102(b)(1)(B).

application does not originate from an inventor of the supplementary application and the applications are not commonly controlled, but the applications have identical inventorship.[216]

When the relationship between the original and supplementary applications is weak, the supplementary innovation is not patentable. In particular, no supplementation grace period typically exists if the relevant disclosure in the original application does not originate from an inventor of the supplementary application, there is no common control, and the applications do not have identical inventorship. This is true even if the applications have partially overlapping inventorship.[217]

There are other doctrinal nuances and factual scenarios not addressed here. But even considering only the simple fact patterns above, it should be clear that the patentability of supplementary innovation in any given situation depends primarily on complicated line-drawing based on *who* is involved in the original and supplementary innovation and *when* the supplementary application is filed. But the patentability of supplementary innovation does not depend on *what* the supplementary innovation is. That is, no distinction is made between minor and deepening supplementary innovation, encompassed and broadening supplementary innovation, or no-fault and at-fault supplementary innovation.

B. LIMITATIONS OF THE AIA FRAMEWORK

1. Lost Correspondence to Double Patenting

As Part II described, as Congress created and expanded the safe harbor under § 103 for commonly controlled innovation, it made clear its expectation that the safe harbor would be counterbalanced by expanded application of double patenting.[218] This *quid pro quo* made sense in its original context of the 1984 amendments. There, Congress was reacting to *In re Bass*, where the CCPA had used the "prior invention" of an earlier-issued patent as § 102(g) prior art in nonobviousness analysis under § 103.[219] Obviousness-type double patenting similarly asks whether claims are obvious in view of the reference patent's claims—not its disclosure as a whole.[220] Thus, replacing § 102(g)-based

216. The original application is not prior art under § 102(a)(2), since it does not name "another inventor," but it is typically prior art under § 102(a)(1) when it publishes, since the exception under § 102(b)(1)(A) for disclosure originating from an inventor of the supplementary application does not apply. *See id.* § 102(a), (b). In some cases, however, another exception under § 102(b)(1)(B) may apply. *See id.* § 102(b)(1)(B). Such scenarios are likely to be rare.

217. The original application is typically prior art retroactive to its filing date upon publication, since it "names another inventor" under § 102(a)(2), and the exceptions under § 102(b)(2)(A) and § 102(b)(2)(C)–(c) for origination from an inventor and common control, respectively, do not apply. *See id.* § 102(a), (b). In some cases, however, another exception under § 102(b)(2)(B) may apply. *See id.* § 102(b)(2)(B).

218. *See supra* Part II.B, II.C.

219. *See In re* Bass, 474 F.2d 1276, 1286–88 (C.C.P.A. 1973); *supra* notes 79–104 and accompanying text.

220. *See* Geneva Pharm., Inc. v. GlaxoSmithKline PLC, 349 F.3d 1373, 1385 (Fed. Cir. 2003) (citing Gen. Foods Corp. v. Studiengesellschaft Kohle mbH, 972 F.2d 1272, 1281–82 (Fed. Cir. 1992)) ("Because nonstatutory double patenting compares earlier and later claims, an earlier patent's disclosure is not available to

obviousness with obviousness-type double patenting and terminal disclaimers restored the pre-*Bass* availability of additional patent scope, but not patent term, for certain later inventions.

But once the safe harbor under § 103 was expanded to § 102(e) art in 1999,[221] obviousness-type double patenting and terminal disclaimers sometimes failed to restrict additional patent term. The entire disclosure, not just the claims, of an earlier-filed application is prior art under pre-AIA § 102(e) and corresponding post-AIA § 102(a)(2).[222] A patent application's disclosure is usually much more extensive than its claims.[223] As such, the expanded safe harbor can result in a supplementary patent to which obviousness-type double patenting over the original patent does not apply. When there is no obviousness-type double patenting, no terminal disclaimer will be required in the supplementary patent.[224]

Allowing a supplementary application to issue without a terminal disclaimer leads to the loss of three benefits: a limitation on additional patent term, forward-looking common control requirements, and documentation in the record of the relationship between applications.

An example helps illustrate the loss of these benefits. Consider AstraZeneca's patents covering the recently approved drug Lokelma®, used to treat hyperkalemia (elevated potassium in the blood).[225] Patents resulting from several different applications have been listed in the Food and Drug Administration's *Orange Book* as covering Lokelma® or a method of using it,[226] including patents resulting from U.S. Application No. 13/371,080 and U.S. Application No. 14/060,279.[227] Although it is difficult to know with certainty, it

show nonstatutory double patenting."). The specification is only considered to the extent that it is used to interpret the claims. *See* Sun Pharm. Indus., Ltd. v. Eli Lilly & Co., 611 F.3d 1381, 1387–88 (Fed. Cir. 2010).

221. *See supra* Part II.C.1.

222. *See* 35 U.S.C. § 102(e) (2000); 35 U.S.C. § 102(a)(2) (2018).

223. *See supra* notes 177–178 and accompanying text.

224. Douglas Rogers has made a similar observation about double patenting doctrine's scope. *See* Rogers, *supra* note 18. He has argued that "the Federal Circuit has improperly limited double patenting by determining the inventions involved through comparison only of the patents' claims and not of their specifications." *Id*. at 324. He advocates for a strengthened double patenting doctrine that would prevent the same inventor or employer from patenting a species within the scope of that inventor or employer's existing genus patent. *See id*. at 350–76.

225. *See* LOKELMA, https://www.lokelma-hcp.com (last visited Feb. 4, 2021); Jerome P. Kassirer & Jay B. Wish, *Disorders of Potassium Metabolism*, *in* THERAPY OF RENAL DISEASES AND RELATED DISORDERS 63, 71 (Wadi N. Suki & Shaul G. Massry eds., 2012).

226. New Drug Application (NDA) applicants must submit to FDA information regarding patents claiming the drug or a method of using it. *See* 21 U.S.C. § 355 (2018). FDA's publication containing this information, *Approved Drug Products with Therapeutic Equivalence Evaluations*, is better known as the *Orange Book*. *See* FOOD & DRUG ADMIN., U.S. DEP'T OF HEALTH & HUM. SERVS., APPROVED DRUG PRODUCTS WITH THERAPEUTIC EQUIVALENCE EVALUATIONS, at iv (40th ed. 2020) [hereinafter APPROVED DRUG PRODUCTS 40TH].

227. *See* APPROVED DRUG PRODUCTS 40TH, *supra* note 226, at ADA 245; U.S. Patent No. 8,877,255, at [21] (issued from U.S. Application No. 14/060,279); U.S. Patent No. 8,802,152, at [21] (issued from U.S. Application No. 13/371,080). Thirteen patents were listed in the *Orange Book* for Lokelma® between its approval and July 2020, but nine of these were continuing applications of other patents also listed. *See* FOOD & DRUG ADMIN.,

is likely that U.S. Application No. 14/060,279 (the "supplementary '279 application") fell within the supplementation grace period of U.S. Application No. 13/371,080 (the "original '080 application"). They had the same owner and inventors, ZS Pharma, Inc. (which was acquired by AstraZeneca in 2015[228]) and Donald Keyser and Alvaro Guillem, respectively,[229] and the supplementary '279 application's priority date was within one year of the original '080 application's publication.[230]

The supplementary '279 application's claims likely would have been found unpatentable if not filed within the supplementation grace period. The original '080 application describes microporous zirconium silicate ("ZS") compositions formulated to remove toxins, including potassium ions, from the gastrointestinal tract without causing undesirable side effects.[231] The supplementary '279 application adds new disclosure, including disclosure regarding compositions

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U.S. DEP'T OF HEALTH & HUM. SERVS., APPROVED DRUG PRODUCTS WITH THERAPEUTIC EQUIVALENCE EVALUATIONS—CUMULATIVE SUPPLEMENT 7 JULY 2020, at A-40 (40th ed. 2020) [hereinafter APPROVED DRUG PRODUCTS 40TH—CUMULATIVE SUPPLEMENT]; APPROVED DRUG PRODUCTS 40TH, *supra* note 226, at ADA 245; FOOD & DRUG ADMIN., U.S. DEP'T OF HEALTH & HUM. SERVS., APPROVED DRUG PRODUCTS WITH THERAPEUTIC EQUIVALENCE EVALUATIONS ADA 233 (39th ed. 2019) [hereinafter APPROVED DRUG PRODUCTS 39TH]; U.S. Patent No. 10,695,365, at [60] (claiming priority to U.S. Application No. 14/060,279); U.S. Patent No. 10,413,569, at [60] (claiming priority to U.S. Application No. 13/371,080); U.S. Patent No. 10,398,730, at [60] (claiming priority to U.S. Application No. 13/371,080); U.S. Patent No. 10,335,432, at [60] (claiming priority to U.S. Application No. 13/371,080); U.S. Patent No. 10,300,087, at [60] (claiming priority to U.S. Application No. 14/883,428); U.S. Patent No. 9,913,860, at [60] (claiming priority to U.S. Application No. 14/060,279); U.S. Patent No. 9,861,658, at [60] (claiming priority to U.S. Application No. 13/371,080); U.S. Patent No. 9,844,567, at [60] (claiming priority to U.S. Application No. 13/371,080); U.S. Patent No. 9,592,253, at [21] (issued from U.S. Application No. 14/883,428); U.S. Patent No. 8,877,255, at [21] (issued from U.S. Application No. 14/060,279); U.S. Patent No. 8,808,750, at [60] (claiming priority to U.S. Application No. 13/371,080); U.S. Patent No. 8,802,152, at [21] (issued from U.S. Application No. 13/371,080); U.S. Patent No. 6,332,985, at [21] (issued from U.S. Application No. 09/597,337).

228. *AstraZeneca Completes Acquisition of ZS Pharma*, ASTRAZENECA (Dec. 17, 2015), https://www.astrazeneca.com/media-centre/press-releases/2015/AstraZeneca-completes-acquisition-of-ZS-Pharma-17122015.html.

229. *Compare* U.S. Patent Application Pub. No. 2012/0213847, at [73], [75], *with* U.S. Patent Application Pub. No. 2014/0113002, at [73], [75].

230. *Compare* '847 Patent Application Pub., at [43] (published August 23, 2012), *with* '002 Patent Application Pub., at [60] (claiming priority to provisional applications filed on October 22, 2012, and March 15, 2013). The supplementary '279 application was examined under pre-AIA §§ 102–103 because its claims had effective filing dates before March 16, 2013. *See* Leahy-Smith America Invents Act, Pub. L. No. 112–29, § 3(n), 125 Stat. 284, 293 (2011) (specifying that the amendments to §§ 102–103 take effect eighteen months after enactment); Non-Final Office Action, U.S. Patent Application No. 14/060,279, at 3 (Apr. 3, 2014), https://portal.uspto.gov/pair/PublicPair (select "Application Number" under "Choose type of number"; then enter "14/060279" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Non-Final Rejection" hyperlink) (stating that the claims have an effective filing date of March 15, 2013). Under pre-AIA §§ 102–03, the '080 application was not prior art to the '279 application under § 102(e) because it was not "by another" (assuming no non-inventors contributed to the disclosure), *see supra* note 77, and it was not prior art under § 102(b) because the '279 application's effective filing date was within a year of the '080 application's publication. *See* 35 U.S.C § 102 (2006). The '279 application thus fell within the supplementation grace period of the '080 application as long as the '080 application was not prior art under § 102(a)—that is, as long as the invention of the '279 application's claimed invention was before the '080 application's publication. *See id*. Information about the timing of invention is not available in the record.

231. *See* '152 Patent, at [57].

having lower amounts of one form of ZS ("ZS-8") based on the inventors' finding that ZS-8 had higher solubility and therefore could undesirably increase levels of zirconium and silicates in the urine.[232]

The supplementary '279 application relies on this additional disclosure to claim an invention only slightly different from what is described in the original '080 application. The first claim of the patent issuing from the supplementary '279 application, U.S. Patent No. 8,877,255, reads:

> 1. A zirconium silicate composition comprising zirconium silicate of formula (I):
>
> $A_pM_xZr_{1-x}Si_nGe_yO_m$ (I)
>
> where
>
> A is a potassium ion, sodium ion, rubidium ion, cesium ion, calcium ion, magnesium ion, hydronium ion or mixtures thereof,
>
> M is at least one framework metal, wherein the framework metal is hafnium (4+), tin (4+), niobium (5+), titanium (4+), cerium (4+), germanium (4+), praseodymium (4+), terbium (4+) or mixtures thereof,
>
> "p" has a value from about 1 to about 20,
>
> "x" has a value from 0 to less than 1,
>
> "n" has a value from 1 to about 12,
>
> "y" has a value from 0 to about 12,
>
> "m" has a value from about 3 to about 36 and $1 \leqq n+y \leqq 12$, *wherein the composition comprises ZS-9 and ZS-7 and lacks detectable amounts of ZS-8*.[233]

Everything in this claim was disclosed in the original '080 application, with the exception of the last italicized phrase.[234] When ZS Pharma presented a nearly identical claim in the European counterpart application, where the original '080 application was prior art, the European examiner stated that the claim did not involve an inventive step (analogous to nonobviousness[235]) as compared to the disclosure in the original '080 application.[236] But in the United States, the patent

232. *See* '255 Patent, at cols. 6–7, 36.

233. *Id.* at col. 37 l. 7–26 (emphasis added).

234. *Compare* '152 Patent, at cols. 3, 20, *with* '255 Patent, at col. 37.

235. Duffy, *supra* note 8, at 1–2; Convention on the Grant of European Patents art. 56, Oct. 5, 1973, 1065 U.N.T.S. 199 ("An invention shall be considered as involving an inventive step, if having regard to the state of the art, it is *not obvious* to a person skilled in the art.") (emphasis added).

236. *See European Search Opinion*, European Patent Application No. EP13849651.8, at 1–3, EURO. PAT. REG. (Feb. 3, 2016), https://register.epo.org/application?number=EP13849651&lng=en&tab=doclist (follow "European Search Opinion" hyperlink). The applicant argued in response that the inventive step requirement was met, but it later amended the claims. *See Amendments Received Before Examination*, European Patent Application No. EP13849651.8, at 2–3, EURO. PAT. REG. (August 28, 2016), https://register.epo.org/application?number=EP13849651&lng=en&tab=doclist (follow "Amendments received before examination" hyperlink); *Reply to Communication from the Examining Division*, European Patent Application No. EP13849651.8, at 1, EURO. PAT. REG. (Jan. 8, 2020), https://register.epo.org/application?number=EP13849651&lng=en&tab=doclist (follow "Reply to communication from the Examining Division" hyperlink). The

examiner did not use the original '080 application as prior art in her obviousness rejection, despite being aware of it.[237] The record thus suggests that the supplementation grace period allowed ZS Pharma to obtain additional patent coverage for its drug based on post-filing innovation about the specific forms of ZS that were more desirable.[238] And although both the original '080 and supplementary '279 applications resulted in patents that covered the drug substance,[239] the patent examiner did not find the '279 application's claims obvious in view of the '080 application's claims. Thus, no obviousness-type double patenting was found, and no terminal disclaimer was filed.[240]

a. Patent Term

Without a terminal disclaimer, a supplementary patent's term can extend beyond the term of the original patent. The Patent and Copyright Clause of the Constitution provides that Congress shall have power "[t]o promote the progress of science and useful arts, by securing *for limited times* to authors and inventors the exclusive right to their respective writings and discoveries."[241] A limit on patent term reflects the view that monopolies, while permissible to the extent that they encourage innovation, should not be excessive; a monopoly that extends too broadly or too long is harmful to social welfare.[242] Under current

disclosure of original U.S. Patent Application No. 13/371,080 was prior art against the European application because European law excludes applications from prior art only until publication (and only for inventive step, not novelty). *See supra* note 153.

237. *See* Non-Final Office Action, U.S. Patent Application No. 14/060,279, at 4–12 (Apr. 3, 2014), https://portal.uspto.gov/pair/PublicPair (select "Application Number" under "Choose type of number"; then enter "14/060279" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Non-Final Rejection" hyperlink) (rejecting the claim under pre-AIA 35 U.S.C. § 103(a) over patent references to Ash and Bem et al. and relying on the original '080 application as evidence of inherent properties disclosed in the Bem reference); U.S. Patent Application Pub. 2004/0105895, at [76]; U.S. Patent No. 5,891,417, at [75]. Further evidence that the U.S. examiner did not consider the original '080 application to be prior art can be found in a continuation application claiming priority to the supplementary '279 application, U.S. Patent Application No. 14/628,017. *See* U.S. Patent Application Pub. No. 2015/0250821, at [63]. There, in examining a nearly identical claim, the examiner stated that the Bem reference was "arguably the closest prior art." Non-Final Office Action, U.S. Patent Application No. 14/628,017, at 4–5 (May 9, 2017), https://portal.uspto.gov/pair/PublicPair (select "Application Number" under "Choose type of number"; then enter "14/628017" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Non-Final Rejection" hyperlink).

238. It is not possible to definitively determine whether the '279 application actually qualified for the supplementation grace period without knowing the date of invention, which is not available in the record; nor is it possible to know from the record whether the patent examiner relied on the supplementation grace period during examination; nor is it possible to know whether the '279 application's claims would have been considered patentable over the '080 application. Part IV.B.1.c addresses concerns about such lack of public notice. A detailed analysis of whether the '279 application's claims were obvious in view of the '080 application is beyond the scope of this Article.

239. *See* APPROVED DRUG PRODUCTS 40TH, *supra* note 226, at ADA 245.

240. *See* Transaction History, U.S. Patent Application No. 14/060,279, https://portal.uspto.gov/pair/PublicPair (last visited Feb. 4, 2021) (select "Application Number" under "Choose type of number"; then enter "14/060279" in search box; then click "Search"; then click "Transaction History").

241. U.S. CONST. art. I, § 8, cl. 8 (emphasis added).

242. *See* Price, *supra* note 173, at 1619.

law, the term of a patent is twenty years from the application's filing date, subject to certain adjustments.[243]

When Congress dictated the replacement of § 102(g)-based obviousness with obviousness-type double patenting in 1984, the new safe harbor allowed original patent applicants additional scope but not longer term.[244] But as a result of the subsequent expansions of the safe harbor, an original applicant can often receive later-expiring patent protection for post-filing innovation that would be unpatentable absent preferential treatment. For instance, in the Lokelma® example, the patent covering the drug resulting from the original '080 application expires on April 19, 2032; the patent resulting from the supplementary '279 application expires a year and a half later, on October 22, 2033.[245]

b. Common Control

Terminal disclaimers to overcome an obviousness-type double patenting rejection provide not only that the issuing patent's term will not extend beyond the term of the reference patent, but also that the patents are only enforceable if they remain commonly controlled.[246] This forward-looking common control requirement addresses concerns that patents with similar claims will end up in the hands of different assignees and result in multiple suits against the same alleged infringer.[247]

When supplementary applications become patents without terminal disclaimers over the original patent, there is no forward-looking restriction on ownership or control. Eligibility for preferential treatment based on common control is determined only at a single point in time—under current law, at the

243. *See* 35 U.S.C. § 154 (2018); *supra* note 157 and accompanying text.

244. *See supra* Part II.B.

245. *See* APPROVED DRUG PRODUCTS 40TH, *supra* note 226, at ADA 245. ZS Pharma received slightly fewer additional days than based on the twenty-year term alone, because the earlier-expiring '152 patent had sixty-nine days of patent term adjustment under 35 U.S.C. § 154(b), whereas the later-expiring '255 patent had none. *Compare* U.S. Patent No. 8,802,152, at [*] (filed Feb. 10, 2012), *with* U.S. Patent No. 8,877,255, at [*] (filed Oct. 22, 2013). An application for patent term extension under 35 U.S.C. § 156 has been filed in the '152 patent, which would extend the term to May 18, 2032. *See* Application for Extension of Patent Term under 35 U.S.C. § 156, U.S. Patent No. 8,802,152, at 11 (July 21, 2018), https://portal.uspto.gov/pair/PublicPair (select "Patent Number" under "Choose type of number"; then enter "8802152" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Patent Term Extension Application Under 35 USC 156" hyperlink).

246. When the two patents are commonly owned, the terminal disclaimer must include a provision that the issuing patent will be enforceable only for and during the period that they are commonly owned. 37 C.F.R. § 1.321(c)(3) (2018). When the obvious-type double patenting is a result of the safe harbor for joint research agreements, the terminal disclaimer must include a provision waiving the right to separately enforce the patents, and providing that the issuing patent will be enforceable only for and during the period that the patents are not separately enforced. *Id.* § 1.321(d)(3).

247. *In re Van Ornum*, 686 F.2d 937, 944 (C.C.P.A. 1982) (citing DONALD S. CHISUM, PATENTS § 9.04(2)(b) (1981)).

supplementary application's effective filing date.[248] In some cases, the two applications may in fact never be commonly controlled if the supplementation grace period is a result of identical inventorship or origination of the original application's relevant disclosure from an inventor of the supplementary application.[249]

c. Public Notice

The relationships between patent applications typically must be explicitly stated in the record. This is true when an application claims the benefit of another application's earlier filing date, and when a terminal disclaimer is filed.[250] But when a supplementary patent does not have a terminal disclaimer over the original patent, there is often no indication in the record that the supplementary patent would be unpatentable but for the supplementation grace period.

In the Lokelma® example above, for instance, there is nothing in the supplementary '279 application's record that links it to the original '080 application, nor is there anything in the original '080 application's record that links it to the supplementary '279 application.[251] Indeed, it is not possible to definitively determine from the record whether the '279 application actually qualified for the supplementation grace period, whether the patent examiner relied on the supplementation grace period during examination, or whether the '279 application's claims would have been considered patentable over the'080 application had the supplementation grace period not applied. And assuming that the '279 application was in fact patentable only as a result of the supplementation grace period, because there is no such indication in the record, another innovator aware of the original '080 application, but not aware of the supplementary '279 application, could incorrectly assume that obvious variants of what was disclosed in the original '080 application were in the public domain. Such an assumption would not be unreasonable, since supplementary applications are an exception to the "fundamental premise" of patent law that

248. *See* 35 U.S.C. § 102(b)(2)(C), (c)(1) (2018). Pre-AIA § 103(c) similarly assessed eligibility only at a single point in time (when the supplementary application's claimed invention was made). *See* 35 U.S.C. § 103(c) (2006).

249. *See supra* Part IV.A.

250. *See* 35 U.S.C. § 119(e)(1) (2018) (requiring a specific reference to a provisional application); *id*. § 120 (requiring a specific reference to an earlier-filed nonprovisional application); 37 C.F.R. § 1.321(a) (2018) (requiring the disclaimer be recorded at the USPTO and stating that a notice of a disclaimer is published in the Official Gazette and attached to the patent).

251. The prosecution history of a different patent application, however, contains an erroneous statement in which the supplementary '279 application is described as a continuation-in-part of the original '080 application. *See* Response to Decision on Petition under 37 C.F.R. § 1.78(c) and (e), U.S. Patent Application No. 14/826,058, at 2 (Jan. 13, 2017), https://portal.uspto.gov/pair/PublicPair (select "Application Number" under "Choose type of number"; then enter "14/826058" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Petition for review by the Office of Petitions" hyperlink). See *supra* note 31 for a discussion of continuation-in-part applications.

"only significant inventions receive patent protection while minor improvements remain in the public domain."[252]

2. *Applicant Control over the Supplementation Grace Period*

The AIA also reverses some of the simplification of line-drawing between favored original patent applicants and others that was established by the reforms of 1984, 1999, and 2004. The supplementation grace period under the AIA is created by several layered carve-outs, each drawing the line differently between original applicants and others in ways that can impact the length of the supplementation grace period. As such, it is particularly subject to applicant manipulation.

a. *Inventorship and Common Control*

Before the AIA, the supplementation grace period for eligible minor supplementary innovation extended until the original application's publication (or issuance when there was no pre-grant publication).[253] Pre-AIA law treated minor supplementary innovation equally whether it was by the same inventor group, by the same owner, or under a joint research agreement. Difficult line-drawing between original applicants and others was therefore largely eliminated for minor supplementary innovation within almost all collaborative research environments.

But the AIA reintroduced a new line-drawing problem by making the length of the supplementation grace period dependent on inventors and their contributions, even with common control.[254] The AIA framework thus creates more opportunities and incentives to modify a supplementary application to make it fall within the supplementation grace period of an original patent application.

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252. Pedraza-Fariña & Whalen, *supra* note 9, at 63. Occasionally, a supplementary application's record will indicate that the applicant is relying on the supplementation grace period; this can happen, for example, when the USPTO incorrectly rejects a supplementary application over a commonly controlled original application, and the applicant then makes a statement during examination to remove the original application as prior art. *See* MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 135, § 717.02 (describing the procedure "to invoke common ownership to except a disclosure as prior art"). Even in these instances, however, the link between applications can be buried in hundreds of pages of correspondence between the applicant and USPTO. For example, ZS Pharma relied on the supplementation grace period in another application, U.S. Application No. 14/536,056. There, the patent examiner rejected the application as obvious over the '279 application. *See* Non-Final Office Action, U.S. Patent Application No. 14/536,056, at 5 (Sept. 13, 2016), https://portal.uspto.gov/pair/PublicPair (select "Application Number" under "Choose type of number"; then enter "14/536056" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Non-Final Rejection" hyperlink); U.S. Patent Application Pub. No. 2014/0113002, at [21]. In response, ZS Pharma made a statement of common ownership to remove the '279 application as prior art. *See* Petition for Extension of Time, Amendment and Response to Non-Final Office Action, U.S. Patent Application No. 14/536,056, at 13 (Mar. 13, 2017), https://portal.uspto.gov/pair/PublicPair (select "Application Number" under "Choose type of number"; then enter "14/536056" in search box; then click "Search"; then click "Image File Wrapper"; then follow "Applicant Arguments/Remarks Made in an Amendment" hyperlink dated Mar. 23, 2017).

253. *See supra* notes 147–148 and accompanying text.

254. *See supra* notes 149–150, 213–217 and accompanying text.

For example, by adding an inventor to the supplementary application such that the relevant disclosure in the original application originates from an inventor of the supplementary application, a patent applicant can add a year to the supplementation grace period.[255] Adding such an inventor is often within the applicant's control. Inventorship is based on an application's claims, and small changes to the claims can allow an applicant to add or remove an inventor.[256] Indeed, practitioners recommend this strategy for patenting supplementary innovation.[257]

Applicants can also use ownership and joint research agreements to control which supplementary innovation is patentable. Since the common-control safe harbor developed to accommodate collaborative research,[258] this is largely unproblematic. Yet the AIA departs from the original goal because the relevant date for assessing common control is the supplementary application's date of *filing*, not its date of *invention* (as it was pre-AIA).[259]

An applicant can therefore purchase certain earlier-filed applications before filing a new application (but after inventing its claimed invention) in order to remove the earlier-filed application as prior art.[260] An applicant can similarly enter into a joint research agreement to remove certain earlier-filed applications owned by parties to the agreement, as long as the agreement is in effect by the new application's filing date (even if it was not in effect at the time of invention). This requires only that the new application is developed as part of the joint research agreement; the applications removed as prior art do not need to result from work under the agreement.[261] Thus, original and supplementary applications can be based on completely independent work.[262]

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255. *See supra* notes 213–216 and accompanying text.

256. *Cf.* 35 U.S.C. § 116 (2018) ("Inventors may apply for a patent jointly even though . . . each did not make a contribution to . . . every claim."); 37 C.F.R. § 1.48 (2018) (describing the procedures for correcting or changing inventorship, for example to due to "cancelation of claims in the application"); Ethicon, Inc. v. U.S. Surgical Corp., 135 F.3d 1456, 1460 (Fed. Cir. 1998) ("A contribution to one claim is enough.").

257. *See, e.g.*, Michael K. Henry, *How to Avoid Your Own Patents and Applications as Prior Art Under the America Invents Act (AIA)*, HENRY PATENT L. FIRM (Oct. 19, 2017), https://www.henrypatentfirm.com/blog/prior-art-under-aia. Pre-AIA law created some incentives to manipulate inventorship for deepening supplementary innovation. Original patent applicants could create a supplementation grace period for deepening supplementary innovation by adding inventors to the supplementary application such that the disclosure in the original application was not "by another." This would remove the original application's disclosure as prior art under § 102(e). *See* 35 U.S.C. § 102 (2006); Lewis et al., *supra* note 62, at 83; TERRI SHIEH-NEWTON, MINTZ LEVIN IP SUMMER ACADEMY 2016, HOW TO OVERCOME REJECTIONS UNDER 35 U.S.C. § 102, at 48, 59–60 (2016), https://www.mintz.com/newsletter/2016/Documents/IPSA2016/IPSA%20Presentations/Week%201/IPSA2016%20Week%201%20All%20Presentations.pdf.

258. *See supra* Part II.B, II.C.

259. *See supra* notes 143–145 and accompanying text.

260. *See* 35 U.S.C. § 102(b)(2)(C) (2018); MaCharri Vorndran-Jones, Donna M. Meuth, Tom Irving, Deborah Herzfeld & Stacy Lewis, *Top Five Dangers for the AIA Unwary*, 5 LANDSLIDE 10, 11–12 (2013).

261. *See* 35 U.S.C. § 102(c)(1)–(3); Matal, *supra* note 118, at 487; Vorndran-Jones et al., *supra* note 260, at 11; Dennis Crouch, *The New Law Effective Today: 35 U.S.C. 102*, PATENTLY-O (Mar. 16, 2013), https://patentlyo.com/patent/2013/03/the-new-law-effective-today-35-usc-102.html.

262. But in circumstances where the supplementation grace period would end with publication, a purchase or formation of a joint research agreement for the purpose of removing earlier-filed applications as prior art

b. Publication

Applicants can also influence the supplementation grace period's length through the original application's publication. As Part II.C.2 described, the 1999 AIPA tied the supplementation grace period to publication, and this feature is maintained under the AIA. Under 35 U.S.C. § 122, a patent application is generally published eighteen months from its priority date.[263] But an applicant may choose to keep its application secret until grant if no corresponding foreign or international application is filed that will publish at eighteen months.[264] An applicant can thus substantially lengthen its supplementation grace period by requesting nonpublication, and some practitioners specifically recommend this strategy for patenting supplementary innovation.[265]

C. AN OWN PRIOR APPLICATION DISCLAIMER

Instead of the current complex and haphazardly developed statutory framework, the Subparts that follow suggest an alternative approach to preferential treatment. This alternative approach would address the problems outlined above and simplify the statutory framework such that its parameters could be more directly tailored to policy goals. In particular, 35 U.S.C. § 102 would be amended to eliminate the carve-outs that create preferential treatment for original applicants. This would clear away the layered statutory provisions that have accumulated piecemeal over time, and would give original applicants' earlier-filed applications the same prior art effect as others' earlier-filed applications.[266]

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would presumably require the applicant of the intended supplementary application to know about the original application while it was still secret, suggesting some prior relationship between the parties.

263. *See* 35 U.S.C. § 122(b)(1).

264. *Id.* § 122(b)(2)(B)(i). A study of U.S. applications that ultimately became patents found that 7.5% of applications filed between 2001 and 2005 took advantage of § 122(b)(2)(B)(i)'s pre-grant secrecy provision. *See* Graham & Hegde, *supra* note 132, at 5. Even if an applicant may not or does not file a nonpublication request, it can take other steps to delay publication. For example, filing an incomplete application can delay publication slightly. *Cf.* MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 135, § 710.02(d) (describing that the period for reply to a Notice to File Missing Parts of an application can be extended by up to five months).

265. *See* CARLYN BURTON, OSHA LIANG LLP, TIMING IS EVERYTHING: WHEN TO FILE A PATENT APPLICATION 9 (2010); *cf.* Crouch, *supra* note 145 ("Theoretically, the exception [of 35 U.S.C. § 102(b)(2)(C)] favors . . . applicants who file applications under non-publication requests."); *Patent Application Publication*, NEUSTEL ATT'YS AT L., https://www.neustel.com/patents/patent-applications/patent-application-publication (last visited Feb. 4, 2021) (describing as a reason for a nonpublication request that "[i]f you abandon this patent application and it is not published, the patent application cannot be used as prior art by the U.S. Patent Office to reject a later filed patent application by you for a related invention"). Prior to the institution of pre-grant publication, it was similarly possible to lengthen the supplementation grace period by invoking strategies to delay issuance (thus requiring that the patentee delay the start of its patent rights). Under the pre-grant publication regime, however, delaying or avoiding pre-grant publication has no direct effect on the timing of patent issuance.

266. More specifically, the amendments would make original patent applicants' earlier-filed applications retroactively eligible as prior art as of their effective filing date upon publication or grant. To accomplish this, the amendments would remove the language "names another inventor" from § 102(a)(2) and eliminate the carve-outs for disclosures originating from an inventor and for commonly controlled applications. This would render

Further statutory amendments would then allow an original applicant to remove its earlier-filed application(s) as prior art—and thus obtain a supplementary patent despite its unpatentability over the prior art original application—by making certain concessions.[267] These concessions would limit the rights created by the supplementary patent and include (1) disclaiming patent term beyond that available from the original patent application; (2) maintaining common control over the original and supplementary applications and any resulting patents; and (3) providing clear public notice of the relationship between the original and supplementary applications. These concessions would be made via what this Article terms an "own prior application disclaimer" ("OPA disclaimer"). OPA disclaimers would complement existing terminal disclaimers for obviousness-type double patenting.

1. Disclaimed Term

An OPA disclaimer would disclaim patent term beyond that of a patent issuing from the original patent application. Like terminal disclaimers filed in response to obviousness-type double patenting ("ODP disclaimers"), OPA disclaimers would rely on 35 U.S.C. § 253(b), which permits an applicant to "disclaim or dedicate to the public the entire term, or any terminal part of the term, of the patent granted or to be granted."[268] Because patent terms are calculated as a time period (generally twenty years) from filing,[269] filing an OPA disclaimer would result in the supplementary patent's expiration date being calculated from the filing date of the original application, rather than from the filing date of the supplementary application.[270] This is consistent with Congress's initial expectation that expanded preferential treatment for original patent applicants would not result in lengthened patent terms.[271]

An OPA disclaimer would limit the term of a patent issuing from the supplementary application whether or not the original application matured into a patent. This is a key distinction from an ODP disclaimer. An ODP disclaimer gives up the portion of the term of one patent that extends beyond the term of another patent. Although an ODP disclaimer can be filed over a pending application,[272] if the application never matures into a patent there can be no double patenting, and no term need be disclaimed. The effect of OPA

published applications and granted patents § 102(a)(2) art, regardless of inventorship, origination of disclosure, or control.

267. The supplementary patent would be granted (subject to any other prior art) despite its unpatentability over the original U.S. patent application and any other publications of the same patent disclosure (that is, continuation or divisional applications and international or foreign counterparts).

268. 35 U.S.C. § 253(b) (2018); *In re* Longi, 759 F.2d 887, 894 (Fed. Cir. 1985).

269. *See* 35 U.S.C. § 154(a); *supra* note 157 and accompanying text.

270. The supplementary patent's term could still be extended by patent term "adjustment" to account for delays within the USPTO and/or "extension" to account for premarket regulatory review, and/or shortened by ODP disclaimer(s). *See* 35 U.S.C. § 154(b) (patent term adjustment); *id.* § 156 (patent term extension).

271. *See supra* Parts II.B, II.C, IV.B.1.

272. *See* MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 135, § 804(I)(B).

disclaimers could not be limited in this way; if it were, an original patent applicant could shift its patent term later by serially filing and abandoning applications if no intervening prior art existed.

Disclaimers of term would have varying effects on supplementary patents' incentive function depending on the type of supplementary innovation (as discussed further in Part IV.C.4) and depending on the commercial significance of the end portion of patent term. In industries with short product cycles, the end portion of patent term may have little practical significance. In industries with long product life cycles like the pharmaceutical industry,[273] on the other hand, each day at the end of a patent's term can be very valuable. For blockbuster drugs, extending patent term by a matter of months can lead to hundreds of millions of dollars of additional profits.[274]

2. Common Control

The current framework for preferential treatment leaves open the possibility that original and supplementary applications are separately controlled and enforced. OPA disclaimers would, like ODP disclaimers, provide a mechanism for placing forward-looking restrictions on their control.[275] That is, OPA disclaimers could require that original and supplementary applications remain commonly controlled in order for the patents to be enforceable and that the owner(s) waive the right to separately enforce any patents issuing from the original and supplementary applications. Such restrictions cannot be workably implemented under the current system.[276]

Ensuring that original and supplementary applications and patents are commonly controlled at licensing and enforcement reduces preferential treatment's potential to hamper innovation by others. In particular, it mitigates the risk of alleged infringers facing multiple suits, and of potential licensees needing to negotiate with multiple potential licensors.[277]

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273. *See* Henry Grabowski, *Patents and New Product Development in the Pharmaceutical and Biotechnology Industries*, 8 GEO. PUB. POL'Y REV. 7, 8 (2003) (comparing product life cycles between the pharmaceutical industry and other industries, and describing that "R&D investment periods and product life cycles are typically much shorter in" industries "such as computer technologies, scientific instruments, and semiconductors").

274. Feldman, *supra* note 40, at 601. But drugs with secondary patents that extend the effective patent terms are more likely to attract generic challenges. *See* C. Scott Hemphill & Bhaven N. Sampat, *When Do Generics Challenge Drug Patents?*, 8 J. EMPIRICAL LEGAL STUD. 613, 635 (2011). If supplementary patents that extend effective patent term are likely to be found invalid based on the primary patent (or an earlier secondary patent), an ODP disclaimer's actual impact on effective term might be less than suggested on its face.

275. *See supra* note 246 and accompanying text.

276. *See supra* notes 143, 248 and accompanying text.

277. *Cf.* Cotropia, *supra* note 9, at 1525 (noting that different patentees holding rights "on small technical advances make it extremely difficult and 'expensive to search and to license' these patents in order to produce further innovations") (citing FED. TRADE COMM'N, TO PROMOTE INNOVATION ch. 4, at 3 (2003)).

3. Public Notice

The current system also usually provides no indication in the record of the relationship between the original and supplementary applications.[278] Under an OPA disclaimer system, the original patent applicant would need to file an OPA disclaimer with the USPTO, rather than an exception applying automatically as under current law. OPA disclaimers would thus provide a mechanism for making information about the relationship between the applications easily available to the public. For example, like an ODP disclaimer, an OPA disclaimer could be indicated on a patent's face and in the USPTO's public application database.[279] Applicants could be required to file any OPA disclaimer with the USPTO within a short period after filing the supplementary application, similar to requirements for claims of priority to earlier-filed applications.[280]

OPA disclaimers would thus substantially improve public notice as to the potential scope and duration of rights available to the original patent applicant. In particular, an indication on the face of the original application's pre-grant publication or resulting patent would serve as a warning to other innovators who might incorrectly assume that obvious variants were in the public domain. And by helping others identify and understand the relationships within a patent portfolio, an indication in each application's record would reduce supplementary applications' contribution to patent thickets.[281]

4. Eligibility for Preferential Treatment

The statutory amendments would also need to define the eligibility criteria for preferential treatment. These include (1) *who* is eligible for preferential

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278. *See supra* Part IV.B.1.c.

279. *See Quick Guide to Locating Patent Term Information on the USPTO Web Site*, USPTO, https://www.uspto.gov/sites/default/files/patents/law/How_to_Locate_Patent_Term_Information.docx (last visited Feb. 4, 2021) (pages 7–8). OPA disclaimers would ideally appear (unlike ODP disclaimers) in the database entries for both the original and supplementary applications and any of their children, on the face of both applications' pre-grant publications and resulting patents, and on the face of both applications' children's pre-grant publications and resulting patents.

280. *See* 37 C.F.R. § 1.78(a)(4) (2018). ODP disclaimers, in contrast, can be filed during an application's pendency or after issuance (but not after expiration of the reference patent). *See* Boehringer Ingelheim Int'l GmbH v. Barr Labs., Inc., 592 F.3d 1340, 1347–48 (Fed. Cir. 2010). ODP disclaimers can even be filed during litigation in response to a finding of invalidity due to obviousness-type double patenting. *Id.* at 1347; Jeffrey I. D. Lewis, *Curing Double Patenting During Prosecution and After Issuance: When Once Is Never Enough and Twice Is Too Much*, 21 AIPLA Q. J. 34, 48–50 (1993).

Because applicants can pursue a series of continuing applications off of a parent application to form a patent family, *see* 35 U.S.C. § 120 (2018); Chiang, *supra* note 3, at 533–34; Lemley & Moore, *supra* note 180, any OPA disclaimer would need to be filed in the first nonprovisional application in a family. The OPA disclaimer would then also apply to any later applications claiming priority to the first application. Otherwise, applicants could file OPA disclaimers in some family members but not others, effectively eliminating the public notice function.

281. Preferential treatment encourages innovators to file patent applications that they would not otherwise file, *see supra* Part III.A.1, potentially contributing to large patent portfolios. Large patent portfolios, in turn, can contribute to patent thickets that are difficult for others to navigate. *See* Day & Schuster, *supra* note 41, at 127–30; Parchomovsky & Wagner, *supra* note 7, at 62–64.

treatment; (2) *when* preferential treatment is available; and (3) *what* type of supplementary innovation is eligible. Each of these received piecemeal, if any, attention during the historical development of preferential treatment for original patent applicants.

a. Who Is Eligible

Of these criteria, who is eligible for preferential treatment—that is, how to define an "original patent applicant"—received the most attention historically. The CCPA struggled with drawing the line between favored original patent applicants and others in the 1960s, and Congress has since shifted the line toward expanded eligibility, first to include whole organizations, then to include collaborative teams across organizations.[282] The AIA defines who is eligible by three layered criteria: common control, identical inventorship, and origination of the original disclosure from an inventor of the supplementary application.[283]

An OPA disclaimer's ongoing common control requirement would create the most important constraint regarding who is eligible for preferential treatment. As described above, requiring ongoing common control would mitigate some of the key ways that supplementary applications can hamper innovation by others.[284] It would also make preferential treatment more consistent with theoretical justifications for nonobviousness by eliminating the requirement (along with novelty) when allocation of rewards between parties is not needed.[285]

Additional eligibility requirements beyond common control depend on policy goals. If, consistent with its historical development, the primary goal of preferential treatment is to accommodate the difficulty of mapping complex, collaborative research and development to the patent system, an ongoing common control requirement alone would award preferential treatment to too much supplementary innovation. Common control, especially based on common ownership by large or decentralized institutions, such as universities, may not reflect any collaboration.[286]

Requiring common control in combination with knowledge transfer between innovators involved in the original and supplementary innovation would better tailor preferential treatment to collaborative work, but documenting knowledge transfer could impose substantial burdens on patent applicants. Relying on origination of the original application's relevant disclosure from an inventor of the supplementary innovation is a reasonable, if not perfect, proxy

282. *See supra* Part II.B, II.C.

283. *See* 35 U.S.C. § 102 (2018); *supra* Part IV.A.

284. *See supra* Part IV.C.2.

285. *See supra* notes 9–13 and accompanying text; *cf.* Duffy, *supra* note 8, at 14–16 (describing, with respect to pre-AIA law, that the nonobviousness requirement serves to allocate rewards among inventors, but that when there is common ownership between these applications, "allocating rewards among parties is not a concern," so the "law thus eliminates the nonobviousness requirement in those circumstances").

286. *Cf.* Crouch, *supra* note 261, at n.7 ("Large companies who file many patent applications receive additional relief from their own prior art . . . .").

for actual knowledge transfer between innovators. Opportunities for manipulating eligibility via inventorship could be reduced by assessing eligibility on a claim-by-claim basis in the supplementary application, rather than based on the inventorship of the supplementary application as a whole.[287]

If, however, the primary goal of preferential treatment is to increase disclosure and innovation incentives for supplementary innovation, rather than to reflect collaborative work, additional requirements beyond common control may be unnecessary. Allowing companies to purchase original patent applications to gain preferential treatment, for example, would allow redistribution of these incentives to entities valuing exclusivity as to supplementary innovation higher than the original applicants.

b. When Preferential Treatment Is Available

Another important consideration is when preferential treatment is available—that is, the length of the supplementation grace period. The temporal boundaries of preferential treatment received little attention historically, even while undergoing significant changes with the passage of the AIPA and AIA.[288]

A supplementation grace period of zero would eliminate preferential treatment; a supplementation grace period of infinite duration would allow an original applicant to patent supplementary innovation occurring at any time (subject to any other prior art). Between these extremes, supplementation grace periods could be set by duration (for example, months from the original application's filing), by original application status (for example, publication or issuance), or by a non-patent event (for example, regulatory approval, sale of a product, licensing, assignment, or enforcement). They could also be set by a combination of these approaches, as under the AIA, where the supplementation grace period ends with the original application's publication or a year thereafter.[289]

Even if the supplementation grace period were infinite, an effective temporal limit would often be formed by the original applicant's own non-patent prior art. The original applicant can create prior art against its own supplementary application through a printed publication, public use, sale, or other public disclosure more than a year before the supplementary application is filed.[290] The OPA disclaimer proposed here would not have any effect on non-

287. Because the OPA disclaimer would be ineffective for ineligible claims, the content of the prior art could vary by claim. This can also occur when a patent application claims priority to a provisional application or is a continuation-in-part. In these cases, the effective filing date (and thus the content of the prior art) is determined individually for each claim. *See* Lucent Tech., Inc. v. Gateway, Inc., 543 F.3d 710, 718 (Fed. Cir. 2008).

288. *See supra* Part II.C.2, II.D.

289. *See supra* Parts II.D, IV.A.

290. *See* 35 U.S.C. § 102(a)(1) (2018) (setting forth sources of prior art); *id.* § 102(b)(1)(A) (setting forth a one-year grace period for disclosures by an inventor).

patent prior art. These other forms of the original applicants' own prior art could thus generate an effective end date for the supplementation grace period.[291]

Setting aside these limits created by other forms of own prior art, the most notable effects of the supplementation grace period's length are on the scope of exclusivity for original patent applicants, on the timing of public notice regarding that exclusivity, and on how original patent applicants allocate their resources.

A longer supplementation grace period increases the chance that an original patent applicant will invent supplementary innovation in time to patent it. Moreover, a longer supplementation grace period changes what post-filing innovation an original applicant can patent as a result of preferential treatment. Nonobviousness is assessed as of the supplementary application's filing; when this date is later, the scope of follow-on innovation that is obvious in view of other technological developments since the original application may be broader.[292] The boundary between unpatentable and patentable innovation thus shifts over time. Follow-on innovation that is initially patentable in view of an original application, and thus equally subject to patent exclusivity by the original applicant and others, may later be unpatentable, and thus subject to patent exclusivity only by the favored original applicant. A longer supplementation grace period allows for more shifting of this boundary.

A longer supplementation grace period thus increases uncertainty for the public regarding an original patent applicant's ultimate scope of exclusivity. It delays public notice as to how much of the potential scope of exclusivity the original applicant has actually attempted to capture through supplementary applications, while also increasing uncertainty as to the boundary of that potential scope. Longer supplementation grace periods also have the potential to change innovation incentives for original patent applicants by encouraging them to direct resources toward supplementary innovation, rather than other innovation, for longer.[293]

The supplementation grace period's length can have other effects as well. For example, longer supplementation grace periods are likely to result in more

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291. See *supra* notes 27–28 and accompanying text for discussion of a few examples of these forms of prior art. For more discussion of non-patent own prior art before and after the AIA, see, for example, Phillip W. Goter, *The Commercial Exploitation Continuum*, 13 MINN. J.L. SCI. & TECH. 795 (2012); Dmitry Karshtedt, *Did Learned Hand Get It Wrong?: The Questionable Patent Forfeiture Rule of* Metallizing Engineering, 57 VILL. L. REV. 261 (2012); Lemley, *supra* note 65; Mark Levy, *An Analysis of the On Sale Bar and Its Impact on the Structure and Negotiation of Development Agreements*, 30 U. DAYTON L. REV. 181 (2004); Shashank Upadhye, *To Use or Not to Use: Reforming Patent Infringement, the Public Use Bar, and the Experimental Use Doctrine as Applied to Clinical Testing of Pharmaceutical and Medical Device Invention*, 4 MINN. INTELL. PROP. REV. 1 (2002); John C. Williams, Note, *Giving Meaning to "Otherwise Available to the Public": How* Helsinn *Perpetuates a Version of the On-Sale Bar to Patentability that Disproportionately Burdens Small Inventors,* 97 TEX. L. REV. 421 (2018).

292. *Cf.* Holbrook, *supra* note 2, at 1474–75 ("[B]ecause the knowledge of the PHOSITA expands over time, the nature of the prior art teaching also changes.").

293. *Cf.* MERGES & DUFFY, *supra* note 9, at 609 ("[G]ranting patents to obvious developments may compromise the incentives that the patent system provides to develop nonobvious inventions.").

new applications than shorter ones. Increased numbers of applications and issued patents may be more difficult for others to navigate, even if the original and supplementary applications are commonly controlled and publicly disclosed as this Article proposes. Scholars have also suggested that high volumes of patent applications overload the USPTO and contribute to poor quality examination, leading to more invalid patents.[294] On the other hand, because supplementation grace periods may decrease pressure on applicants to try to capture post-filing innovation through original patent applications,[295] at least some supplementary applications may replace continuing applications.

These effects mean that supplementation grace periods cannot be lengthened without some costs. Yet, there are good reasons to consider coupling the supplementation grace period's end to patent issuance (as it was before the AIPA instituted pre-grant publication), rather than to patent application publication.[296] In such a system, a supplementary application could be filed any time during the original application's pendency. Once the original application matured into a granted patent or went abandoned after publication, the supplementation grace period would close.[297]

This approach would eliminate the largely arbitrary difference in supplementation grace periods between original applications that undergo pre-grant publication and those that do not. Coupling the supplementation grace period's end to patent issuance is also appealing because issuance marks the start of enforceable patent rights.[298] Original applicants would be able to extend the supplementation grace period by delaying issuance of the original patent.[299] But unlike extending the supplementation grace period by delaying or opting out of pre-grant publication, delaying issuance requires the original applicant to make a potentially meaningful sacrifice by giving up a beginning portion of its exclusivity.[300] The appeal of trading exclusivity for an extended

294. *See* Cotropia, *supra* note 6, at 104–05; Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 46–47 (2007).

295. *See supra* Part III.A.2.

296. This approach would lengthen the supplementation grace period in most cases. *See supra* notes 131–133.

297. If the original application went abandoned without publication, it would never become prior art. *See* 35 U.S.C. § 102(a) (2018). There is a small window in which an application could go abandoned before publication, yet still publish. *Cf.* 37 C.F.R. § 1.138(c) (2018) (describing that a petition for express abandonment to avoid publication should be received by the USPTO more than four weeks before the projected publication date to provide sufficient time to remove the application from the publication process).

298. *But see* 35 U.S.C. § 154(d) (creating provisional rights beginning with application publication, if the invention claimed in the published application is "substantially identical" to the invention ultimately claimed in the granted patent).

299. An applicant can use various tactics to delay issuance, such as taking extensions of time, filing requests for continued examination, requesting suspension of action, and abandoning pending applications in favor of continuing applications. *See* 37 C.F.R. § 1.136 (extensions of time); *id.* § 1.114 (requests for continued examination); *id.* § 1.103 (suspension of action); 35 U.S.C. § 120 (continuing applications). The USPTO fees associated with these methods of delay could be significant in the aggregate. *See* 37 C.F.R. § 1.17.

300. Some strategies for delaying issuance could also result in an original applicant giving up an end portion of its exclusivity. Patent term adjustment can be added onto a patent's twenty-year term for USPTO's delays

supplementation grace period would likely vary by industry. In the pharmaceutical industry, where an initial patent filing is usually many years before product launch,[301] applicants might value the beginning portion of their exclusivity less than the ability to patent more supplementary innovation.[302] In other industries where product cycles are shorter, such as the electronics industry,[303] applicants might be more likely to value earlier exclusivity over a longer supplementation grace period.

A key critique of coupling the end of the supplementation grace period to issuance rather than to pre-grant publication is that preferential treatment for original patent applicants has historically been an exception to "secret" prior art.[304] As such, the supplementation grace period's duration has been tied to public availability of the original patent application. Lengthening the supplementation grace period to extend more than a year beyond the original application's publication would thus be a significant departure from historical precedent, in that it would allow original patent applicants to patent innovation that was unpatentable as compared to information that had been publicly available for a substantial period of time.[305]

Although it would depart from precedent, allowing supplementary applications over publicly available original applications is not inconsistent with the broader theoretical justifications for treating an applicant's own public disclosures as prior art. Inventors are typically barred from patenting an invention more than a year after it has been available to the public because "inventions that the public reasonably has come to believe are freely available" should not be removed from the public domain.[306] This justification makes sense for disclosures such as those via academic publications, sales of a product, or

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during prosecution, *see* 35 U.S.C. § 154(b), but USPTO delays are offset by delays attributable to the applicant. *See* Stephanie Plamondon Bair, *Adjustments, Extensions, Disclaimers, and Continuations: When Do Patent Term Adjustments Make Sense?*, 41 CAP. U. L. REV. 445, 454–55 (2013).

301. *See* Grabowski, *supra* note 273, at 11; Roin, *supra* note 18, at 529.

302. On the other hand, patent applicants in the pharmaceutical industry are careful to accumulate as much patent term adjustment as possible, so strategies to delay patent issuance that would decrease patent term adjustment would be undesirable. *See supra* note 300.

303. *Cf.* Grabowski, *supra* note 273, at 8 (describing that "R&D investment periods and product life cycles are typically much shorter in" industries "such as computer technologies, scientific instruments, and semiconductors").

304. *See supra* Part II; *supra* note 18.

305. A detailed analysis of constitutional considerations in patentability is beyond the scope of this Article, but it is worth noting that a (likely very weak) constitutional challenge to this change might be based on the Patent and Copyright Clause of the Constitution's role as "both a grant of power and a limitation." Graham v. John Deere Co., 383 U.S. 1, 5 (1966). Congress may not "enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby" or "authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available." *Id.* at 6; *see also* Roin, *supra* note 18, at 557 (suggesting that "carv[ing] out an exemption in the novelty and nonobviousness standards for drugs . . . . could even be considered unconstitutional under current Supreme Court precedent"); Seymore, *supra* note 62, at 1068 n.310 ("Commentators agree that novelty is a constitutional requirement. Nonobviousness has constitutional underpinnings in that some standard of creativity might be needed to support patentability.") (citations omitted).

306. Delano Farms Co. v. Cal. Table Grape Comm'n, 778 F.3d 1243, 1247 (Fed. Cir. 2015).

trade show displays, where there is no clear signal to the public of patent rights. But during the original application's pendency, the public cannot reasonably rely on the availability of the innovation it discloses. Indeed, the assumption should be exactly the opposite—that the innovation may end up the subject of exclusive rights and therefore is not available to the public. Public reliance becomes reasonable only when the original patent application and any continuing applications are no longer pending, and therefore the complete set of rights are defined.[307] This justification is thus particularly tenuous for encompassed supplementary innovation, which falls entirely within the scope of patentable claims of the original application.

c. What Type of Supplementary Innovation Is Eligible

Under the current framework, the patentability of supplementary innovation does not depend on the nature of the innovation itself—that is, no distinction is made between minor and deepening supplementary innovation, encompassed and broadening supplementary innovation, or no-fault and at-fault supplementary innovation. It may be best to maintain this approach under an OPA disclaimer system; introducing distinctions would significantly increase the system's complexity. While line-drawing between minor and deepening supplementary innovation would be relatively straightforward and finds precedent in pre-AIA law,[308] line-drawing between encompassed and broadening supplementary innovation, and between no-fault and at-fault supplementary innovation, would be substantially more complex. That said, these types of supplementary innovation involve different considerations. It is thus worth briefly noting how these considerations could be used to tailor an OPA system more closely to policy goals.

One key consideration, for example, is the difference in effect of disclaiming patent term on disclosure and innovation incentives for encompassed versus broadening supplementary patents. As Part III described, under the current system, patents on broadening supplementary innovation offer additional term and scope, whereas patents on encompassed supplementary innovation offer only additional term.[309] The OPA disclaimers proposed here would restrict any additional term from supplementary patents. Broadening supplementary patents would thus offer only additional scope; encompassed supplementary patents would offer neither additional scope nor term.[310] This outcome is consistent with a system of preferential treatment focused on accommodating complex and collaborative research. If, however, maintaining significant patent-based disclosure and innovation incentives for all supplementary innovation is a primary policy goal, a modified OPA disclaimer

307. Even then, it is possible for the patentee to change the scope of its claims. *See, e.g.*, 35 U.S.C. § 251 (2018) (providing for reissue of "defective" patents).

308. *See supra* Part II.A, II.C.

309. *See supra* notes 157–159 and accompanying text.

310. But even without additional scope or term, encompassed supplementary patents can have value for original applicants. *See supra* note 198.

system could require a disclaimer of term only for broadening supplementary patents. For encompassed supplementary patents, only ongoing common control and public notice would be required. Preferential treatment would thus offer scope but not term for broadening supplementary innovation, and term but not scope for encompassed supplementary innovation.

The distinctions between broadening and encompassed supplementary applications also suggest other differences in how preferential treatment could be structured. For example, concerns associated with longer supplementation grace periods regarding expanded boundaries and delayed public notice of potential or actual exclusivity are more salient for broadening supplementary applications. If these concerns were of particular policy importance, the supplementation grace period could be extended to issuance only for encompassed supplementary innovation; for broadening supplementary innovation, the end of the grace period could continue to be coupled to pre-grant publication.[311]

No-fault and at-fault supplementary innovation also present distinct considerations. It could be desirable to restrict patents on at-fault supplementary innovation to discourage applicants from using supplementary applications to correct their own avoidable errors in earlier-filed applications. For example, an OPA disclaimer could be rendered ineffective if an original patent applicant were found to be at fault for the post-filing innovation's unpatentability. The original application would therefore be prior art to the supplementary application, making the supplementary application unpatentable. Clear line-drawing between no-fault and at-fault supplementary innovation would be challenging, but as one example, if claims of an original patent were invalidated in litigation for lacking utility, the original patent's disclosure of the subject matter of those claims would be prior art against the supplementary application, notwithstanding any OPA disclaimer. This would discourage applicants from filing original applications too early in reliance on supplementary applications.[312]

CONCLUSION

The difficulty of mapping research and development to the patent system, and the accompanying risk that innovators will render their own work unpatentable, play an important role in shaping innovators' patent strategies.[313]

311. There is precedent for differing time periods for changes to patent rights based on how the changes affect scope. Patents can be reissued when they are "through error, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent." 35 U.S.C. § 251(a) (2018). The reissued claims can be broader than the original ones, but only if the reissue application is filed within two years of the original patent's grant. *See id*. § 251(d).

312. *See supra* notes 175–176 and accompanying text.

313. *See, e.g.*, Charles J. Andres & Richard L. Treanor, *Patents in Drug Discovery: Case Studies, Examples, and Simple Steps Medicinal Chemists Can Take to Protect Hard-Won Intellectual Property*, *in* 45 ANNUAL REPORTS IN MEDICINAL CHEMISTRY 449, 458 (John E. Macor ed., 2010); Maria Souleau, *Legal Aspects of*

Preferential treatment allowing original applicants to patent unpatentable follow-on innovation is one way that the patent system has adapted to this difficulty. Yet the practice of filing supplementary applications,[314] the historical development and scope of preferential treatment for original applicants, and the theory behind it, are mostly overlooked by scholars.[315]

This Article examines these issues and suggests a reform of the statutory framework. The reform would alter only a part of patent law's incredibly complex prior art ecosystem. This Article has addressed other ways that applicants create their own prior art, such as journal publications, presentations at conferences or trade shows, clinical trials, and sales, only in passing, but these, too, play an important role in applicants' strategies for mapping dynamic innovation to the patent system. This Article has also touched only very briefly on international considerations. Innovation and patent strategy often happen on a global scale, so U.S. patent law, while a very significant component, is far from the whole picture. Unilateral changes to U.S. law may ultimately have only limited impact. Despite these limitations, this Article takes an important step toward understanding how dynamic innovation processes are mapped to the patent system and how the treatment of applicants' own prior art affects disclosure and innovation.

Product Protection: What a Medicinal Chemist Should Know About Patent Protection, *in* THE PRACTICE OF MEDICINAL CHEMISTRY 878, 892 (Camille Georges Wermuth ed., 3d ed. 2008); Henry, *supra* note 257; Perkins Coie, *Beware of the CIP—Parent Applications Can Be Prior Art*, JD SUPRA (Aug. 26, 2014), https://www.jdsupra.com/legalnews/beware-of-the-cipparent-applications-ca-63798/.

314. For examples of practitioners recommending it, see Henry, *supra* note 257; Christina Sperry & Inna Dahlin, *Does the AIA Have a Prior Art Exception You Can Use?*, MINTZ (Apr. 21, 2015), https://www.globalipmatters.com/2015/04/21/does-the-aia-have-a-prior-art-exception-you-can-use; *cf.* Perkins Coie, *supra* note 313 (describing a similar strategy for continuation-in-part applications).

315. *See supra* note 18 and accompanying text.

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