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Dynamic Patent Disclosure

*Jeanne C. Fromer**

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INTRODUCTION

Those who tout the role of disclosure as a benefit of the patent system emphasize—as the Supreme Court has—that the information in patents “add[s] to the general store of knowledge [and is] of such importance to the public weal that the Federal Government is willing to pay the high price of . . . exclusive use for its disclosure, which disclosure . . . will stimulate ideas and the eventual development of further significant advances in the art.”¹

As I excavate in this Article, the current state of patent disclosure—which many think is poor and does not achieve its objective of stimulating innovation—is impoverished in part because it occurs so early in the process of innovation, at the time a patent is filed. The law mandates no further disclosures after this point. So much of the

* Professor of Law, New York University School of Law; Co-Director, Engelberg Center on Innovation Law & Policy. For their forward-looking comments, I thank Arnaud Ajdler, Jonas Anderson, Clark Asay, Gaia Bernstein, Jeremy Bock, Dan Burk, Colleen Chien, Christopher Cotropia, Rochelle Dreyfuss, Al Engelberg, Roger Ford, David Jones, Suzanne Michel, Craig Nard, Sean O'Connor, Nicholson Price, Greg Reilly, Sean Seymore, Laura Sheridan, Stephen Yelderman, and participants at the *Vanderbilt Law Review* Symposium on The Disclosure Function of the Patent System and the 2016 Works in Progress in Intellectual Property Colloquium. I thank Doran Satanove for excellent research assistance. I also gratefully acknowledge support from the Filomen D'Agostino and Max E. Greenberg Research Fund.

1. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 481 (1974).

innovation process, from refinement to prototyping to market research to mass production, has yet to occur at the moment of patent filing. Yet the law does not require disclosure of so much of this valuable information related to a patented invention. That is, patent disclosure is early and static. In this Article, I propose requiring more dynamic patent disclosure of important information generated post-patent filing. In particular, I advocate that patentees should be required to divulge all commercialized products they or their licensees make, linking the products to the patents they reasonably think cover those products. This form of dynamic patent disclosure would better effectuate patent law's goal of promoting innovation by revealing helpful technological information, communicating clearer notice of patent scope, and generating useful empirical information to study the effectiveness of the patent system in promoting innovation and commercialization.

Part I introduces the role and state of disclosure in the patent system. Part II proposes that patent law implement at least some forms of dynamic patent disclosure, underscoring the benefits of doing so. Part III addresses and seeks to resolve some of the complications of implementing a form of dynamic patent disclosure, namely, costs, reliability, and spillover effects.

I. STATIC PATENT DISCLOSURE

At its core, American patent law exists to stimulate scientific and technological innovation.² The law seeks to effectuate this goal by granting the reward of time-limited exclusive rights in certain worthy inventions to their creators as an incentive to create in the first place.³ In addition, as the courts have long noted, American patent law seeks to stimulate innovation by requiring patentees to disclose certain information about their inventions. As the U.S. Supreme Court has explained,

[T]he *quid pro quo* [for the patent grant] is disclosure of a process or device in sufficient detail to enable one skilled in the art to practice the invention once the period of the monopoly has expired; and the same precision of disclosure is likewise essential to warn the industry concerned of the precise scope of the monopoly asserted.⁴

2. See U.S. CONST. art. I, § 8, cl. 8 (granting Congress 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”).

3. See, e.g., Jeanne C. Fromer, *Expressive Incentives in Intellectual Property*, 98 VA. L. REV. 1745, 1750–52 (2012); Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 129–30 (2004).

4. *Universal Oil Prods. Co. v. Globe Oil & Refining Co.*, 322 U.S. 471, 484 (1944) (emphasis added).

In furtherance of disclosure, American patent law contains four statutory disclosure requirements. The first structures the content a patentee must present. A patent application must contain a specification describing the invention in writing and concluding with one or more claims “particularly pointing out and distinctly claiming the subject matter which the inventor . . . regards as the invention.”⁵ The other three statutory requirements—written description, enablement, and best mode⁶—are best understood as obliging disclosure of certain content within the specification. The written-description requirement asks the applicant to divulge enough information to indicate that the inventor is in possession of the claimed invention.⁷ To enable the invention, the patent applicant must demonstrate in the specification to “any person skilled in the [relevant] art [how] . . . to make and use the [invention],”⁸ without “undue experimentation.”⁹ Also, the patent applicant must set out “the best mode contemplated by the inventor . . . of carrying out his invention.”¹⁰

As I have explained in previous work on patent disclosure, should disclosure work, it can stimulate further innovation in multiple ways:

First, it permits society at large to apply the information by freely making or using the patented invention after the expiration of the patent. Second, the disclosure can stimulate others to design around the invention or conceive of new inventions—either by improving upon the invention or by being inspired by it—even during the patent term. Otherwise, the patent system would not require disclosure earlier than the expiration of the patent term, as it does here by requiring disclosure at the time of the patent grant, at the latest, and typically much sooner.

. . . As long as there has been innovation, technologists have built upon extant research, whether reinventing—and thereby reimagining—the cart wheel, the bicycle wheel, or the roulette wheel. Disclosure of an invention sets out what others have already accomplished, thereby both revealing information about those discoveries—enabling the avoidance of wasteful duplication of the original inventor’s research—and noting, usually implicitly by omission, what has yet to be done. Patent disclosures act, as one commentator labels it, as an “invisible college of technology.” Use of these disclosures, in turn, speeds the rate of innovation in society, which is central to economic growth.

5. 35 U.S.C. § 112(a)–(b) (2012); *see also id.* § 113 (indicating that applicants can include one or more drawings, if necessary, to elucidate the invention).

6. *Id.* § 112(a).

7. *See Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1349 (Fed. Cir. 2010); *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998).

8. 35 U.S.C. § 112(a).

9. *Monsanto Co. v. Syngenta Seeds, Inc.*, 503 F.3d 1352, 1360 (Fed. Cir. 2007) (citing 35 U.S.C. § 112).

10. 35 U.S.C. § 112(a). Since 2011, when the relevant portions of the America Invents Act went into effect, a failure to disclose the best mode is no longer a basis to invalidate an otherwise valid patent. *See id.* § 282(b)(3)(A). Failure to satisfy the other statutory disclosure requirements is a basis for patent invalidity. *See id.*

... [Disclosure can further lead to the] democratization of innovation: effective disclosure in a patent system should tend to equalize the positions of the initial innovator and potential competitors by granting the latter the information needed to innovate subsequently in the field. Without successful disclosure, the same inventor will be more likely to continue building up on his original invention because he will be the one with the best information to do so. In fact, inventors appear to innovate based only on the information they already have when other information is difficult to acquire. Ineffective disclosure, by extension, can also prolong the patent right beyond its stated expiration because more of the useful information about an invention remains only in the patentee's hands. Innovative rivalry, despite creating some inefficiencies, is more beneficial to society—both economically speaking and as a matter of distributive justice—than a prospecting system that fully concentrates the investment in a technological area in the hands of the initial innovator. History has shown that most technological change comes through the small contributions of ordinary, anonymous workers and tinkerers. That is, more minds are able to effect that much more technological progress—both in quantitative terms and in terms of the breadth of creativity—which benefits both society and a broader set of innovators, including newcomers and those in the developing world.¹¹

These helpful consequences notwithstanding, legal scholars debate whether the statutory disclosure requirements stimulate innovation. Some think that scientists and engineers do in fact turn to patent disclosures to learn helpful technological information.¹² Other scholars—including myself—conclude that the current requirements do not sufficiently effectuate disclosure's goals on the grounds that scientists and engineers do not look frequently enough to patents to acquire technical knowledge. In large part, this is due to multiple substantive aspects of patent law, including that patent law does not demand enough or the right sort of disclosures from patentees, and to patent disclosures not providing information that the public does not already have.¹³ Some nonetheless think that, even in this damaged state, patent disclosures beneficially encourage technical disclosures outside of the patent or can pinpoint for third parties the patentees from

11. Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 548–51 (2009) (internal marks omitted) (citing Carolyn C. Cooper, *Nineteenth-Century American Patent Management as an Invisible College of Technology*, in LEARNING AND TECHNOLOGICAL CHANGE 40, 40 (Russ Thompson ed., 1993)). But see Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401, 402–03 (2010) (proposing that disclosure should be seen as a goal that can conflict with the underlying incentives to invent and commercialize and should be subordinated to those more important goals).

12. See Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 562, 567–70 (2012) (citing, inter alia, Wesley M. Cohen et al., *R&D Spillovers, Patents and the Incentives To Innovate in Japan and the United States*, 31 RES. POL'Y 1349 (2002)).

13. See J. Jonas Anderson, *Secret Inventions*, 26 BERKELEY TECH. L.J. 917, 940–45 (2011); Fromer, *supra* note 11; Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 131–45 (2006); Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 745–49 (2012); Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 657–669 (2010); Katherine J. Strandburg, *Users as Innovators: Implications for Patent Doctrine*, 79 U. COLO. L. REV. 467, 485–88 (2008); Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007 (2005).

whom to seek further technical information through licenses.¹⁴ There has been no shortage of proposals, including some of my own, about how to invigorate patent disclosure at the time of filing and to remove legal disincentives to read patents.¹⁵

Regardless of one's position on the efficacy of patent disclosure, this debate has centered on what ought to be disclosed at the time of patent application and how to review that disclosure's adequacy. Amidst this vibrant discussion, there seems to be implicit agreement on the following fact: whatever disclosure the patent document provides does not extend beyond the moment of patent application.¹⁶ Put another way, the only patent disclosure that is required is for information known to the applicant at the time of patent filing.¹⁷

Yet patent filings—the concluding moment of patent disclosure—tend to occur at the beginning of the process of innovation. In the American (quasi-)first-to-file patent system (and even under the previous first-to-invent system), patent filing can and does happen very early in the timeline of innovation.¹⁸ Patenting is permissible once a

14. See Anderson, *supra* note 13; Jason Rantanen, *Peripheral Disclosure*, 74 U. PITT. L. REV. 1, 16–37 (2012); cf. Christopher A. Cotropia, *Physicalism and Patent Theory*, 69 VAND. L. REV. 1543, 1564–66 (2016) (linking the emphasis on disclosure theory in patent law to the removal of physicalism from the law).

15. See, e.g., Fromer, *supra* note 11, at 563–94 (suggesting that the technical and legal layers in the patent document ought to be teased apart, that indexing of patents ought to be improved, and that patent applicants perhaps ought to disclose three-dimensional models of their inventions); Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1215–22 (2008) (asking for applicants to provide more definitional information); Ouellette, *supra* note 12, at 590–95 (urging for peer review of patent disclosure adequacy); Jason Rantanen, *Patent Law's Disclosure Requirement*, 45 LOY. U. CHI. L.J. 369, 378–81 (2013) (arguing against bifurcating the technical and legal layers of the patent document); Seymore, *supra* note 13 (granting patent examiners the authority to request working examples when patent disclosure appears inadequate).

16. In theory, patent applicants can amend their disclosure after patent filing. They almost never do so because they will almost certainly lose priority on their filing date, or their constructive invention date, for adding new matter to the patent specification. See 35 U.S.C. § 132(a) (2012) (“No amendment shall introduce new matter into the disclosure of the invention.”); *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571–72 (Fed. Cir. 1997) (disallowing a claim of priority to a previous patent application because of a somewhat different patent disclosure); Janet Freilich, *The Uninformed Topography of Patent Scope*, 19 STAN. TECH. L. REV. 150, 171 n.85 (2015) (explaining that patent applicants rarely opt to amend the specification “to broaden the disclosure therein,” because doing so would delay the patent application’s priority date).

17. Cf. *Transco Prods. Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 558 (Fed. Cir. 1994) (“[P]ublic policy does not demand that the public receive a new best mode disclosure in . . . continuing applications. Such a rule would subvert the patent system’s goal of promoting the useful arts through encouraging early disclosure.”).

18. See Christopher A. Cotropia, *The Folly of Early Filing in Patent Law*, 61 HASTINGS L.J. 65, 68–70, 72–81, 93 (2009); Kristen Osenga, *Formerly Manufacturing Entities: Piercing the “Patent Troll” Rhetoric*, 47 CONN. L. REV. 435, 469 (2014); Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 343 (2010).

new, useful, and nonobvious invention has been conceived and reduced to practice.¹⁹ Reduction to practice can be actual, in that “the claimed invention work[s] for its intended purpose,” or constructive, merely by filing a patent application that satisfies the statutory disclosure requirements.²⁰ Constructive reduction to practice means that patent filing can occur well before an actual prototype—let alone a commercialized product—has been made. Legal and marketplace pressures encourage inventors to file for patents at this early juncture. The patent system grants priority to the first to file for a patent on an invention.²¹ This rule encourages inventors to file patent applications expeditiously to avoid being blocked from getting a patent by a competing inventor.²² Moreover, patent law’s statutory bar to filing a patent more than one year after disclosure of one’s invention (among other things)²³ compels inventors to file relatively quickly lest they bar themselves from obtaining a patent. In addition, there are marketplace pressures to rush to patent, in that patent applications and granted patents readily serve as signals to venture capitalists and other funders that the inventions at issue are a worthy business investment.²⁴

Given that patenting tends to happen very early on, it is often only much later that a patented invention makes its way to the marketplace. As Ted Sichelman explains, “[M]any of the twentieth century’s greatest inventions, including the television, radio, radar, and penicillin, were not commercialized until decades after they were

19. See 35 U.S.C. §§ 101–103 (novelty, utility, and nonobvious subject matter requirements); *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67–68 (1998) (indicating that an invention is “ready for patenting” when there is “reduction to practice . . . or . . . the inventor had prepared drawings or other descriptions of the invention that were sufficiently specific to enable a person skilled in the art to practice the invention”); *Solvay S.A. v. Honeywell Int’l Inc.*, 742 F.3d 998, 1000 (Fed. Cir. 2014) (“Making the invention requires conception and reduction to practice.”).

20. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986).

21. See 35 U.S.C. § 102.

22. See David S. Abrams & R. Polk Wagner, *Poisoning the Next Apple? The America Invents Act and Individual Inventors*, 65 STAN. L. REV. 517, 528–29 (2013) (highlighting how a first-to-file system gives inventors a “need to ‘rush’ to the door of the patent office”). Even under the first-to-invent system the United States long had until recently, there was heightened pressure in patent law to move quickly to patent—for example, between competing claims to have been first to invent, the first patent filer would get a presumption of first invention. See 35 U.S.C. § 102(g). In addition, other pressures that continue to exist in the patent system, such as statutory bars, likely pushed inventors to file promptly in the previous first-to-invent system. See *infra* text accompanying note 23.

23. See 35 U.S.C. § 102(a).

24. See Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625 (2002); Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1 (2005). But see Ted Sichelman, *Commercializing Information with Intellectual Property*, 92 TEX. L. REV. 35, 39 (2014) (citing Riitta Katila et al., *Swimming with Sharks: Technology Ventures, Defense Mechanisms and Corporate Relationships*, 53 ADMIN. SCI. Q. 295, 316 (2008)).

invented.”²⁵ Even when the innovation timeline is more compressed, so much happens between invention and commercialization: refinement of and changes to an invention, prototype development, integration with industrial design, development for cost constraints, market testing, marketing, distribution, and further refinements over time in response to customer feedback.²⁶ During this development process—which is typically post-patent filing—so much new information is typically generated, information which will not be contained within the patent disclosure. This information about refinements, development, commercialization, and markets is bound up with the invention.

The reasons outlined above as to how disclosure can helpfully generate further innovation apply just as much to this information, especially as this information helps complete the fragmented informational picture contained in a patent.²⁷ Numerous scholars have recognized as much in other contexts. Pertinently, Michael Abramowicz and John Duffy propose a new intellectual property right to encourage the production of valuable information about products’ consumer demand and market feasibility.²⁸ Peter Lee discusses the important tacit knowledge that patentees can transfer over long-term relationships with other interested parties.²⁹ Mark Lemley and Robin Feldman express skepticism that patent holders are effectuating sufficient license-enabled technology transfer to provide third parties with otherwise unavailable information beyond what is contained in the patent document.³⁰ And Ted Sichelman writes on the importance of encouraging investment in the involved journey from utility patent to commercialization.³¹

This valuable post-invention information tends to be missing from the patent disclosure.³² In this Article, I will not go so far as to

25. Sichelman, *supra* note 18, at 343 (citing Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 272 (1977)).

26. *See id.* at 347–54; accord Cotropia, *supra* note 18, at 101 (“After an inventor files early, she gains more information about her invention.”).

27. *See supra* text accompanying note 11.

28. *See* Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L. REV. 337 (2008).

29. Peter Lee, *Transcending the Tacit Dimension: Patents, Relationships, and Organizational Integration in Technology Transfer*, 100 CALIF. L. REV. 1503 (2012).

30. Mark A. Lemley & Robin Feldman, Patent Licensing, Technology Transfer, and Innovation (Feb. 26, 2016) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2738819 [<https://perma.cc/SK94-FXFW>].

31. Sichelman, *supra* note 18.

32. While it is important to recognize that there can be chains of patents that build on one another, which in theory can lead to post-filing patent disclosures in follow-on patent applications, these follow-on applications are frequently continuation or divisional applications, which provide

propose that patent law ought to require that patentees disclose all of this information post-filing. There are some good reasons for such a requirement (principally, the utility of the public having this information) and some good reasons against it (such as the difficulty of enforcing whether a patentee has complied with such a muscular requirement and the costs of such disclosure on patentees).³³

Instead, I turn now to Part II, wherein I propose a more modest version of post-filing—or dynamic—patent disclosure.

II. DISCLOSING PATENT COMMERCIALIZATIONS

In this Part, I propose a form of dynamic patent disclosure: that patentees be required to divulge all inventions commercialized by the patentee or a licensee of the patentee. After discussing this proposal, I enumerate the three principal innovation-spurring benefits of this dynamic patent disclosure: invigorated disclosure, improved notice of patent scope, and improved information on the relationship between patents and commercialization.

The proposal is straightforward. 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 ("PTO") on the existence of the commercialized product and its coverage by the relevant patents.³⁴ The PTO would make this information available to the public, linking it directly to the relevant patents.

There are many benefits to this form of post-filing disclosure of patented commercializations. First and foremost, divulging this information would share more useful innovation information, underscoring the reasons for patent disclosure discussed in Part I. By virtue of the disclosed product having been commercialized, of course, some information about the product—including the product itself—is

no new patent disclosure in the specification. *See, e.g.*, 35 U.S.C. §§ 111(a), 120–121 (2015); 37 C.F.R. § 1.53(c)–(d) (2015).

33. In addition, it is likely that some of this valuable information gets disclosed post-filing outside of the patent document. *See* Colleen Chien, *Rethinking Patent Disclosure*, 69 VAND. L. REV. 1849, 1866–72 (2016); Rantanen, *supra* note 14, at 21–37.

34. This proposal would comprise subjective and objective impositions on patentees. The obligation would arise whenever a patentee thinks a commercialized product is covered by a patent or should think it is. Another way to see this obligation is that it arises whenever the patentee could plausibly sue an unauthorized producer or seller of the product for patent infringement. Additionally, this disclosure requirement also ought to apply to patented methods when use of a commercially released product would carry out that method in full or substantially. The proposal would need to refine, as well, which versions of preexisting products would be covered by preexisting dynamic disclosure and which would require new disclosure.

already publicly available. However, linking that information to a product's associated patent or patents would be beneficial. Not everyone is aware of particular commercializations, let alone their link to particular patents. This dynamic disclosure would alert those who are, or are likely to become, aware of a patent, but not of its associated commercializations. Once this information is bundled together with the static patent disclosure, it should help shed light on that earlier patent disclosure itself by giving a concrete instantiation to understand the contribution of the patented invention.³⁵ That is, a tangible example of a patented invention is often absent from the prose and drawings in the current patent disclosure.³⁶ Third parties can capitalize on the dynamic disclosure by buying the disclosed products, using them, and perhaps deconstructing them to learn how they work, better allowing them to understand the patent's contribution.³⁷ This dynamic disclosure would thus help improve the disclosure function of the patent system, all in the name of stimulating further innovation.

Relatedly, this dynamic disclosure would give a better sense of the scope of patent claims. As I explain in prior work on claiming intellectual property, providing tangible examples of what is protected intangibly, in the form of an intellectual property right, can be helpful. These examples can provide more effective notice of the extent of the right than do the patent's peripheral claims—typically listing characteristics shared by all embodiments of the invention.³⁸ These commercialized exemplars would provide a concrete way to better understand and contextualize what the typically too-abstract patent claim language³⁹ is doing. This then would help provide better

35. Cf. Fromer, *supra* note 11, at 574–79 (advocating that disclosure be invigorated by requiring patentees to contribute a computer simulation of their invention and describe the best exemplar of their invention); Seymore, *supra* note 13, at 641 (justifying a working example requirement in patent disclosure with the observation that “[i]t is axiomatic that the best way to teach a technical subject is with real examples”).

36. See *supra* Part I.

37. See Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 92 (“Experimentation is a primary path toward technological and scientific progress. When patents restrict experimentation, the tension between incentives for initial invention and the progress that comes from building upon the available store of knowledge is palpable.”); cf. Strandburg, *supra* note 13, at 478 (describing the phenomenon of user innovation—“innovation motivated by an intention to use, rather than sell, an innovative technology”—that stems from using and modifying products released by others, and the implications for patent law).

38. Jeanne C. Fromer, *Claiming Intellectual Property*, 76 U. CHI. L. REV. 719, 761–67 (2009) (challenging the traditional view that peripheral claims provide the public with better content notice).

39. See Fromer, *supra* note 11, at 568 (“Because the patentee’s legal goal is to maximize patent protection, the specification—much like the claims—will often contain broad or ambiguous phrasings to maximize the probability of extensive patent protection in the face of ever-changing

constructive notice of patent rights. Better notice is critical because it lets the public know what is outside the scope of a patent's claims that it can use freely and what falls within claim scope, for which a license from the patent holder is necessary.⁴⁰ This in turn would help third parties avoid patent infringement, resulting in less litigation and associated costs, which can direct yet more resources toward innovation.

Both of these consequences of dynamic disclosure—invigorated disclosure and clearer notice of claim scope—come from putting a burden of disclosure on the patentee. As much as this burden comes at some increased cost to patentees, it is likely not overwhelmingly significant, as a patentee can readily assess which products it or a licensee has commercialized and whether these products plausibly fall within the scope of its patent claims.⁴¹ Right now, absent this dynamic disclosure requirement, the burden of linking patents to a patentee's or licensee's products falls, perhaps too heavily, on third parties. As between patentees and third parties, patentees more readily possess or can assess this information and therefore ought to bear the cost of this disclosure for the public benefit.⁴²

This understanding is consistent with American patent law's recognition, in some contexts, of the valuable information that patentees more readily possess than third parties about the implementation of their patented inventions and the linkage of those implementations to their patents. A prominent context in which patent law imposes disclosure requirements on patentees, likely for this reason, is with regard to process patents. The Process Patent Amendments Act of 1988 extended infringement liability to the sale or use within the United States (or importation into the United States) of products made by a patented process.⁴³ Congress worried that it would be too easy to sue recipients of a product made by a patented process, especially because possession of it implies no knowledge about the

technological conditions, further confusing the technical expert eager to understand the invention.”).

40. See Fromer, *supra* note 38, at 761 (“Clear content notice to the public . . . is valuable so that the public can avoid improper use . . .”).

41. I consider the costs of implementing this form of dynamic patent disclosure in more detail below in Section III.A.

42. Cf. Tun-Jen Chiang, *The Reciprocity of Search*, 66 VAND. L. REV. 1 (2013) (arguing that the cost of searching in patent law should be placed on the party with the lower cost of that search, be it a patentee seeking out producers or a producer looking for patentees).

43. See 35 U.S.C. § 271(g) (2010). See generally David L. Hitchcock & Craig Allen Nard, *The Process Patents Amendments Act: The Labyrinth*, 3 FORDHAM ENT. MEDIA & INTELL. PROP. L.F. 441 (1993) (describing the impetus for and the details of this complex legislation).

process used to make the product.⁴⁴ It therefore required notice of infringement to be sent by patentees to parties likely to be unaware of the manufacturing process before filing suit, as a prerequisite to obtaining infringement remedies.⁴⁵

Moreover, this understanding of dynamic disclosure's benefits and who ought to bear its burden is similar to the reasons for patent marking. As per statute, patent law encourages patentees to mark their patented products with the associated patent numbers, either on the products themselves or virtually by marking the product with a website on which these patent numbers are provided.⁴⁶ The law encourages patentees to comply with patent marking as a prerequisite to recovering infringement damages, by characterizing it as a way to provide third parties with notice—constructively—of patent infringement.⁴⁷ The U.S. Court of Appeals for the Federal Circuit understands the marking provision to “serve[] three related purposes: (1) helping to avoid innocent infringement, (2) encouraging patentees to give notice to the public that the article is patented, and (3) aiding the public to identify whether an article is patented.”⁴⁸ As such, patent marking provides to third parties information linking patents and their commercialized instantiations, but only if they already know of the marked commercialized products, not if they start with mere knowledge of a patent.⁴⁹ For all of the reasons discussed heretofore, the law ought to provide this linkage, whether a third party starts with knowledge of a commercialized product or of a patent, by providing both an index and reverse index of patents linked with their commercializations.⁵⁰ That is,

44. See Hitchcock & Nard, *supra* note 43, at 468 (“These notice provisions reflect the sensitivity of Congress to the plight of innocent purchasers of goods under the Act.”).

45. See 35 U.S.C. § 287(b); Hitchcock & Nard, *supra* note 43, at 468.

46. See 35 U.S.C. § 287(a).

47. See *id.* (stating that absent marking, patentees can provide actual notice of patent infringement to particular third parties in order to recover infringement damages if they had products to mark but did not do so).

48. Nike, Inc. v. Wal-Mart Stores, Inc., 138 F.3d 1437, 1443 (Fed. Cir. 1998) (internal citations omitted); accord U.S. PATENT & TRADEMARK OFFICE, REPORT ON VIRTUAL MARKING 4–5 (2014), http://www.uspto.gov/sites/default/files/aia_implementation/VMreport.pdf [<https://perma.cc/M9H8-PLGA>]; Michael J. McKeon, *The Patent Marking and Notice Statute: A Question of “Fact” or “Act”?*, 9 HARV. J.L. & TECH. 429, 434–35 (1996); Preston Moore & Jackie Nakamura, *The United States Patent Marking and Notice Statute*, 22 AIPLA Q.J. 85, 87 (1994); Jessica S. Siegel, Comment, *The Patent Marking & Notice Statute: Invitation To Infringe or Protection for the Unwary?*, 36 HOUS. L. REV. 583, 586–87 (1999).

49. See Fromer, *supra* note 38, at 778–79, 779 n.317; Jeanne C. Fromer, *Expressive Incentives in Intellectual Property*, 98 VA. L. REV. 1745, 1793 n.282 (2012); accord U.S. PATENT & TRADEMARK OFFICE, *supra* note 48, at 17–18.

50. Cf. Christina Mulligan & Timothy B. Lee, *Scaling the Patent System*, 68 N.Y.U. ANN. SURV. AM. L. 289, 307 (2012) (observing that the information-technology industry generally ignores patents because “firms have no cost-effective way of obtaining a complete list of relevant patents

whereas patent law already encourages the marking of products with patents, it ought to also require the marking of patents with products.⁵¹

Like dynamic patent disclosure, virtual marking—which recently debuted in the America Invents Act of 2011⁵²—suggests an appreciation for the ever-changing state of innovation information. As Corey McCaffrey observes as a justification for virtual marking:

The rationale for virtual marking is that patenting an invention and manufacturing a product are distinct processes. Patents are dynamic: new patents are granted, existing patents expire, and a patent's scope may change during its lifetime. Manufacturing, on the other hand, is typically static: manufacturing equipment is expensive to change, and individual products are not modified after production. Traditional patent marking entangles these different processes by requiring patent numbers to be labeled on physical products.⁵³

Virtual marking solves this disconnect by allowing patentees to place their ever-changing roster of enforceable patents linked to particular products on a website, whose content can be modified easily, without having to (expensively) change the manufacture of those products, marked as they are already with the unchanging website address.⁵⁴

The dynamic patent disclosure proposed here is also similar to the disclosure offered in the Orange Book's compilation of patents on drugs approved by the FDA for safety and effectiveness.⁵⁵ The Orange Book contains a list of small-molecule drug products that have been approved by the FDA post-1938 for both safety and effectiveness.⁵⁶ For

in the first place"); Corey McCaffrey, Note, *The Virtues of Virtual Marking in Patent Reform*, 105 NW. U. L. REV. 367, 384–400 (2011) (proposing a public virtual marking registry to collect all patent markings on a single website in a standardized format). There are recognized worries of false marking, which patent law tries to discourage. I discuss false marking and the analogues for dynamic patent disclosure below in Section III.B.

51. One easy way to implement both forms of marking would be to require all virtual, or perhaps even physical, markers to submit that information to the PTO so they collect that information there (and possibly also to require all virtual markers to use a standard metatag so that all of the virtual markings online can easily be collected).

52. U.S. PATENT & TRADEMARK OFFICE, *supra* note 48, at 1–2.

53. McCaffrey, *supra* note 50, at 375.

54. *See id.* at 376; accord U.S. PATENT & TRADEMARK OFFICE, *supra* note 48, at 16–17. Nonetheless, there are some pertinent deficiencies to virtual marking, as implemented. The PTO has analyzed several virtual marking webpages and found that all webpages listed *all* patented products produced or sold by the company responsible for the webpage, with *no* single webpage indicating a specific model or product type with which a patent was associated. *See* U.S. PATENT & TRADEMARK OFFICE, *supra* note 48, at 21. This situation suggests that patentees can undercut virtual marking's purpose to provide constructive notice about their specific products, by burying the specific information for which the public might be looking in a sea of patent numbers. *See id.* at 23.

55. The "Orange Book" is the colloquial name for the FDA's publication, *Approved Drug Products with Therapeutic Equivalence Evaluations*. FOOD & DRUG ADMIN., APPROVED DRUG PRODUCTS WITH THERAPEUTIC EQUIVALENCE EVALUATIONS (36th ed. 2016), <http://www.fda.gov/downloads/Drugs/DevelopmentApprovalProcess/UCM071436.pdf> [<https://perma.cc/P5J6-62VK>].

56. *See id.* at iv.

each listed drug is the list of patents that cover that drug.⁵⁷ Although the Orange Book serves as a reference for healthcare providers and pharmacies to ascertain safety and effectiveness data for branded drugs and their generic equivalents, it is thereby also a source of pertinent patent information for pharmaceutical companies.⁵⁸ Generic pharmaceutical companies, in particular, review the Orange Book to identify drugs eligible for generic production, to determine whether their generic version of the drug will infringe any listed patents, and to acquire necessary patent information for their applications that they submit to the FDA for approval of generic drug products.⁵⁹

Generic manufacturers can search the Orange Book for patents and see their associated commercialized drugs. The Orange Book thus gives generic manufacturers a better understanding of patent disclosures and patent scope by linking them to their associated commercialized drugs. Even though rarely discussed as such, this consequence is baked into the purpose of the Hatch-Waxman Act of 1984, which sought to make low-cost generic drugs more readily available by making it easier for drugs bioequivalent to branded drugs to be approved to enter the market.⁶⁰ The listing of all patents relevant to the pioneer drug in the Orange Book expedites the FDA application process by allowing the generic drug company to find the necessary patent information for effective approval of its application to the FDA.⁶¹ Specifically, the Orange Book enables generic drug manufacturers to facilitate expedited FDA application by linking patents to their commercialized drugs.⁶²

57. See 21 C.F.R. § 314.53 (2014). There are three types of patents that cover a drug: patents that claim the drug substance (the active ingredient), patents that claim the drug product (the active ingredient in combination with inactive ingredients), and patents that claim methods of use. See *id.* § 314.53(b)(1). Absent from the addendum are patents that claim off-label methods of use, drug packaging, processing, metabolites, or intermediates of the listed drugs. See *id.*

58. Jane F. Djung, Note, *Insufficient Mechanisms for Orange Book Corrections and the FDA's Ministerial Role: A Need for Reform*, 47 CONN. L. REV. 229, 241 (2014) (explaining that the Orange Book serves as a "source of use codes and patent term information").

59. See *id.* at 242.

60. See H.R. REP. NO. 98-857, pt. 1, at 14 (1984) ("The purpose of the bill is to make available more low cost generic drugs by establishing a generic drug approval procedure for pioneer drugs first approved after 1962."). In furtherance of this goal, the Act allows generic manufacturers to gain approval of their drugs by submitting an abbreviated application to the FDA. See 21 U.S.C. § 355(j) (2012).

61. See 21 U.S.C. § 355(j)(2)(A)(vii)(i)-(iv).

62. As Benjamin Liu elaborates, a registry like the Orange Book is the foundation of an effective patent linkage system and serves three important goals: it provides notice to generic drug companies to invent around or otherwise challenge a known patent and can therefore promote earlier dispute resolution and avoid unnecessary patent litigation; it can benefit innovators by creating an automatic barrier to generic manufacturers' entry for a set period of time and improve transparency between companies; and it is cost-effective for drug regulators because it shifts the

In fact, Mark Lemley suggests that the pharmaceutical industry does not ignore patents like other industries do *because* the Orange Book addendum makes them easy to find, especially because pharmaceutical patent holders “identify all the patents they have covering a drug.”⁶³ Or, as Timothy Holbrook observes, patents are not fully serving their public notice function in the context of pharmaceuticals; if they were, the Orange Book would not be as good at providing notice as it is.⁶⁴ The Orange Book is so useful that biologics manufacturers have fought, thus far successfully, to exclude patent listings of covered biologics from the FDA’s comparable Purple Book⁶⁵ as a way to shield their trade secrets (while scholars favoring notice and disclosure advocate otherwise).⁶⁶ Because it would be fruitful for the other industries in which patenting takes place to garner these patent disclosure and notice benefits, there ought to be an Orange Book not just for small-molecule drugs, but an Orange Book for everything. (Or perhaps a Rainbow Book?)⁶⁷

responsibility to the patentee of determining whether a generic drug infringes the patentee’s patents, and also rewards generic companies that invent around patented drugs and expose weak or inaccurate patents. See Benjamin P. Liu, *Fighting Poison with Poison? The Chinese Experience with Pharmaceutical Patent Linkage*, 11 J. MARSHALL REV. INTELL. PROP. L. 623, 665–68 (2012).

63. Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 29–30; accord Lorie Graham & Stephen McJohn, *Thirty-Two Short Stories About Intellectual Property*, 3 HASTINGS SCI. & TECH. L.J. 1, 29–30 (2011). This is not to say that the Orange Book discloses all useful patent information for small-molecule drugs. For one thing, the law does not require the divulging of process patents related to these drugs. 21 U.S.C. § 355(b)(1) (2012); 21 C.F.R. § 314.53(b) (2016).

64. Holbrook, *supra* note 13, at 141–42.

65. See FOOD & DRUG ADMIN., BACKGROUND INFORMATION: LISTS OF LICENSED BIOLOGICAL PRODUCTS WITH REFERENCE PRODUCT EXCLUSIVITY AND BIOSIMILARITY OR INTERCHANGEABILITY EVALUATIONS (PURPLE BOOK), <http://www.fda.gov/Drugs/DevelopmentApprovalProcess/HowDrugsareDevelopedandApproved/ApprovalApplications/TherapeuticBiologicApplications/Bio-similars/ucm411424.htm> (last visited June 5, 2016) [<https://perma.cc/LXF7-QDV7>] (listing biological products, including any biosimilar and interchangeable biological products, licensed by the FDA under the Public Health Service Act).

66. W. Nicholson Price II & Arti K. Rai, *Manufacturing Barriers to Biologics Competition and Innovation*, 101 IOWA L. REV. 1023 (2016) (advocating that manufacturing information for large-molecule biologics be disclosed to counter what are otherwise heavily guarded trade secrets); see also Candice Decaire; John McDonald, Cynthia Rothschild, Kathryn Wade & Alyson Wooten, *Negotiating a New Legal Landscape: The Advent of Follow-On Biologics*, 46 U.S.F. L. REV. 1029, 1053–55, 1069–70 (2012); Charles Davis, Note, *Take Two and Call Congress in the Morning: How the Biologics Price Competition and Innovation Act May Fail To Prevent Systemic Abuses in the Follow-On Biologics Approval Process*, 81 GEO. WASH. L. REV. 1255, 1279–92 (2013).

67. One other similarity is to the Bayh-Dole Act’s requirement that contractors receiving federal funds report their inventions to the funding agency within a reasonable time, and should they elect to retain their rights in the invention, file for patent rights thereon, to which the agency gets a license. 35 U.S.C. § 202(c) (2012); see also John H. Raubitschek, *Responsibilities Under the Bayh-Dole Act*, 87 J. PAT. & TRADEMARK OFF. SOC’Y 311, 313–14 (2005) (explaining the requirements of contractors and grantees under the Bayh-Dole Act).

Having considered improved disclosure and notice, two important benefits of this dynamic form of patent disclosure, consider a last important advantage. By establishing this system of dynamic disclosure, we would be better able to study empirically the relationship between patents and commercialization. As many scholars have noted, there is a great need for reliable data to answer many fundamental questions underpinning the patent system, to get at how the patent system encourages innovation (if at all).⁶⁸ The data in the proposed dynamic patent disclosure would shed important light on a number of important questions concerning patent law's effect on innovation and how to structure patent law. First, the data would speak to which classes of patents (or even individual patents) yield commercialized products. We would then be better equipped to evaluate whether the law ought to provide encouragement beyond utility patents to commercialize, at least in undercommercialized sectors,⁶⁹ or conversely, whether there are too many worthless patents issued.⁷⁰ Second, the data would shed light on how many patents are associated with any particular commercialized product. Currently, there is some uncertainty about how many patents cover particular products, like smartphones.⁷¹ Having a better sense of the relationship between patents and commercialized products is important to understanding,

68. *E.g.*, John M. Golden, Robert P. Merges & Pamela Samuelson, *The Path of IP Studies: Growth, Diversification, and Hope*, 92 TEX. L. REV. 1757, 1759 (2014) (expressing a hope of “ever greater commitment to more systematic and sophisticated studies of intellectual property’s normative justifications, empirical context, and actual and potential practical performance”). Empirical scholarship uses different methodologies, including social-science experiments and statistical studies of natural data, to start answering important questions about innovation policy. *See, e.g.*, David S. Abrams & R. Polk Wagner, *Poisoning the Next Apple? The America Invents Act and Individual Inventors*, 65 STAN. L. REV. 517, 517–18 (2013) (predicting from a study of natural data in the United States and Canada that recent changes to American patent law will negatively affect individual inventors); Christopher Buccafusco, Zachary C. Burns, Jeanne C. Fromer & Christopher Jon Sprigman, *Experimental Tests of Intellectual Property Laws’ Creativity Thresholds*, 92 TEX. L. REV. 1921, 1946–72 (2014) (reporting four original experiments designed to measure the effects of different thresholds, much like intellectual property laws’, on creativity); C. Scott Hemphill & Bhaven N. Sampat, *When Do Generics Challenge Drug Patents?*, 8 J. EMPIRICAL L. STUD. 613, 613 (2011) (applying econometric techniques to study the effects of brand-name drug sales on the likelihood of generic drug companies’ patent challenges); Mark A. Lemley, Su Li & Jennifer M. Urban, *Does Familiarity Breed Contempt Among Judges Deciding Patent Cases?*, 66 STAN. L. REV. 1121, 1121 (2014) (studying the statistical relationship between district court judges’ experience and patent case outcomes, and finding that more experienced judges are less likely to rule for the patentee).

69. *See supra* text accompanying notes 28, 31.

70. *See, e.g.*, Roger Allan Ford, *The Patent Spiral*, 164 U. PA. L. REV. 827, 832 (2016) (arguing that examiners are increasingly granting low-quality and invalid patents).

71. *See, e.g.*, Joel R. Reidenberg, N. Cameron Russell, Maxim Price & Anand Mohan, *Patents and Small Participants in the Smartphone Industry*, 18 STAN. TECH. L. REV. 375, 382 tbl.2 & n.23 (2015) (estimating the number of patents relevant to smartphones).

for example, whether there are patent thickets—“dense web[s] of overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology,” in the words of Carl Shapiro⁷²—that ought to affect substantive patent law⁷³ and apportionment of patent infringement damages for a subcomponent in a larger product.⁷⁴ Third, we might learn more systematically how long it takes for commercialization to happen for patents or classes of patents, better informing the details of the timeline of innovation in ways that might affect, for example, patent duration.⁷⁵ Fourth, we would learn the number of different manufacturers per patent, lending insight into questions on exclusive and non-exclusive licensing.⁷⁶ Finally, the data would give a more accurate sense than currently exists on which patent holders are non-practicing entities or patent assertion entities, to help analyze these entities’ common characteristics and how patent law ought to treat them.⁷⁷ Furthermore, it would provide a way to mark off these entities in a more precise way than is done currently, as a way to target patent law reforms concerning them.⁷⁸ These are a sampling of some of the important issues that this dynamic disclosure can help elucidate. It is ever important to start collecting and collating important data like the links between patents and commercialized

72. Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 119, 120 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001).

73. See, e.g., Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1614 (2003) (arguing that patents should be narrowed to avoid the overlap between existing rights).

74. See, e.g., Elizabeth M. Bailey, Gregory K. Leonard & Mario A. Lopez, *Making Sense of “Apportionment” in Patent Damages*, 12 COLUM. SCI. & TECH. L. REV. 255, 256 (2011) (explaining how smaller damages may be calculated with reference to an apportioned value of a product “attributable” to a patented technology rather than the overall value of the product).

75. See, e.g., Mark A. Lemley, *An Empirical Study of the Twenty-Year Patent Term*, 22 AIPLA Q.J. 369, 371–72 (1994) (evaluating through data the likely effects of the new twenty-year patent term law).

76. See, e.g., Ian Ayres & Lisa Larrimore Ouellette, *Ex Ante March-In Rights: A Market Test for Bayh-Dole Patents*, 102 CORNELL L. REV. (forthcoming 2016) (explaining that it is difficult to determine whether exclusive patents encourage commercialization); Robin Feldman & Mark A. Lemley, *Do Patent Licensing Demands Mean Innovation?*, 101 IOWA L. REV. 137, 174–75 (2015) (arguing that commercialization under nonexclusive licenses undermines the logic of the Bayh-Dole Act).

77. See, e.g., Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 612 (2008) (explaining that comparing universities to “patent trolls” helps determine what distinguishes universities from trolls).

78. Cf., e.g., Greg Reilly, *Linking Patent Reform and Civil Litigation Reform*, 47 LOY. U. CHI. L.J. 179, 201 (2015) (“Arguably, merits-related reforms, such as the heightened pleading requirements and loser pays fee shifting of the current patent reform proposals, are better situated to address concerns with bottom feeder trolls. This is because these reforms more precisely target weak claims, thus minimizing the spillover effects that reforms have on stronger claims.”).

products so patent law can be reconfigured, if necessary, to optimize valuable innovation, rather than undercut it or encourage innovation suboptimally.

With the proposal and benefits of dynamic disclosure discussed, I now turn to some complications that must be addressed in implementing a system of dynamic patent disclosure.

III. COMPLICATIONS

In this Part, I consider, in turn, three categories of complications—costs, reliability, and spillover effects elsewhere in patent law—that might arise from implementing a form of dynamic patent disclosure that requires patentees to disclose the commercialized products that they and their licensees release, linking them to the patents they reasonably think cover them.

A. Costs

While Part II primarily considered the benefits of implementing a form of dynamic patent disclosure,⁷⁹ it is also essential to analyze its costs. In the previous Part, I note that if the burden of this disclosure is not allocated to patentees, it is assigned by default instead to third parties, which is relatively more costly.⁸⁰ That ought to be justification enough to allocate any increased cost of dynamic patent disclosure to the patentee, as explained previously. Moreover, if the legal requirement is structured well, dynamic patent disclosure as proposed here is an issue that patentees, licensees, and third parties could support. If it improves disclosure and (constructive and actual) notice, third parties will favor it. Patentees and licensees already marking their products should not be opposed to this change, because they have already determined the information they would need to provide, so the cost would be minimal to them. Other patentees, like those biologics manufacturers seeking to prevent required disclosure, might object so as to preserve more secrecy or out of a desire to surprise third parties with infringement claims.⁸¹ A patentee not marking its products might also complain about the costs of construing its patent claims to see which of its and its licensees' products are covered by its patents.

79. *But see supra* text accompanying notes 41–43 (outlining why the burden of this dynamic disclosure should fall on patentees rather than third parties).

80. *See id.*

81. *See supra* text accompanying notes 65–66 (mentioning the situation of biologics manufacturers).

One might reject these concerns of costs to the patentee—particularly maintaining trade secrecy and surprise—as being illegitimate ones to consider. However, the costs—particularly of discerning claim coverage—can be significant. For instance, when a patentee issues non-exclusive licenses to many others for multiple patents, the patentee has to supervise, in some way, what the licensees are doing.⁸² As another example, some products—like software⁸³ or smartphones⁸⁴—map onto a very large number of patents, so the patentee will have much more work to do to discern which patents need further dynamic disclosure, as compared with patentees whose products map onto a small number of patents, as in the pharmaceutical industry.⁸⁵ As a last example, and perhaps most poignantly, in some areas patent claim boundaries are clearer than in others, which might make it disproportionately costly in some contexts to discern whether a patentee's or licensee's product is in fact covered by a patent claim.⁸⁶

If these costs are sufficiently large relative to the benefits of dynamic disclosure, there are two possibilities for implementation beyond assigning these costs to the patentee. First, the law might require dynamic disclosure but offset its costs with benefits to the patentee. One possibility would be more widespread constructive notice of patent rights and infringement.⁸⁷ A second, softer possibility is to encourage rather than require dynamic patent disclosure with incentives to the patentee. Just as patent marking is not technically required, but patentees cannot easily recover damages otherwise before actually notifying an infringer, so too might patentees be encouraged to provide dynamic disclosure.

Incentives that confer constructive notice, or for that matter enhanced damages, will help encourage patentees that sue, or might plausibly sue, others to disclose commercialized products linked to their

82. In response, the law could place the burden of disclosure on the licensee, but it probably rests more efficiently with the patentee as between the two parties.

83. *E.g.*, Robert P. Merges, *Software and Patent Scope: A Report from the Middle Innings*, 85 TEX. L. REV. 1627, 1630 (2007) (explaining that the software industry involves many narrow patents).

84. *See supra* text accompanying note 71.

85. *E.g.*, Engy Elrefaie, Note, *Injunctive Relief Post eBay and the Various Applications of the Four-Factor Test in Differing Technological Industries*, 2 HASTINGS SCI. & TECH. L.J. 219, 239 (2010) (explaining that pharmaceutical patents often consist of one component).

86. Of course, in response, one might reiterate that patentees (and even licensees) are better able to bear this cost than unrelated third parties. And if patentees cannot discern which of its own patents cover its own or licensed products, then how would it be reasonable to expect third parties to determine if their products are covered by these patents and make them liable for patent infringement?

87. *See supra* text accompanying notes 46–50 (discussing constructive notice in the context of patent marking).

patents. What incentives might be offered to companies that seek patents and commercialize products, yet do not typically assert their patents against others?⁸⁸ These companies might find incentive enough in the offsetting benefits they would get from dynamic patent disclosure. Specifically, third parties can and do assert their patents against these companies. They thus need to manage their risk and be vigilant as to which patents might potentially be asserted against them. Systemic dynamic patent disclosure would give them a better sense of those patents than they currently get by making it easier for them to locate those that cover products in a similar product space to their own products.

In sum, there are costs to dynamic patent disclosure that ought to be considered. That said, they either are negligible, ought to be placed on patentees, or can be offset by conferring benefits on patentees that bear these costs.

B. Reliability

In addition to cost, dynamic patent disclosure needs to be reliably accurate to confer its benefits. If there were no consequence for doing so, some patentees might link commercialized products to a subset of their patents that do not cover those products or fail to so link when the patents do cover those products. They might do so to mislead third parties that their patents reach more broadly than they do, while seeming to comply with dynamic disclosure, or because they do not want to bear the cost of actually investigating and narrowing down which of their patents link up to which of their commercialized products. In doing so, they can unfairly stifle competition or harm the path of innovation, particularly by preventing others from marketing unpatented products.⁸⁹

Since 1842, patent law has been addressing an analogue of this concern with regard to the false marking of products with patent numbers, due to similar motivations by patentees.⁹⁰ Currently, the

88. This situation tends to obtain in the high-technology sector. See generally Colleen V. Chien, *From Arms Race to Marketplace: The New Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297 (2010) (arguing that high-technology companies frequently get patents to guard against patent litigation by competitors).

89. Cf. *Forest Grp., Inc. v. Bon Tool Co.*, 590 F.3d 1295, 1302–03 (Fed. Cir. 2009) (asserting similar negative consequences of false patent marking); Steve Williams & Jane Du, *Successfully Defending Against False Marking Claims*, 9 NW. J. TECH. & INTELL. PROP. 10, 11–12 (2010) (same).

90. E.g., Mark H. Anania & Carissa L. Rodrigue, *Combating the Rise of False Marking Trolls*, INTELL. PROP. & TECH. L.J., Sept. 2011, at 3, 3 (describing plaintiffs who experience no harm but bring false patent marking cases as “false marking trolls”); Kevin Zickterman, Comment, *Pa-Trolling’ the False Marking Frontier: Giving Section 292 the Proper Makeover in Wake of the*

statute provides that “[w]hoever marks upon, or affixes to, or uses in advertising in connection with any unpatented article, the word ‘patent’ or any word or number importing that the same is patented, for the purpose of deceiving the public” can be liable for false marking.⁹¹ Either the U.S. government can sue to fine the violator for up to \$500, or “[a] person who has suffered a competitive injury as a result of a violation of this section may file a civil action in a district court of the United States for recovery of damages adequate to compensate for the injury.”⁹² These provisions are designed to deter false marking and the harms they confer on society. To avoid similar problems with dynamic patent disclosure, the law ought to install similar penalties for false disclosures (with attention paid to deterring an over-assertion of “false disclosure” claims to recover against operating companies, as has been an issue with regard to false marking⁹³).

C. Spillover Effects

Before implementing dynamic patent disclosure, it is important to ensure that any negative spillover effects in other areas of patent law are cabined or addressed, if they indeed exist.

The most pressing spillover is with regard to patent claim construction.⁹⁴ That is, how much should dynamic disclosures (let alone other post-patent-filing information) influence our understanding of patent claims?⁹⁵ On the one hand, it is nearly canonical blackletter law that patent claims are given “the[ir] ordinary and customary meaning

America Invents Act, 33 N. ILL. U. L. REV. 189, 192–94 (2012) (providing background on the history of false marking claims).

91. 35 U.S.C. § 292(a) (2012).

92. *Id.* § 292(a)–(b).

93. See, e.g., Anania & Rodrigue, *supra* note 90; Zickterman, *supra* note 90, at 195–200, 218–52 (emphasizing how the false marking provisions have been recently amended to add a competitive injury requirement for a nongovernmental suit in response to a frenzy of false marking claims).

94. Additionally, given that patents speak to many different types of groups, and are used in different ways communicatively, it would be important to study ethnographically whether post-filing disclosures could harm these other communicative uses. See Dan L. Burk, *Patent Silences*, 69 VAND. L. REV. 1603 (2016) (arguing that there are benefits to patent silence and nondisclosure).

95. Cf. Mark A. Lemley, *The Changing Meaning of Patent Claim Terms*, 104 MICH. L. REV. 101, 102 (2005):

In order to construe the claims of a patent, the court must fix the meaning of the claim terms as of a particular point in time. Both the knowledge of the [person having ordinary skill in the art] in a particular field and the meaning of particular terms to that [person having ordinary skill in the art] will frequently change over time. Indeed, the risk of change in the meaning of terms over time is particularly great in patent law, because patents necessarily involve new ideas, and the process of assigning terms to describe those new ideas is not static.

of a claim term[, which] is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.”⁹⁶ From that rule, it would seem that post-filing information should have little to no role in claim construction.

If one of the key benefits of dynamic disclosure is that it will help contextualize the otherwise hard-to-parse disclosure and provide better notice of patent claim meaning, however, this dynamic disclosure would seem to affect, or at least inform, claim meaning post-filing. Nonetheless, that need not be the case; there is less tension between dynamic disclosure and this tenet of claim construction than there might seem. For good reason, patent claim construction doctrine also states that claims should be construed to cover the preferred embodiments that the patentee sets out in its application.⁹⁷ As the Federal Circuit has explained, “A construction which reads the preferred embodiment out of the scope of the claims would generally seem at odds with the intention of the patentee as expressed in the specification.”⁹⁸ On its face, this canon deals not with post-filing disclosures, but with disclosure in the patent application itself. Therefore, it is in no tension with the timing construction canon. It is, however, instructive. The justification for the preferred-embodiment canon seems to be that a patentee would obviously seek patent coverage that includes the best way of practicing the invention. The patentee has no general strategic incentive to disclose a preferred embodiment and proceed to place it outside the corresponding claims’ scope.

The same is likely true of post-filing product commercializations. There is every chance that, barring a substantial lack of foresight, patentees’ commercialized products fall within the scope of their claim construction. Otherwise, those products—because they lie outside patent claim scope—could be copied freely by competitors. Moreover, if a patentee, post-patent filing, comes to realize that a product it would like to bring to market falls outside of its claim scope, it would probably file one or more follow-up patent applications—whether through a continuation application or a new standalone application—to cover that product. In either case, the patentee would likely end up with one or more patents that cover this commercialized product.

96. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005).

97. *E.g.*, *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 747, 755 (Fed. Cir. 2016) (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996)) (stating the court’s remark that “a construction which excludes the preferred embodiment is ‘rarely, if ever correct’”).

98. *Id.*

This analysis helps dissolve the apparent tension between post-filing information about commercialized products being used to inform patent claims, whose meaning is to be fixed as of the patent filing date. This post-filing information can be reliably used to interpret the meaning of the claim terms as of the filing date because both forms of information will tend to cohere strategically for the patentee. That is why it can reliably be used by third parties to invigorate patent disclosure and help provide them with notice of patent scope in the first instance.⁹⁹

There remains one other important concern with regard to claim construction: penalizing those patentees who have commercialized their inventions, as compared with non-practicing entities or patent assertion entities, which have not. If patent disclosure and claim scope can be informed by disclosed commercialized products, then what of entities that are not commercializing their patented inventions? Perhaps patent assertion entities—which, if anything, ought to be deprived for not commercializing their invention or at least for not providing licensees with any valuable technical information¹⁰⁰—would then have the perverse ability to mold the meaning of their claim terms to cover defendants' products in a way that operating companies cannot. This concern is a serious one, given the critical focus on infringement suits brought by patent assertion entities in recent years,¹⁰¹ even if patent doctrine is otherwise being adjusted to curb these suits.¹⁰²

That said, my proposal for dynamic patent disclosure can be repurposed not only to prevent patent assertion entities from having more opportunity to stretch claim meaning, but also to provide a practicable way to penalize them in claim construction, should that be desirable. Specifically, as noted above, my version of dynamic disclosure

99. See *supra* Part II.

100. See Jeanne C. Fromer, *Should the Law Care Why Intellectual Property Rights Have Been Asserted?*, 53 HOUS. L. REV. 549, 571–74 (2015) (discussing parties holding intellectual property rights that do not contribute to various forms of progress).

101. There are debates over how to interpret litigation data and whether there has indeed been an explosion in recent years in lawsuits brought by patent assertion entities. Compare, e.g., Robin Feldman, Tom Ewing & Sara Jeruss, *The AIA 500 Expanded: The Effects of Patent Monetization Entities*, 17 UCLA J.L. & TECH. 1, 78 (2013) (arguing that there has been such an increase), with, e.g., Christopher A. Cotropia, Jay P. Kesam & David L. Schwartz, *Unpacking Patent Assertion Entities (PAEs)*, 99 MINN. L. REV. 649, 654–55 (2014) (making the case that there has not been any rise in such litigation).

102. For example, non-practicing entities have had a harder time securing injunctive relief when they win patent infringement litigation. Benjamin Petersen, Note, *Injunctive Relief in the Post-eBay World*, 23 BERKELEY TECH. L.J. 193, 217 (2008) (arguing that *eBay* is limited to nonpracticing patent holders). Others propose having litigation losers pay winners' fees as a way to deter frivolous suits perceived to be brought disproportionately by patent assertion entities. Reilly, *supra* note 78 (discussing this view).

marks non-practicing entities and patent assertion entities as separate from operating companies.¹⁰³ Separating these categories of companies provides a way to treat them differently. At a minimum, courts can be attentive in infringement suits brought by patent assertion entities to disallow claim stretching. Another possibility is to operationalize John Duffy's approach to revive the paper patent doctrine to favor patents that have been commercialized and disfavor those that have not, on the basis that "a practiced patent discloses more, teaches more, and contributes more to the sum total of social knowledge than does a mere paper patent."¹⁰⁴

All in all, careful integration of dynamic patent disclosure into patent law can be achieved with minimal negative spillover into other areas of patent law.

CONCLUSION

If the patent system's disclosure function is to effectuate its goals of stimulating innovation by sharing critical scientific and technological information pertaining to patented inventions, it is critical to appreciate that much of this information tends to be generated after patents are filed. As such, this Article proposes that patent law take a step in the direction of dynamic patent disclosure by requiring patentees to divulge some of the most useful information related to their patented inventions, namely, post-filing information on the products they or their licensees commercialize. This information will invigorate the goals that patent law's disclosure function is thought to serve, as well as improve public notice of patent rights and enable better empirical study of the role that patents play in stimulating innovation and commercialization.

103. See *supra* text accompanying notes 77–78.

104. John F. Duffy, *Reviving the Paper Patent Doctrine*, 98 CORNELL L. REV. 1359, 1395 (2013).
