

# Contextualizing Patent Disclosure

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*One of the main justifications for a patent system is that patents disclose useful technical information that others can learn from. However, patents are not performing this function well. The average patent is written in legalese, uses vague language, and is hard to connect to commercial activity. Legal scholars have responded with calls to improve the patent document through better writing, more examples, and better enforcement of patent doctrines. The courts have sought to ensure that patent specifications are robust and justify the grant of a monopoly. This follows from the Supreme Court's characterization of technical teachings within a patent as the "quid pro quo" for the patentee's exclusive rights.*

*The problem with these approaches is that they focus exclusively on patent content, and overlook the many ways in which patent context matters to the dissemination of technical information. A review of the ways in which patents truly promote the progress reveal that patent information beyond, not just within, a patent's four corners, can shape the extent to which the subject invention of the patent spreads beyond the inventor. Whether a patent is in force, is commercially important, is subject to licensing or other commitments, or is held for defensive or offensive reasons, for example, can determine whether and how the teachings within the patent spread.*

*In this Article, I argue that we need to rethink the concept of patent disclosure. Rather than focusing only on the content of the patent, we should keep in mind the context of the patent, and how the greater availability of contextual information about the patent can promote the progress. This contextual information represents not only the final "product" of a patent as issued, but the "process" by which it is made and used, the timing and terms on which it is provided to the world, and the publicly reported transactions in which the patent is involved. Making contextual information more accessible*

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would do much to reinvigorate the disclosure function of the patent system—in many cases, using already existing information.

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## INTRODUCTION

The word “patent,” comes from the Latin, “patere,” which means “to lay open.”<sup>1</sup> One of the main justifications for the patent system is

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1. *Patent*, ONLINE ETYMOLOGY DICTIONARY, <http://www.etymonline.com/index.php?term=patent> (last visited Jan. 14, 2016) [<https://perma.cc/3P9S-X2G9>]; see also SUBCOMM. ON PATENTS, TRADEMARKS, AND COPYRIGHTS OF THE S. COMM. ON THE JUDICIARY, 85TH CONG., AN ECONOMIC REVIEW OF THE PATENT SYSTEM 1 (Comm. Print 1958) (prepared by Fritz Machlup) (describing the noun “patent” as the customary abbreviation of “open letter” or “letters patent,” a literal translation of the Latin *litterae patentēs*) [hereinafter SUBCOMM. ON PATENTS ECONOMIC REVIEW].

that exclusive rights are needed to induce innovators to lay open, or disclose, technical information to the world. By adding the “fuel of interest to the fire of genius,”<sup>2</sup> the patent system encourages the disclosure of non-rivalrous, non-excludable technical information that would otherwise be kept secret. Like other “open” innovation systems such as academic publication,<sup>3</sup> the patent system rewards those who not only make costly and risky investments in innovation but also share this information in detail, spurring follow-on innovation.

Patent law provides protection that is in many ways stronger and broader than trade secrecy or copyright: it can be enforced against independent inventors and non-exact copies. But in return for this protection, the invention must be disclosed, in enough detail that others can make and use it. During the term of the patent, rivals can learn from the technical descriptions in patents to design around, improve upon, and otherwise reduce the cost of producing the invention.<sup>4</sup> They may even practice the invention when the patent is in force, based on licensed or unlicensed use. After the patent expires (or the patent application goes abandoned), the world may freely use the information therein. It is for this reason that the Supreme Court has called patent disclosure “the *quid pro quo* of the right to exclude.”<sup>5</sup>

But there are at least two problems with justifying the patent system on the basis of patent documents. First, when inventors can keep inventions or details secret, they will, by declining to apply for patents or, in some cases, withholding key information from patent applications.<sup>6</sup> This limits the scope of the patent system, some argue, to inventions that would have been disclosed anyway,<sup>7</sup> while enabling inventors to retain their most valuable secrets. Second, the patents that

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*Litterae patentes*, or “open letters,” were public documents issued by a ruler that bestowed certain rights, such as a rank, upon its subjects. *Id.* at 2.

2. Abraham Lincoln, Lecture on Discoveries and Inventions, Jacksonville, Illinois (Feb. 11, 1859), in ABRAHAM LINCOLN: SPEECHES AND WRITINGS 1859–1865, at 10–11 (Don E. Fehrenbacher ed., 1989).

3. Kevin J. Boudreau & Karim R. Lakhani, “Open” Disclosure of Innovations, Incentives and Follow-on Reuse: Theory on Processes of Cumulative Innovation and a Field Experiment in Computational Biology, 44 RES. POL. 4, 5 (2015) (describing academic science, the patent system, open source computing, and other innovation platforms as all open, but at different points within the innovation process).

4. *Id.* at 4.

5. J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc., 534 U.S. 124, 142 (2001).

6. SUBCOMM. ON PATENTS ECONOMIC REVIEW, *supra* note 1, at 24–25 (advancing the idea that an inventor patents and discloses “only what he fears he cannot be kept secret”).

7. Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 109.

are filed are often relatively poor tools of teaching.<sup>8</sup> The patent system incents early disclosure by awarding those who are first to file their applications at the United States Patent and Trademark Office (“PTO”),<sup>9</sup> but as a result, disfavors mature, complete disclosure, as the invention is often still at the preliminary, pre-commercial stage at the time of filing. Patents are written in ways that makes them hard to find and understand. For example: a piece of bread becomes “a first bread layer having a first perimeter surface coplanar to a contact surface,”<sup>10</sup> and a computer becomes a “computing device having a physical patent processor programmed with one or more computer program instructions that, when executed, program the physical processor to perform [a] method.”<sup>11</sup> This is because, although patents are supposed to function as technical documents, they are also legal documents,<sup>12</sup> often written by lawyers<sup>13</sup> and for lawyers, juries, and courts. It’s no wonder that technical personnel routinely rank patents below publications and exchanges (e.g., with new employees, suppliers, customers, competitors) as sources of technical information (Table 1).

There is a third problem with conceptualizing patent disclosure exclusively in terms of the patent document, however, one that has largely gone unnoticed. The problem is that traditional “patent disclosure” theory is built on an incomplete understanding of how the patent system actually supports the diffusion of technical knowledge. Conventional accounts assume that the primary way the patent system encourages the dissemination of technical information is through others reading and learning from the patent.<sup>14</sup> Academic proposals have centered, accordingly, on improving the patent document.<sup>15</sup> But exclusively focusing on the *content* of the patent overlooks the importance of the *context* of patent disclosures to the diffusion of technical information. By context, I mean information *about* the patent

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8. Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 627 (2010) (proposing the use of working examples to improve the readability and teaching function of patents).

9. The transition of the United States, under the America Invents Act of 2011, from a “first-inventor-to-invent” system to the “first-inventor-to-file” system, with some exceptions, is detailed in Robert P. Merges, *Priority and Novelty Under the AIA*, 27 BERKELEY TECH. L.J. 1023 (2012).

10. U.S. Patent No. 6,004,596 (filed Dec. 8, 1997).

11. U.S. Patent No. 8793159 (filed June 3, 2011).

12. Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 543 (2009) (discussing the two layers, technical and legal, within the patent document and arguing that they should be separated).

13. They might also be written by legally trained technical specialists called patent agents.

14. This assumes it has run its full term—if it has not, other patents still in force may preclude the follow-on innovator from practicing the invention.

15. See *infra* Part I.

that is beyond, not just within, a patent's four corners. Contextual information includes whether a patent is in force, commercially important, practiced, subject to licensing or other commitments, or held for defensive or offensive reasons, for example. Each influences how teaching about the invention is (or is not) diffused during and after the patent's term.

In this Article, I argue that we need to rethink the concept of patent disclosure. Rather than focusing only on the content of the patent, we should keep in mind the context of the patent, and how the greater availability of contextual information about the patent can promote the progress. This contextual information represents not only the final "product" of a patent as issued, but also the "process" by which it is made and used, the timing and terms on which it is provided to the world, and the publicly reported transactions that the patent is involved in. This information is not readily available at present, but making it so would do much to reinvigorate the disclosure function of the patent system—in many cases, using already existing information. Removing the current barrier to reading patents and defaulting to the earliest practicable publication of applications could also greatly enhance patent teaching, and in contrast to content-based proposals, do so without requiring significant changes to the ways patents are written and examined.

The context of a patent influences its reach. There may be a large number of patents over how to pick the next best song for a listener, for example, but for a company building a music streaming service, the patents that matter are the ones that are owned by their competitors or that are being used in the market. To take another example, while there may be any number of patented methods for connecting to a wireless network, incorporation of a particular method into a standard determines its adoption by others.

Building on such examples, this Article articulates and applies a context- rather than content-based framework for understanding and improving the contribution of the patent system to the diffusion of technical information. Part I discusses conventional patent disclosure theory and evidence. This review suggests that we should be skeptical of the premise that disclosures within patents can justify the patent system, and that suggested fixes to the content of patents alone can overcome the numerous obstacles to learning from patents. It argues that the relative success of chemistry and drug patents as instruments of technical teaching are attributable not just to better content, but better context—they are searchable and findable, are integrated into databases of practice, and describe the commercial product years before it is sold on the market.

Part II builds upon Part I by arguing that pure content-based approaches to improving patent disclosure are misguided because they overlook the many ways that technical teaching occurs within the patent system, but outside of the patent document. It details the mechanisms by which patents lead to technical learning beyond the patent document: by freeing up inventors to make ancillary disclosures of the invention, by supporting the sale and transfer of technology, and by creating freedom to operate. Policymakers should consider how to encourage these modes of patent-supported diffusion, rather than just improved patent document disclosures.

Part III explores the various layers of contextual patent information and the relevance of each of these layers to the diffusion of technical teaching described in Parts I and II. While conversations about patent disclosure have mostly focused on a lack of quality content, this Part focuses on the overlooked problem of the lack of patent context. When available, contextual information can, for example, signal which inventions are important from an economic point of view, are unimportant from a risk management perspective (insofar as they are expired or pledged to defensive uses), and may be the subject of broader technology and know-how transfers. Making contextual information more readily available could enhance the disclosure function of the patent system and, in contrast to proposals to enhance disclosure by substantially changing the way patents are written or examined, leverages already available information in many cases. Building upon Part III, Part IV suggests two other ways to improve the context in which all patents are read that would not require additional resources: first, by changing the default publication of patent applications, including provisionals, to the earliest time agreed to by the applicant, and second, by removing the penalty for reading patents.

## I. CONVENTIONAL PATENT DISCLOSURE THEORY AND EVIDENCE

### *A. Brief History of Patent Disclosure*

While the concept of disclosure has always been part of the patent system, what qualifies as disclosure has varied over time. Early systems considered inventions disclosed only when they were actually done or produced, or when the device was provided to society. The Venetian patent system, for example, granted patents to those who made a new and ingenious device “when it has been reduced to

perfection so that it can be used and operated.”<sup>16</sup> The early British patent system shared this emphasis on physical things, extending patents only to “manufactures.”<sup>17</sup> An 1837 description of the U.S. system, likewise, restricted patents to inventions that had “been reduced to practice; it is not enough that it is merely practicable or possible; it must be something which has been actually done or produced.”<sup>18</sup> Although the early U.S. patent system allowed for the patenting of methods, not just devices, patent examiners had the right to ask for small-scale models,<sup>19</sup> obtaining them in about half of the patents that issued, over everything from nail cutting machines, to presses, to boring machines.<sup>20</sup> The disclosure to society came not exclusively within the patent document, but also outside of it.

As the patent system expanded and modernized, things changed. The growth of the patent system required the Patent Office to review thousands of patent applications quickly. Paper-based reviews were more practical than physical evaluations of patent models, which, by 1880, were no longer submitted.<sup>21</sup> In addition, patent specifications were increasingly expected to contain enabling disclosure,<sup>22</sup> elevating the importance of the text within, rather than outside of, the patent document. Finally, the practice of using patent claims, or “peripheral claiming,” to delineate the scope of the patent became formalized over time,<sup>23</sup> enabling inventors to expand the scope of their patents just by claiming the patent differently and more abstractly. In 1906, the Supreme Court confirmed that practicing an invention was not a prerequisite to patenting it.<sup>24</sup> As a result, what was written in the patent became more important than what the inventor had actually done.

The striking result of this evolution is that today, one need not have made an invention in order to get, through the patent, exclusive

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16. Giulio Mandich, *Venetian Patents (1450–1550)*, 30 J. PAT. OFF. SOC'Y 166, 176–77 (1948); see also BRUCE W. BUGBEE, GENESIS OF AMERICAN PATENT AND COPYRIGHT LAW 21 (1967).

17. Michael Risch, *America's First Patents*, 64 FLA. L. REV. 1279, 1297–98 (2012) (describing the English Statute of Monopolies).

18. John F. Duffy, *Reviving the Paper Patent Doctrine*, 98 CORNELL L. REV. 1359, 1369 (2013) (citing WILLARD PHILLIPS, THE LAW OF PATENTS FOR INVENTIONS 110–11 (1837)).

19. See 35 U.S.C. § 114 (2012).

20. Risch, *supra* note 17, at 1309–10.

21. Craig Allen Nard, *Legal Forms and the Common Law of Patents*, 90 B.U. L. REV. 51, 70 n.83 (2010) (providing a history of the Patent Office's model requirement).

22. Duffy, *supra* note 18, at 1370–74.

23. Jeanne C. Fromer, *Claiming Intellectual Property*, 76 U. CHI. L. REV. 719, 721 (2009).

24. *Cont'l Paper Bag Co. v. E. Paper Bag Co.*, 210 U.S. 405, 422–23 (1908) (confirming that a patentee need not practice an invention to obtain a patent).

rights to it.<sup>25</sup> The lack of a working requirement has had significant consequences for the patent system, influencing what gets patented, when, and by whom. It lowers barriers to patenting, supports specialization in innovation, and shifts patenting towards invention and away from commercialization. It also means that those who win the race to the PTO, generally earlier, have rights over those who are successful in the market, generally later.

### *B. The Doctrines of Patent Disclosure*

Consistent with an emphasis on “documentary disclosure,”<sup>26</sup> an inventor can now file a patent application that describes the invention and thereby constructively reduce the invention to practice and satisfy patent law’s requirements. Several “disclosure” doctrines within patent law are designed to ensure that the patent specification is sufficient, including enablement, best mode, and written description. The willfulness doctrine influences how follow-on innovators access patent specifications.

According to the enablement doctrine, a patent must describe the invention in enough detail that a person skilled in the art can recreate it based on the patent.<sup>27</sup> While the patent need not comprise a detailed blueprint, readers of the patent should be able to make and use the invention without “undue experimentation.”<sup>28</sup> The purpose of the enablement requirement, codified in the international TRIPS agreement,<sup>29</sup> is to ensure that the public is gaining from the patent specification a level of knowledge that is commensurate with the scope of the patent’s claims.<sup>30</sup>

The patent’s “written description” encompasses the entirety of the patent document by which the patent’s validity is evaluated; the related written description requirement requires a demonstration that

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25. Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 61 (1998) (“It is well settled that an invention may be patented before it is reduced to practice.”).

26. Duffy, *supra* note 18, at 1361.

27. 35 U.S.C. § 112(a) (2012).

28. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

29. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299 [hereinafter TRIPS] (“Members *shall* require that an applicant for a patent shall disclose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art . . .” (emphasis added)).

30. Warner-Lambert Co. v. Teva Pharm. USA, Inc., 418 F.3d 1326, 1337 (Fed. Cir. 2005) (citing Nat’l Recovery Techs., Inc. v. Magnetic Separation Sys., Inc., 166 F.3d 1190, 1195–96 (Fed. Cir. 1999)).



the patentee possessed the claimed invention.<sup>31</sup> The test is whether one of skill would think that the inventor had possession of the claimed subject matter, based on reading the specification.<sup>32</sup>

Although patent law applies equally across all technology areas, disclosure requirements are stricter for the so-called unpredictable arts, like chemistry and biopharma, where slight alterations can produce substantially different outcomes. In one well-known example from patent law, adding salt to plastic fishing lures was seen as undesirable because mixing salt with plastic can cause violent explosions. When an inventor did so anyway and was able to devise a lure that stayed salty in the water for longer, he was rewarded with a patent.<sup>33</sup> In general, the unpredictability of chemistry means that a protocol that works for one compound does not necessarily work for another.<sup>34</sup> Merely providing high-level descriptions in such fields, therefore, will not suffice; the inventor must provide details that convey possession of the invention and that it works as described.<sup>35</sup> In biotechnology, a heightened written description requirement applies as well, under which, for example, the United States Court of Appeals for the Federal Circuit has held that DNA cannot be claimed without disclosure of the DNA sequence.<sup>36</sup> In contrast, in a “predictable art” like computer science, a high-level description can readily be reduced to practice by a person with ordinary programming and technical skills, without undue experimentation. As a result, less is required of specifications in the predictable arts and more of patents in the unpredictable arts. As described below, this has had implications for the examination and reuse of such patents.

Finally, the “best mode” requirement goes beyond the enablement requirement and requires a description of the best way the claimant knows of making the invention at the time of the patent application.<sup>37</sup> Courts apply a two-step test to determine whether the best mode has been adequately disclosed: “whether, at the time of filing the application, the inventor possessed a best mode for practicing the invention,” and “whether the written description disclosed the best mode such that one reasonably skilled in the art could practice it.”<sup>38</sup>

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31. *Capon v. Eshhar*, 418 F.3d 1349, 1357 (Fed. Cir. 2005).

32. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc).

33. *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 957–58 (Fed. Cir. 1997).

34. Sean B. Seymore, *Heightened Enablement in the Unpredictable Arts*, 56 UCLA L. REV. 127, 137 (2008).

35. *See, e.g., id.* at 137–38.

36. *Regents of the Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559 (Fed. Cir. 1997).

37. 35 U.S.C. § 112(a) (2012) (“The specification shall . . . set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.”).

38. *Eli Lilly & Co. v. Barr Labs., Inc.*, 251 F.3d 955, 963 (Fed. Cir. 2001).

But while the United States and a few other countries<sup>39</sup> require more of patent disclosures than do others through the best mode requirement, American patent law also discourages innovators from reading patents during their term. Although patent infringement is generally a strict liability offense, without regard to the accused infringer's state of mind,<sup>40</sup> having knowledge of a patent has historically influenced the risk that an accused infringer will owe treble damages for infringement of the patent.<sup>41</sup> As a result of the Supreme Court's *Halo* decision, which did away with any particular rigid rule, courts have wide discretion to award treble damages to those who engage in "egregious conduct" and improperly appropriate the patent.<sup>42</sup> Historically, there has been a much higher likelihood of treble damages being made based on actual knowledge of the patent.<sup>43</sup> Perhaps in part, as a result, knowledge of the patent is only alleged thirty percent of the time.<sup>44</sup> The penalty for reading patents extends beyond the risk of treble damages, to the award of attorney's fees as well.<sup>45</sup>

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39. See Bingbin Lu, *Best Mode Disclosure for Patent Applications: An International and Comparative Perspective*, 16 J. INTELL. PROP. RTS. 409, 409 (2011) (describing analogous requirements in Japan, China, and India).

40. 35 U.S.C. § 271(a) (2012).

41. See 35 U.S.C. § 284 (2012) ("[T]he court may increase the damages up to three times the amount found or assessed."); *In re Seagate Tech., LLC*, 497 F.3d 1360, 1371 (Fed. Cir. 2007) (noting that, in the absence of statutory guidance, the Federal Circuit has held that "proof of willful infringement permitting enhanced damages requires at least a showing of objective recklessness").

42. See *Halo Elecs., Inc. v. Pulse Elecs., Inc.*, 136 S. Ct. 1923, 1932–34 (2016) (easing the standard to prove willful infringement).

43. See, e.g., NAT'L JURY INSTRUCTION PROJECT, MODEL PATENT JURY INSTRUCTIONS § 4.1 (2009), <http://www.nationaljuryinstructions.org/documents/NationalPatentJuryInstructions.pdf> [<https://perma.cc/J9J7-BXWZ>] (explaining to juries that "[w]hen considering [the alleged infringer]'s conduct, you must decide whether [the patent holder] has proven it is highly probable that [the alleged infringer]'s conduct was reckless; that is, that [the alleged infringer] proceeded with the allegedly infringing conduct with *knowledge of the patent* . . ." (emphasis added)); Randy R. Micheletti, *Willful Patent Infringement After In Re Seagate: Just What Is "Objectively Reckless" Infringement?*, 84 CHI.-KENT L. REV. 975, 1008:

Knowledge of the patent at issue should remain a critically important factor in the *Seagate* analysis, however, because such knowledge may create an inference that the defendant knew or should have known of the risk of infringement. Conversely, proving an infringer should have known of the risk that he would infringe the patent at issue becomes very difficult—if not impossible—if the defendant had no knowledge of the patent at all.

44. See Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1442 (2009) (reporting that, "[o]f . . . 193 cases, only 60 (or 31.1%) involved allegations that the defendant was even aware of the patent before the lawsuit").

45. 35 U.S.C. § 285 (2012) (specifying that "[t]he court in exceptional cases may award reasonable attorney fees to the prevailing party"). One way to show that a case is "exceptional" is by showing that the defendant engaged in "willful infringement." See, e.g., *Minks v. Polaris Indus.*, 546 F.3d 1364, 1375 (Fed. Cir. 2008) (upholding exceptional case determination and award of attorney fees based on jury finding of willful infringement); *Tate Access Floors, Inc. v. Maxcess Techs., Inc.*, 222 F.3d 958, 972 (Fed. Cir. 2000) (noting that an express finding of willful

*C. The Usefulness of Patent Disclosures—the Evidence*

For critics of patent disclosure, the main question is whether, as the Supreme Court has asked, the “additions to the general store of knowledge” provided by patents are in fact worth the “high price of . . . exclusive use,” as the Supreme Court has claimed.<sup>46</sup> There are reasons to be skeptical. In his comprehensive economic review of the patent system in 1952, Professor Fritz Machlup explained the factors that undermine the patent system’s disclosure function:

[T]he unwillingness of firms to patent what they think they may be able to keep secret; the unwillingness of researchers to publish what they think they may later develop into patentable inventions; the ability of inventors to obtain patents despite incomplete disclosure; and the inability of manufacturers to keep secret most of the technology they use and, consequently, society’s munificence in granting monopolies for the disclosure of what would become known in any case.<sup>47</sup>

Patent disclosure has few contemporary defenders. It is routinely asserted that few read patents,<sup>48</sup> and there have been few concerted efforts to change this impression.<sup>49</sup> Those who find patents inadequate in the software realm, for example, have arguably been more focused on invalidating rather than improving patents. Documentary disclosure has been dealt a significant blow in recent years. Following passage of the America Invents Act, a lack of best mode is no longer a defense to enforcement.<sup>50</sup> This evisceration of the best mode requirement post-enactment was prompted by concerns that the doctrine was too burdensome to litigate.<sup>51</sup> But rather than improve the best mode requirement, policymakers decided to significantly denude it by making the lack of a best mode no longer a defense to a patent’s enforceability, in a move that was surprisingly uncontroversial at the time.<sup>52</sup>

Based on the evidence, detailed below, much of the pessimism is justified. Patents generally rank below other sources of information in

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infringement is a sufficient basis for classifying a case as “exceptional,” and that when a trial court denies attorney fees in spite of a finding of willful infringement, the court must explain why the case is not “exceptional” within the meaning of the statute).

46. See *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 481–84 (1974).

47. SUBCOMM. ON PATENTS ECONOMIC REVIEW, *supra* note 1, at 32.

48. See, e.g., Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 21 (popularizing the idea that no one reads patents).

49. See *infra* notes 64–75 and accompanying text (describing two empirical efforts to better understand the extent to which innovators read patents and citing surveys done by Ouellette et al.).

50. Leahy-Smith America Invents Act, Pub. L. No. 112-29, sec. 15, § 282, 125 Stat. 284, 328 (2011) (codified at 35 U.S.C. § 282 (2012)).

51. Joe Matal, *A Guide to the Legislative History of the America Invents Act: Part II of II*, 21 FED. CIR. B.J. 539, 581–82 (2012).

52. *Id.* (discussing the repeal of the best-mode defense).

terms of importance, and there are reasons to believe that patent law's enablement standard is not always being enforced. Surveyed researchers cite many of the same obstacles Professor Fritz Machlup described decades ago: that the information in patents is repetitive of other sources and written in obscure language by those who want to hide information.<sup>53</sup> However, the answer also, to some extent, depends on the industry. Chemists save time when they read patents, electrical engineers, less so.<sup>54</sup> It is easier to find relevant chemical patents, and they are the type most frequently cited by research papers, followed by biopharma patents.<sup>55</sup> These and other findings, and their implications, are discussed below.

### 1. The Comparative Value of Patent Disclosures

Surveys of the patent system convey a generally dim view of patent disclosures as compared to other sources of technical teaching. In the 1987 "Yale survey" of 650 publicly traded firms, patents placed sixth out of seven types of disclosures.<sup>56</sup> Professor Stuart MacDonald, surveying small and medium enterprises in the United Kingdom,<sup>57</sup> found that patent disclosures trailed other sources of information such as customers, suppliers, competitors, trade associations, universities, professional associations, and research associations as sources of useful information.<sup>58</sup> Professor Wesley Cohen and others surveyed manufacturing firms in the 1990s, including 826 firms in the United States and 593 in Japan, and found strong differences in these populations regarding the usefulness of patent disclosures for disseminating technical information.<sup>59</sup>

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53. Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 557–58 (2012).

54. See Bronwyn H. Hall & Dietmar Harhoff, *Recent Research on the Economics of Patents* 17–18 (Nat'l Bureau of Econ. Research, Working Paper No. w17773, 2012) ("In fields where patents have strong impact on appropriability such as chemicals and pharmaceuticals, disclosure effects appear to matter the most.")

55. Wolfgang Glänzel & Martin Meyer, *Patents Cited in the Scientific Literature: An Exploratory Study of 'Reverse' Citation Relations*, 58 SCIENTOMETRICS 415, 415–19 (2003).

56. Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 1987 BROOKINGS PAPERS ON ECON. ACTIVITY (SPECIAL ISSUE) 783, 806.

57. STUART MACDONALD, WHAT THE PATENT SYSTEM OFFERS THE SMALL FIRM 5 (1998) (summary report for the Economic and Social Research Council).

58. *Id.* at 5–6.

59. 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, 1355–62 (2002).

**TABLE 1: HOW PATENTS COMPARE TO OTHER SOURCES OF INFORMATION (RELATIVE RANK)**

<u>Levin* (1987) Processes</u>	<u>Levin* (1987) Products</u>	<u>McDonald (1988) SMEs</u>	<u>Cohen (2002) US</u>
1. Independent R&D	1. Independent R&D	1. Customers	1. Publications
2. Licensing Technology	2. Reverse Engineering	2. Suppliers	2. Informal Exchange
3. Publications or Technical Meetings	3. Licensing Technology	3. Competitors	<b>3. Patents</b>
3. Reverse Engineering	4. Hiring	4. Trade Associations	4. Meetings or Conferences
5. Hiring	5. Publications or Technical Meetings	5. Universities	5. Others' Products
<b>6. Patents</b>	<b>6. Patents</b>	6. Professional Associations	6. Joint Ventures
7. Conversations with employees	7. Conversations with employees	7. Research Associations	7. Trade Associations
		<b>8. Patents</b>	
		9. Gov't Departments	

Patent disclosures were the single most important channel of information for Japanese firms, scoring more than twenty percent higher than the next most important channel, publications.<sup>60</sup> In the United States, patents ranked only third, well behind publications and informal information exchange and just barely ahead of public meetings, conferences, and competitors' products.<sup>61</sup>

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60. *Id.* at 1363. The high rate of dependence on patent disclosures by Japanese firms may be explainable, in part, to the lower grant rate of patents—a study of patent applications filed in the United States and several other jurisdictions and granted in the United States found that Japan only awarded patent applications on 42.6 percent of the applications that the United States did. This means that for a larger number of Japanese patents, the follow-on innovator is not precluded from practice by a patent. See Paul H. Jensen, Alfons Palangkaraya & Elizabeth Webster, *Application Pendancy Times and Outcomes Across Four Patent Offices* 11–13 (Melbourne Inst. of Applied Econ. & Soc. Research, Working Paper No. wp2008n06, 2008).

61. Cohen et al., *supra* note 59, at 1363.

There remain legitimate questions about the extent to which we can accurately discern the contribution of patents to the storehouse of knowledge. As Professor Robert Merges recounts, though innovators may discount learning from patents, “inadvertent plagiarism” can occur, for example, when a follow-on innovator reads a related patent but does not cite or value its contribution.<sup>62</sup> Another shortcoming of many of these surveys is that they were completed in the 1980s and 1990s, and the rise of internet and digital communications since then has made it easier to discover technical information through modes such as conferences, whose proceedings are now often recorded and posted; informal exchanges, which can take place over social media; and written disclosures, which now can be more readily accessed through digitization and search.

## 2. The Enforceability of Doctrinal Requirements

It is unclear the extent to which issued patents in fact satisfy the enablement and written description requirements. The enablement inquiry is complex and fact intensive—requiring a patent examiner to put herself in the shoes of a skilled inventor and to determine whether the specification includes enough information so that the invention could be made and used “without undue experimentation.” But the rapid pace of technological change makes it hard for patent examiners to channel and apply the knowledge of such a skilled inventor to the task of examination. “Possession,” the written description standard, is to be evaluated by a person of skill in the art but patent examiners must provide their best guess of how such a person would evaluate the application. The Supreme Court has acknowledged the challenge of evaluating the sufficiency of disclosure “in light of the highly developed art of drafting patent claims so that they disclose as little useful information as possible . . . while broadening the scope of the claim as widely as possible . . . .”<sup>63</sup>

The available evidence suggests that examiners and courts relatively infrequently reject or invalidate patents based on a lack of enabling disclosure. For example, according to a study of patent applications, of all grounds of rejection,<sup>64</sup> enablement was the least used ground for rejection among bioinformatics applications and the second-

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62. Robert P. Merges, *A Few Kind Words for Absolute Infringement Liability in Patent Law*, 31 BERKELEY TECH. L.J. 1, 17–20 (2016).

63. *Brenner v. Manson*, 383 U.S. 519, 534 (1966).

64. Grounds for rejection included the patentability of the subject matter, novelty, obviousness, best mode, written description, and definiteness.

to-least used by examiners among data-processing applications.<sup>65</sup> Based on an analysis of published district court decisions from 2008 to 2009, enablement and written description were among the least asserted grounds for invalidity during litigation.<sup>66</sup> When patents were scrutinized for the sufficiency of the disclosure contained within them, software patents covering nonbusiness method inventions fared worse than others, according to a study of disclosure rulings in 1,144 court decisions from 1982 to 2012.<sup>67</sup>

The lack of rejections could reflect that disclosures are mostly adequate, or it could reflect that it is harder, relative to other ways of rejecting patents, to assess whether a patent provides enough information to reproduce the invention. The nature of the examination process puts the burden of proof on the examiner to allege that disclosures are inadequate, rather than on the applicant to show that her disclosure actually teaches.<sup>68</sup> The little evidence available about reproducibility is not encouraging. In her study of two hundred nanotechnology researchers, Professor Lisa Larrimore Ouellette found that only thirty-eight percent of those who read patents responded “yes” to the question of whether the invention was reproducible,<sup>69</sup> as required by the law.

### 3. The (Variable) Value of Patent Disclosures

As to the broader question of whether patents ever contain useful information, the answer appears to be, it depends. Industry effects are strong. Variation by technology area in the value of patent disclosures is documented in a forthcoming study by Professor Dietmar Harhoff and his colleagues. Inventors from the United States, Europe, and Asia were asked to quantify the time saved in their respective invention processes due to the availability of patent information. The answer depended on the industry. Though the median time savings was 5.9 hours and the mean was 12.2 hours, in the field of organic chemicals,

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65. Saurabh Vishnubhakat & Arti K. Rai, *When Biopharma Meets Software: Bioinformatics at the Patent Office*, 29 HARV. J.L. & TECH. 205, 231–36 (2015).

66. John R. Allison, Mark A. Lemley & David L. Schwartz, *Understanding the Realities of Modern Litigation*, 92 TEX. L. REV. 1769, 1785 (2014).

67. John R. Allison & Lisa Larrimore Ouellette, *How Courts Adjudicate Patent Definiteness and Disclosure*, 65 DUKE L.J. 609, 646–47 (2016).

68. See Sean B. Seymore, *The Presumption of Patentability*, 97 MINN. L. REV. 990, 1015 (2013) (arguing that the nature of the patenting process, which requires examiners to make affirmative rejections, creates a presumption of patentability that examiners must rebut in order to deny patents).

69. Ouellette, *supra* note 53.

the average time savings from reading a patent was thirty-six hours.<sup>70</sup> In contrast, survey takers reported an average saving in digital communication technology of only one hour from reading a patent.<sup>71</sup> The use of chemistry patents as technical sources of information is also reflected in studies of citation patterns by scientific researchers.<sup>72</sup> In their study of the thirty thousand PTO patents cited by research articles, Professors Glänzel and Meyer found that chemical patents captured a majority of the citations.<sup>73</sup> Drug and medical patents were also highly cited.<sup>74</sup> Among individual patents, content mattered. When surveyed, researchers found the inclusion of details from practice—for example, the choice of equipment, implementation protocols, and recipes—to be most useful.<sup>75</sup> This suggests that practiced inventions, and the sharing of information about their practice, added most.

In light of the foregoing, scholars have suggested a variety of ways of improving patent disclosure. These include better writing,<sup>76</sup> working examples,<sup>77</sup> the use of peer review,<sup>78</sup> and the enhanced enforcement of existing standards.<sup>79</sup> The PTO has trained its examiners to apply more scrutiny to the examination of overly broad claims, particularly in the context of software,<sup>80</sup> and initiated a glossary pilot program in which patent seekers can include definitions of the terms of their patents.<sup>81</sup> In 2015, the PTO, under the auspices of Director Michelle Lee's patent quality initiative, announced further moves to make the patent record clear and to train examiners in the adequacy of

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70. Hall & Harhoff, *supra* note 54, at 18 (describing a forthcoming publication by Alfonso Gambardella, Dietmar Harhoff & Sadao Nagaoka, *The Social Value of Patent Disclosure* (unpublished manuscript) (on file with LMU Munich)).

71. *Id.*

72. Glänzel & Meyer, *supra* note 55.

73. *Id.* at 415. Although, note that the authors did not quantify the number of citable chemistry patents.

74. *Id.* However, the authors did not quantify the share of all citable patents that were chemical, drug, or medical, making it impossible to rule out that one of the causes of the large share of citations was their large share in the general population.

75. Ouellette, *supra* note 53, at 575.

76. See, e.g., Fromer, *supra* note 12, at 563–84 (recommending that patents be written using a structured approach to improve clarity and comprehensibility).

77. See, e.g., Seymore, *supra* note 8, at 627.

78. Ouellette, *supra* note 53, at 590–92.

79. See Fromer, *supra* note 12, at 544.

80. *USPTO-led Executive Actions on High Tech Patent Issues*, U.S. PAT. & TRADEMARK OFF. (Feb. 25, 2016), <http://www.uspto.gov/patent/initiatives/uspto-led-executive-actions-high-tech-patent-issues> [<https://perma.cc/LQ2J-X2XM>] (executive action 2).

81. *Glossary Initiative*, U.S. PAT. & TRADEMARK OFF. (Apr. 3, 2016), <http://www.uspto.gov/patent/initiatives/glossary-initiative> [<https://perma.cc/X4JA-DR4R>].



patent disclosures.<sup>82</sup> The courts have taken modest steps to reign in vagueness in claiming, such as requiring a patent claim's scope be discernible with "reasonable certainty" and discouraging unsupported "functional claiming," the practice of claiming broadly and describing vaguely, without detailed examples or descriptions.<sup>83</sup>

But greater clarity and more details, will not, by themselves, make patents more valuable as sources of information. What makes chemical and drug patents good tools of teaching arguably has as much to do with their context, and the comparative advantages of chemical patent disclosures relative to other sources of technical information, as it does their content. For example, because drugs cannot be sold without obtaining regulatory approvals for safety and efficacy, they are often patented long before they are introduced to the market. Competitors can therefore learn from the patent years before they can learn directly from the product. In technology areas where product lifecycles are short, and corresponding patents are hard to find, the opposite can be true. The product may be close to obsolete by the time the patent is finally granted, making it more feasible to learn from a technology product itself than the patent disclosure.

In addition, the uncertain nature of chemical innovation leads to greater experimentation prior to patenting, which leads, in turn, to greater disclosure of details from practice that are not otherwise easily publicly available. Finally, the ability of follow-on innovators to locate and to read relevant patents represents another way in which contextual information, in this case, indexable information, matters. The best description is of limited use to society if it cannot be found. There are limited ways to refer to biopharmaceutical structures and building blocks, and searches are perceived to be reliable.<sup>84</sup> Chemical patents are well integrated into widely used databases of scientific literature,<sup>85</sup> and pharmaceutical companies are required to provide

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82. *Enhanced Patent Quality Initiative: Moving Forward*, U.S. PAT. & TRADEMARK OFF.: DIRECTOR'S F.: A BLOG FROM USPTO'S LEADERSHIP (Nov. 6, 2015), [http://www.uspto.gov/blog/director/entry/enhanced\\_patent\\_quality\\_initiative\\_moving](http://www.uspto.gov/blog/director/entry/enhanced_patent_quality_initiative_moving) [<https://perma.cc/C344-U2X8>].

83. See *Williamson v. Citrix Online, LLC*, 770 F.3d 1371, 1383–84 (Fed. Cir. 2014) (Reyna, J., dissenting).

84. FED. TRADE COMM'N, *THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION* 91–92 (2011), <https://www.ftc.gov/sites/default/files/documents/reports/evolving-ip-marketplace-aligning-patent-notice-and-remedies-competition-report-federal-trade/110307patentreport.pdf> [<https://perma.cc/F32C-CQVS>].

85. See, e.g., Christina Mulligan & Timothy B. Lee, *Scaling the Patent System*, 68 N.Y.U. ANN. SURV. AM. L. 289, 297 n.23 (2012) (describing the STN International database, which is available at <http://www.stn-international.de/index.php?id=123> [<https://perma.cc/5979-ML28>]).

patent data to the FDA for listing in its “Orange Book.”<sup>86</sup> In contrast, software and high technology patents, because of the non-standard ways in which technology components are described, have been described as “non-indexable.”<sup>87</sup> There is no “Orange Book” for technology patents.<sup>88</sup> Even when relevant patents can be located, innovators need to be able to read them in order to learn from them. But as described above, the law of treble damages creates risks for innovators.

The foregoing description of patent disclosure theory and practice suggests that while there is much room for improvement, there are limits to the usefulness of exclusively focusing on improving the content within patents. Patents fail to teach for a wide variety of reasons—they are poorly written; they are not detailed enough; they describe nascent, early stage technology with few working examples; they cannot be found; and they cannot be read. The likelihood of teaching is more favorable in some areas of technology, and with respect to some patents and inventions, than others. As the next Part details, fortunately, contextual information can help improve the likelihood of knowledge transfer through the patent. It can also improve the diffusion of technical information through the patent system, but outside of the patent.

## II. RETHINKING AND BROADENING THE CONCEPT OF PATENT DISCLOSURES

Part I identified some of the structural problems with the concept of patent disclosure. Much of the development of a patented technology happens after the patent has been filed, when the applicant’s ability to supplement the specification ends.<sup>89</sup> Many patents are never practiced and have little to no present commercial value, and the value of patent disclosures is likewise skewed. While I do not necessarily believe that the challenges are so great that the disclosure rationale for the patent system should be abandoned, as some have

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86. *Orange Book Preface*, U.S. FOOD & DRUG ADMIN. (June 10, 2016), <http://www.fda.gov/Drugs/DevelopmentApprovalProcess/ucm079068.htm> [<https://perma.cc/Y7PB-B782>].

87. See Mulligan & Lee, *supra* note 85, at 310; Ouellette, *supra* note 53, at 571.

88. Not yet, at least. In this symposium volume, Jeanne Fromer explores the idea. See Jeanne Fromer, *Dynamic Patent Disclosure*, 69 VAND. L. REV. 1715 (2016). Also, the marking doctrine, described *infra* at Part III, rewards those who practice their patents for disclosing product-patent links.

89. In accordance with the “no new matter” doctrine under patent law, which nevertheless allows for amendments to the *claims* to be made. See 35 U.S.C. § 132(a) (2012) (“No amendment shall introduce new matter into the disclosure of the invention.”).

suggested,<sup>90</sup> I do think that an exclusive focus on documentary disclosure is unwarranted as a matter of law and policy, and in this Part I argue for rethinking and broadening the concept of patent disclosure.

The law has long encouraged ongoing dissemination of the invention outside of the four corners of the patent, primarily through practice. For years after the Supreme Court confirmed that inventions did not have to be implemented to be patented, patent law nevertheless retained a preference for practiced patents, which Professor John Duffy has recounted by chronicling the “paper patents doctrine.”<sup>91</sup> According to this doctrine, patents that were not being worked by their patentees received worse treatment under the law—they were construed more narrowly and were more likely to be held invalid than other patents. The inverse was also true—patents that were successfully commercialized were favored in determinations of scope and patent validity.<sup>92</sup> And though this doctrine has receded in importance, patent law continues to incent the disclosure of the invention outside of the patent. Under the doctrine of nonobviousness, commercial success,<sup>93</sup> licensing, and copying of the invention by others, all factors which can only be accomplished by putting the invention into practice, weigh in favor of an invention’s patentability.<sup>94</sup> In order to be entitled to the remedy of lost profits, the patentee must demonstrate actual loss, which can only be proven if the patentee is selling a competing product.<sup>95</sup>

Even the defining right of a patent, the right to exclude, has come to depend to some degree on whether the patent is actually practiced. For years, courts granted injunctions to owners of infringed patents as a matter of course.<sup>96</sup> However, ever since the Supreme Court decided the *eBay* case, courts need to consider a variety of factors—

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90. See, e.g., Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401, 404 (2010) (advocating for the demotion of the disclosure rationale of the patent system from a primary justification to an ancillary benefit); Benjamin N. Roin, Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007, 2007–08 (2005) (calling for the abandonment of that which cannot be improved).

91. Duffy, *supra* note 18, at 1386.

92. *Id.* at 1360.

93. *Teleflex, Inc. v. KSR Int’l Co.*, 119 F. App’x 282, 285–87 (Fed. Cir. 2005), *rev’d*, 550 U.S. 398 (2007).

94. Natalie A. Thomas, Note, *Secondary Considerations in Nonobviousness Analysis: The Use of Objective Indicia following KSR v. Teleflex*, 86 N.Y.U. L. REV. 2070 (2011) (describing the use of such objective secondary considerations as evidence of nonobvious).

95. 35 U.S.C. § 284 (2012); *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1545 (Fed. Cir. 1995). The patent owner must also prove a decline in sales due to the infringement and that he would have been capable of fulfilling the demand by the infringer.

96. Colleen V. Chien & Mark A. Lemley, *Patent Holdup, the ITC, and the Public Interest*, 98 CORNELL L. REV. 1, 10 fig.1 (2012) (showing a pre-*eBay* injunction grant rate of close to ninety-five percent).

including irreparable harm, the absence of an adequate legal remedy, the balance of hardships, and the public interest—when deciding whether to grant an injunction. When patents are not practiced by the patent holder, the odds of an injunction plummet, because the inadequacy of money damages cannot be proven.<sup>97</sup>

Consistent with the incentives the patent system has historically offered for practice of the invention, I believe that the concept of patent disclosure should be broadened to include mechanisms for promoting the progress of science and the useful arts outside of the four corners of the patent. The filing of a patent enables the patentee to talk about and to publish the technology even as it evolves or teach or work with a licensee to implement it.<sup>98</sup> If the invention is practiced, members of the public can learn from this practice, potentially in combination with the patent, and adopt the technology lawfully if they have the patentee's permission. To the extent that patents<sup>99</sup> free up inventors to make ancillary disclosures that they otherwise would keep secret, it may be the case that, though ranked low among sources of information, patents are supporting access to higher-ranked sources of information including publications, informal exchanges, and licenses (Table 1).

A broadened conception of patent disclosure has several benefits. It recognizes that patents are part of a broader universe of technical teachings and documents and that situating patent disclosures within this universe is an important way to improve access to the ideas within them. It reveals opportunities to improve the patent system not only by requiring patents to be fundamentally rewritten, but also by paying more attention to the important, varied, and largely overlooked ways in which patents can promote progress during and after their term. This is important because the benefit to society from improving patent documents is self-limiting—if inventors are required to disclose too much, they will opt out of the patent system.<sup>100</sup> Below I

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97. See *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 391 (2006); Chien & Lemley, *supra* note 96, at 10 fig.1 (showing a post-*eBay* contested injunction rate among patent assertion entities to be seven percent).

98. Jason Rantanen, *Peripheral Disclosure*, 74 U. PITT. L. REV. 1, 16–20 (2012).

99. Because companies have powerful incentives to disclose—for example, to establish their reputation or brand among competitors, or in order to sign licensing deals—it can be hard to know exactly how much information would have been disseminated in the absence of the patent. Within a particular company, for example, it may be the case that scientists want to disclose, but managers want protection for the business before they do so. It is hard to know what exchanges would have happened in the absence of the patent.

100. See, e.g., Stuart J. H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1313 tbl.2 (2009) (reporting that fifty-nine percent of biotechnology start-up respondents to the Berkeley

discuss three ways in which technical information is diffused through the patent system outside of the patent document: ancillary technical disclosures related to the patent (like publications and licensing discussions), the transfer of the technology through patent licenses, and public commitments. When coupled with patents, these disclosures promote freedom to operate that I believe should be regarded, alongside reading patents, as forms of patent system disclosure worth encouraging.

### *A. Ancillary Disclosures*

Ancillary disclosures are technical disclosures that are related to the patent and build upon or enhance technical teaching within the patent. In some contexts, such as academic publishing, these disclosures would likely have happened anyway. In other contexts, however, the presence of the patent enables the patentee to make disclosures she would otherwise be reluctant to make. A number of historical examples cited by Professor Petra Moser illustrate how the presence of patents can free up, and a lack of patents can limit, the dissemination of technical information.<sup>101</sup> For example, iron foundry technology was advertised freely in nineteenth-century England, but only after it was patented.<sup>102</sup> In contrast, unpatented silk twisting technology was guarded, literally to the death, by silk weavers from Bologna fearful that their Venetian counterparts would find out about it.<sup>103</sup> Without patents, Pennsylvanian mechanics had to rely on family relations to disseminate information about cotton technology.<sup>104</sup> While patents are usually conceptualized as forcing inventors to reveal secrets, Professor Jason Rantanen has recognized instead that “many inventors want to share information about their inventions and the patent system facilitates this in ways that would not be possible in its absence.”<sup>105</sup> For example, within a firm, corporate managers and engineers are often at cross-purposes, with the former wanting to keep information proprietary in order to support comparative advantages,

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Patent Survey reported that their last decision not to patent was motivated by their desire not to disclose the invention, and that only twenty-five percent of software start-ups had this concern).

101. Petra Moser, *Patents and Innovation: Evidence from Economic History*, 27 J. ECON. PERSP. 23, 32 (2013).

102. *Id.*

103. *Id.*

104. *Id.*

105. Rantanen, *supra* note 98, at 7 (emphasis removed).

and the latter wanting to share and participate in the community.<sup>106</sup> Patenting can support this sharing, by allowing engineers to contribute to and access information from the broader technical community while deterring copying of the product.

### *B. Technology Licenses*

A justification for the patent system is that the patent system facilitates “markets for technology,” accelerating the diffusion of inventions to new applications. When firms can trade, they need not have the full suite of assets needed to develop and commercialize innovation themselves. Markets for technology have grown at a rate substantially higher than the growth rate of the world GDP since the mid-1990s. Based on survey evidence from Europe and Japan, about twenty to twenty-five percent of firms engage in licensing activity.<sup>107</sup> Technology licenses effect the transfer of technology from one setting to another through a variety of arrangements. Complex technologies are built upon standards, in which groups of patent holders agree to make their patents available to each other and to third parties on agreed-upon—often reasonable and non-discriminatory (“RAND”)—terms. Licensing deals are common in the biopharma industry<sup>108</sup> and enable the promising leads developed by start-up firms or universities to be cultivated with the resources and experience of larger and older companies.<sup>109</sup> Agreements to share technology can be exclusive or non-exclusive and can be embedded into larger strategic alliances, joint ventures, or partnerships that can cover both already developed and to-be-developed technology.<sup>110</sup>

The knowledge reflected in a patent is typically only a small part of what is required to practice the technology. Patents can bring transacting parties to the table, paving the way for the transfer of tacit

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106. JESSICA M. SILBEY, *THE EUREKA MYTH* 184–220 (2014) (documenting the tension between lawyers, who are perceived as obstructionist, secretive, and, exclusionary, and the scientists and engineers within firms, whose impulse it is to share and collaborate).

107. Ashish Arora & Alfonso Gambardella, *Ideas for Rent: An Overview of Markets for Technology*, 19 *INDUS. & CORP. CHANGE* 775, 780 (2010).

108. *BCG's Biopharmaceutical Partnering Survey—2012 Results*, BOSTON CONSULTING GROUP 3 (Nov. 2012), [http://documents.bcg.com/BCG\\_Licensing\\_2012-GENERAL-vFinal.pdf](http://documents.bcg.com/BCG_Licensing_2012-GENERAL-vFinal.pdf) [<https://perma.cc/M89P-U272>] (documenting between approximately eight hundred and nine hundred deals per year in the 2008–2011 period).

109. *See Invent It, Swap It, or Buy It: Why Constant Dealmaking Among Drugmakers Is Inevitable*, *THE ECONOMIST* (Nov. 15, 2014), <http://www.economist.com/news/business/21632676-why-constant-dealmaking-among-drugmakers-inevitable-invent-it-swap-it-or-buy-it> [<https://perma.cc/AH7F-UKG9>].

110. *See* Nancy T. Gallini, *The Economics of Patents: Lessons from Recent U.S. Patent Reform*, *J. ECON. PERSP.* 131, 142 (2002).

knowledge and other details from practice through the course of the licensing relationship.<sup>111</sup> Disclosures made during the course of license negotiations are of particular importance. According to information theory, patents facilitate transactions by increasing trust.<sup>112</sup> Within this scheme, patents provide a solution to the Arrow information paradox. This is the idea that in the absence of special legal protection, an owner cannot sell information to someone who can make better use of it, because, in the process of selling the information, he will have to disclose it, and the buyer will not need to pay for it anymore.<sup>113</sup> When the buyer is an investor who must also trust the seller to make a return on the idea, the result has been called a “double trust dilemma,” in which a transaction will not happen unless the innovator trusts the investor with the idea, and the investor trusts the innovator with her money.<sup>114</sup>

### C. Freedom to Operate

While the diffusion of technology pursuant to a patent license is generally limited to the licensee, acts like defensive patenting, cross-licensing, patent pledges, and patent nonrenewal or forbearance can support broader technology flows. Though patents provide the right to exclude, they can also, when coupled with commitments to not enforce, be used to include others in the practice of the invention. They can also support the patentee’s freedom to operate.

Holding patents defensively can support access to the technology of others in two ways. Having patents to retaliate with in the event of a lawsuit deters suits from others in the first place. These patents can also be cross-licensed to enable both sides to practice the other’s patents. Being able to access the technology of others is so important that it motivates forty-five to sixty percent of patent holders to get

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111. See Peter Lee, *Transcending the Tacit Dimension: Patents, Relationships, and Organizational Integration in Technology Transfer*, 100 CALIF. L. REV. 1503, 1523–24 (2012).

112. As Robert Merges describes, “To sell, one must disclose the information, but once the information is disclosed, the recipient has the [sic] it and need not buy it. On the other hand, if one does not disclose anything the buyer has no idea what is for sale.” Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 TENN. L. REV. 75, 81 (1994).

113. Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in NAT’L BUREAU OF ECON. RESEARCH, *THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS* 609, 615 (1962). *But see* Michael J. Burstein, *Exchanging Information Without Intellectual Property*, 91 TEX. L. REV. 227, 227–28 (2012) (criticizing the conventional premise that intellectual property can be justified on the basis of its limited ability to resolve Arrow’s paradox).

114. ROBERT D. COOTER & HANS-BERND SCHÄFER, *SOLOMON’S KNOT: HOW LAW CAN END THE POVERTY OF NATIONS* 27 (2012).

patents.<sup>115</sup> Those that hold overlapping patents enjoy greater freedom to practice each other's technology. The practice of defensive patenting, while particularly pervasive in areas like semiconductors and high-technology, where incremental advances build upon each other, is also a feature of biotechnology patenting.<sup>116</sup> As more and more areas of innovation depend on incremental, technology-based advances, the practice may become even more widespread. Cross-licensing, through which parties agree to share technology and forbear from suing each other in service of patent "détente," formally secures this freedom to operate.<sup>117</sup>

While defensive patenting supports reciprocal forbearance and freedom, patent "pledges," or promises, represent unilateral acts to provide others with the freedom to practice their patents. For example, in a recent blog post entitled *All Our Patent Are Belong To You*,<sup>118</sup> Tesla Motors pledged to "open source" its patents and make them freely available,<sup>119</sup> stating that the real competition was not the "small trickle" of non-Tesla electric cars, but the "enormous flood of gasoline cars pouring out of the world's factories every day."<sup>120</sup> Following that announcement, Toyota declared it was opening its hydrogen-car patents;<sup>121</sup> the LG group announced that it would share its twenty-nine thousand patents with small- and medium-sized companies and make another 3,058 freely available to start-ups;<sup>122</sup> Panasonic moved to open up its source code, technology, and patents in order to expedite R&D about the "Internet of Things,"<sup>123</sup> and a branch of the conglomerate Daewoo stated it would share patents and know-how relating to

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115. Colleen V. Chien, *Opening the Patent System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 795 (2016).

116. SILBEY, *supra* note 106, at 44–45, 51.

117. See Colleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 308 (2011) (describing the various ways in which patents are used to secure freedom to operate).

118. Elon Musk, *All Our Patent Are Belong to You*, TESLA MOTORS: BLOG (June 12, 2014), <http://www.teslamotors.com/blog/all-our-patent-are-belong-you> [<https://perma.cc/W3HL-SVZC>].

119. *Id.*

120. *Id.*

121. Sebastian Blanco, *Toyota Follows Tesla, Makes Hydrogen Patents Open Source*, AUTOBLOG (Jan. 5, 2015, 5:30 PM), <http://www.autoblog.com/2015/01/05/toyota-follows-tesla-makes-hydrogen-patents-open-source/> [<https://perma.cc/PMA3-ZKMT>].

122. Jack Ellis, *LG Has as Much to Gain from Its Open Innovation Drive as Korea's SMEs*, IAM (Feb. 13, 2015), <http://www.iam-magazine.com/blog/Detail.aspx?g=c4010b69-e529-48ce-b83f-de2bce3d763c> [<https://perma.cc/2MRF-V7RG>].

123. Jack Ellis, *Asian Companies Lead the Way in Royalty-free Patent License Strategies*, IAM (March 31, 2015), <http://www.iam-media.com/Blog/Detail.aspx?g=0a884580-e30f-4d5a-a827-786dd0b10316> [<https://perma.cc/XMR2-4D2P>].



liquefied natural gas engine technology with local entrepreneurs.<sup>124</sup> IBM, which has been the top filer of patents for years, Sony, Google, LG Electronics, Canon, and over nineteen hundred other companies<sup>125</sup> are signatories to the Open Invention Network's "non-aggression" pact, which commits them to granting royalty-free patent licenses over Linux technology.<sup>126</sup>

Pledges have been used to advance patent holders' interests in multiple ways. In communities where patents are seen as inconsistent with a culture of innovation and cooperation, defensive pledges serve recruiting, retention, and culture- and trust-building goals. Pledges can also help build or boost a firm's reputation or facilitate the creation of commons, or "zones of freedom," in support of open innovation. In a number of these cases, the right to enforce the patent is reserved for defensive purposes or in the case of bad faith (e.g., copying). However, their overall aim is to lessen the risk of enforcement. The decision to patent but forbear from enforcement creates a freedom to operate that expands dissemination.

In sum, though modern Court decisions conceive of information *inside* the patent document as the quid pro quo of the patent system,<sup>127</sup> the patent system supports the diffusion of technical information *outside* the patent document. As discussed in this Part, through ancillary disclosures following the filing of a patent and licensing of the patent, the patent holder shares with the world additional information about the invention. Through freedom to operate, innovators enjoy greater freedom to be inspired by, absorb, and independently stumble upon the inventions of others.

### III. IMPROVING THE CONTEXT OF PATENT DISCLOSURES

#### A. *The Diffusion of Technical Information*

The last Part argued for a broadened conception of patent disclosure that, unlike conventional approaches, includes the diffusion of technical information outside of, as well as within the patent document. In this Part, I turn to the basic mechanics of the diffusion of

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124. *Id.*

125. *The OIN Community*, OPEN INVENTION NETWORK, <http://www.openinventionnetwork.com/community-of-licensees/> (last visited Dec. 13, 2015) [<https://perma.cc/XD9G-MWR6>] (listing licensees as of December 13, 2015).

126. *OIN License Agreement*, OPEN INVENTION NETWORK, <http://www.openinventionnetwork.com/joining-oin/oin-license-agreement/> (last visited Aug. 24, 2016) [<https://perma.cc/UZJ6-QGUL>] (agreement effective May 1, 2012).

127. *See supra* note 5 and accompanying text (referring to *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 142 (2001)).

technical information—that in order for teachings to be successfully disseminated, the discloser must provide, and the recipient must receive, relevant information or permissions. The search and information costs of locating patents are often high. Parties are transacting less than they otherwise could, reading patents less than they would, and learning less than they could if both content and access were improved. The extent to which society actually receives meaningful teaching from patents and patent-related disclosures depends not only on the patent's content, but on its context—for example, facts about a patent's ownership, licensing, enforcement, and the intents of the owner to, for example, hold the patent defensively, enforce it, or license it. As Professor Joel Mokyr has argued, the mere production of knowledge does not guarantee that others will be able to exploit it.<sup>128</sup> Effective diffusion of knowledge across researchers and over time requires that individuals be aware of extant knowledge and pay the associated costs to access and capitalize upon this knowledge. Contextual information can reduce search costs by providing ways to identify among a sea of unimportant patents the most important ones.

In the context of search, what contextual information matters depends on the objectives of the consumer of patent information. When seeking to understand what solutions are currently being implemented in the market, ownership and assignment records make it possible to identify the patents of competitors, and “marking” information, when available, provides the patentee's association of particular patents with specific products through physical or virtual marking.<sup>129</sup>

For prospective readers of patents, these context clues, as well as other indicia of a patent's value, can be used to locate relevant patents. A study found that the licensing of patents, for example, serves as a signpost for commercially valuable research, resulting in more citations.<sup>130</sup> In the context of managing risk, other data points matter. The likelihood of a patent's assertion depends not only on its value but on whether it is in force and any pledges or commitments made to license it. Only one to two percent of patents are ever litigated, and in previous work, I have connected the eventual litigation of a patent to

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128. JOEL MOKYR, *THE GIFTS OF ATHENA: HISTORICAL ORIGINS OF THE KNOWLEDGE ECONOMY* 2 (2002).

129. MICHELLE K. LEE, U.S. PATENT & TRADEMARK OFFICE, *REPORT ON VIRTUAL MARKING* 9–11 (2014), [https://www.uspto.gov/sites/default/files/aia\\_implementation/VMreport.pdf](https://www.uspto.gov/sites/default/files/aia_implementation/VMreport.pdf) [<https://perma.cc/5XG3-PNKE>] (providing an overview of the marking doctrine in patent law, and the marking through virtual and physical means).

130. Kyriakos Drivas, Zhen Lei & Brian D. Wright, *Academic Patent Licenses: Roadblocks or Signposts for Nonlicensee Cumulative Innovation?* 17 (Aug. 29, 2014) (unpublished manuscript) (<http://ssrn.com/abstract=2489231> [<https://perma.cc/FH8D-CX2T>]).

earlier events in the patent's life. Patents that end up in litigation have markedly different characteristics than patents that do not. They are more likely to be reexamined and cited, and are more likely to have money borrowed against them.<sup>131</sup>

A patent's context thus refers not only to the product of the patent in its finished form, but to the process of prosecuting the patent and what happens before, during, and after the patent issues. While the enablement, written description, and best mode requirements police the content of patents, several regulations and doctrines compel the production and dissemination of context information about patents. As described below, various forms of patent information are required to be disclosed to government agencies including the SEC, FDA, DOJ, and PTO. The marking doctrine in patent law rewards the designation of products by the patents they embody.

One of the two enumerated duties of the PTO is to “be responsible for disseminating to the public information with respect to patents and trademarks.”<sup>132</sup> This duty is vested in both the Under Secretary of Commerce and the Director of the PTO.<sup>133</sup> 35 U.S.C. § 41(i) also obligates the PTO to provide access to patent information electronically. Various sections of Title 35 denote specific actions that the Director of the PTO can take to disseminate information to the public.<sup>134</sup> For example, § 10(a)(4) provides for publication of information, including “annual indexes of . . . patentees,” and § 10(b) allows the Director to publish specified information about the patent. Although the dissemination duty has not been the subject of litigation or much commentary,<sup>135</sup> the PTO has taken a number of affirmative steps to carry out this duty.

However, as described below, even when statutorily required, context patent data suffers numerous defects, including a lack of compliance with reporting requirements, incompleteness, and a lack of access to the disclosed information. The production and reporting of other types of contextual information about patents, for example, patent pledges, are largely unregulated and non-uniform across

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131. Colleen Chien, *Predicting Patent Litigation*, 90 TEX. L. REV. 283, 287–88 (2011).

132. 35 U.S.C. § 2(a)(2) (2012). The “Dissemination Clause,” 35 U.S.C. § 2(a)(2) (2012), was added via the November 29, 1999 amendment to the Patent Act of 1952. Patent and Trademark Office Efficiency Act, Pub. L. No. 106-113, § 2(a)(2), 113 Stat. 1536 (1999).

133. 35 U.S.C. § 3(a)(1) (2012).

134. *See, e.g.*, 35 U.S.C. § 9 (2012) (stating that the Director may furnish certified copies of patents to the public); 35 U.S.C. § 10 (2012) (stating what the Director may publish and in what forms); 35 U.S.C. § 12 (2012) (stating the Director may supply copies of patents to public libraries for access to the public).

135. This assertion is based on a search of Westlaw and Lexis Nexis, which yielded few results.

different contexts. Other contextual data that could reduce the costs of transacting or adopting patented technology or managing the risks associated with extant patent rights are not even being produced at present.

Thus, while conversations about patent disclosure have mostly focused on a lack of quality content, an overlooked aspect of the problem is the lack of patent context. Contextual patent information is not uniformly available at present, but making it so, and incenting further disclosure, federation, and dissemination of patent context information, could do much to reinvigorate the disclosure function of the patent system. Below, I describe the different types of contextual patent data, some of their limitations, and ways of addressing them.

### *B. Types of Contextual Information*

If a patent's content comprises the technical content of an issued patent—the words, drawings, and claims—the context of the patent can be conceptualized as comprising successive layers of information about or related to this content, as shown in Table 2. The first context layer includes what I have, in previous work, described as the intrinsic characteristics of a patent—the characteristics that the patent is “born with,” including the number of claims, the original owner of record, the size of the time spent in prosecution, the prior art citations, and the related patents. This information can be ascertained largely by inspecting the front page of a patent or its file history.<sup>136</sup>

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136. Chien, *supra* note 131, at 298–99.

**TABLE 2: FORMS OF CONTEXTUAL PATENT DISCLOSURE**

Contextual Layer	Description	Examples
<i>Disclosures Within the Patent Itself</i>	Intrinsic characteristics of a patent—characteristics that the patent is “born with”	<ul style="list-style-type: none"> <li>• Number of claims</li> <li>• Original owner of record</li> <li>• Time in prosecution</li> <li>• Prior art citations</li> </ul>
<i>Disclosures Within The U.S. Patent Office</i>	Acquired characteristics of a patent that are captured by the USPTO, often post-issuance	<ul style="list-style-type: none"> <li>• Changes in patent ownership</li> <li>• Size of the owner (e.g., small, micro-entirety)</li> <li>• Maintenance fees</li> <li>• Citation to the patent</li> <li>• Reexamination of the patent</li> <li>• Post-grant challenges to the patent (e.g., <i>inter partes</i> review)</li> <li>• Recorded patent licenses</li> </ul>
<i>Patent Disclosures Under U.S. Law</i>	Disclosures outside of the USPTO but compelled by U.S. statutes	<ul style="list-style-type: none"> <li>• Disclosures in court proceedings</li> <li>• Orange Book (FDA) disclosures</li> <li>• Materials contracts involving the patent (i.e., reported to the SEC)</li> <li>• Bayh Dole Act disclosures</li> </ul>
<i>Disclosures Within The Int’l Patent System</i>	Information regarding where else in the world the counterpart patent is filed and kept in force	<ul style="list-style-type: none"> <li>• PCT applications filed in the WIPO system</li> <li>• Foreign-filed patent counterparts to USPTO-filed patent</li> </ul>
<i>Disclosures Outside the Int’l Patent System But Connected To The U.S. Patent</i>	Information outside the patent but still associated with the U.S. patent	<ul style="list-style-type: none"> <li>• Essentiality to a patent standard</li> <li>• Subject to a commitment to license (e.g., on RAND or royalty-free terms)</li> <li>• Subject to a patent pledges</li> <li>• Availability of the patent for sale or license, with or without “know-how” or other forms of technology transfer</li> </ul>

The second context layer contains “acquired” rather than intrinsic characteristics of the patent. After a patent is granted, it can take a number of different paths. Although patent studies tend to focus on one of two stages in a patent’s life, prosecution or litigation, a number of other “events” can take place within a patent’s life, giving a patent its “acquired” characteristics.<sup>137</sup> These characteristics, captured by the PTO, include changes in patent ownership, size, and other traits of the owner that entitle her to pay reduced fees; investments in the patent, including the payment of maintenance fees; correction or reissue of the patent; reexamination of the patent; financing events involving the patent, including the use of a patent as security; citation to the patent; post-grant challenges to the patent, for example, through

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137. Chien, *supra* note 131, at 299–308.

*inter partes reexam* or covered business method review; and licensing of the patent.

Contextual disclosures outside of the PTO, but compelled by a variety of U.S. statutes, comprise a third layer of patent disclosures. These disclosures generally fall into the categories of court disclosures, regulatory disclosures, and marking disclosures. When patents are asserted, facts about the patent become a matter of public record. According to 35 U.S.C. § 290, trial courts must let the PTO know when a patent is litigated, as well as when a judgment on such litigation is issued.<sup>138</sup>

Under FDA regulations, drugmakers must disclose patents that they believe cover the branded drugs they market for publication in the so-called “Orange Book.”<sup>139</sup> Manufacturers that seek to market a generic version of the drug must certify that the Orange Book patents associated with the branded product are invalid, not infringed by the generic drug, or have expired.<sup>140</sup> Pursuant to securities regulations, public companies are required to disclose significant events that have a “material” impact on the company’s financial standing to the SEC, including patent licenses. Invention disclosure obligations also form an important part of the regulation of federally funded inventions. The Bayh-Dole Act, for example, allows recipients of federal grants, such as universities, to take title to inventions created using federal funds. While it affords universities considerable latitude when exercising their patents rights, it requires patentees to report any subject inventions<sup>141</sup> developed based on federal funding and also, at the behest of the funding agency, periodically report on utilization and efforts at obtaining utilization.<sup>142</sup>

The marking provisions of patent law incentivize the disclosure of patent-product ties, not to any particular government agency, but to the public at large. According to this doctrine, patentees may mark their

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138. 35 U.S.C. § 290 (2012):

The clerks of the courts of the United States, within one month after the filing of an action under this title shall give notice thereof in writing to the Director, setting forth so far as known the names and addresses of the parties, name of the inventor, and the designating number of the patent upon which the action has been brought. If any other patent is subsequently included in the action he shall give like notice thereof. Within one month after the decision is rendered or a judgment issued the clerk of the court shall give notice thereof to the Director. The Director shall, on receipt of such notices, enter the same in the file of such patent.

139. *See Orange Book Preface*, *supra* note 86.

140. *Id.*

141. 35 U.S.C. § 202(e)(1) (2012).

142. 35 U.S.C. § 202(e)(5) (2012) (reporting obligations). Most agencies require reporting. Arti K. Rai & Bhaven N. Sampat, *Accountability in Patenting of Federally Funded Research*, 30 NATURE BIOTECH. 953, 954 (2012).

products with the word “patent” or “pat.” and the numbers of patents that cover the product, for example, on the item itself or its packaging.<sup>143</sup> If a product is so marked in a substantially consistent and continuous way,<sup>144</sup> the patent owner is entitled to favorable treatment when the patent is enforced. More specifically, marking effects adequate legal notice, which is required to collect damages for past infringement when the patentee has put the patented apparatus into practice.<sup>145</sup> If the patent is later found by a court to be infringed, the owner of the patent is entitled to compensatory damages over the entire period of infringement, rather than only after the patentee has given actual notice.<sup>146</sup>

There are at least two other types of contextual information associated with patents. Information within the international patent system, for example, regarding where else in the world the patent is filed and kept in force, comprises a fourth layer of patent disclosure. Such information can have significant implications for the legality of generic production and sales internationally.<sup>147</sup> A fifth layer of disclosure includes information outside the patent but still associated with the patent. Examples of this type of information include standards that the patent is included in, commitments to license patents on RAND or royalty-free terms, and patent pledges such as Tesla’s public promise to “open source” its patents and make them freely available.<sup>148</sup> The

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143. For an example of an item that is directly marked, see the coffee cup holder displayed in the *False Marking: Lobbying Against the Senate Bill* article. Dennis Crouch, *False Marking: Lobbying Against the Senate Bill*, PATENTLYO (Mar. 21, 2010), <http://patentlyo.com/patent/2010/03/false-marking-lobbying-against-the-senate-bill.html> [<https://perma.cc/3GN8-U6AA>].

144. *Am. Med. Sys., Inc. v. Med. Eng’g Corp.*, 6 F.3d 1523, 1537 (Fed. Cir. 1993) (describing two ways that a patentee can provide adequate notice, (1) marking the patented product or (2) notifying the infringer of infringement. and cautioning that, once begun, “patent marking must be substantially consistent and continuous in order to satisfy section 287(a) and constitute constructive notice.”); see also Roger D. Blair & Thomas F. Cotter, *Strict Liability and Its Alternatives in Patent Law*, 17 BERKELEY TECH. L.J. 799, 802–03 (2002) (describing the three ways of providing notice: (1) commencing an infringement action against the defendant; (2) providing actual, specific notice of the infringement, prior to the filing of the lawsuit; or (3) providing constructive notice by means of patent marking, as set forth in Patent Act § 287(a)).

145. 35 U.S.C. § 287(a) (2012):

In the event of failure so to mark, no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement and continued to infringe thereafter, in which event damages may be recovered only for infringement occurring after such notice. Filing of an action for infringement shall constitute such notice.

However, the marking doctrine does not apply in the case of method claims or patentees who do not practice the invention, as described in Blair & Cotter, *supra* note 144, at 804–06.

146. 35 U.S.C. § 287(a).

147. See Amir Attaran & Lee Gillespie-White, *Do Patents for Antiretroviral Drugs Constrain Access to AIDS Treatment in Africa?*, 286 JAMA 1886 (2001).

148. See Musk, *supra* note 118.

availability of the patent for sale or license, with or without know-how or other forms of technology transfer, also represents important contextual information that may be provided through various private sector licensing or sales platforms.

### *C. Improving Contextual Information*

The neglect of contextual patent information has led to omissions in reporting, compliance, and accessibility. Take the example of the question of who owns a patent. Patent ownership is a critical input into many of the diffusive mechanisms described above. In technology transfer contexts, whether the patent is available for licensing is often tied to the identity of the owner. In the case of technical learning from the patent, likewise, ownership is key to competitive intelligence analyses and can help a researcher connect the patent to real-world, commercial embodiments, increasing the patent's relevance and usefulness. Finally, in the risk management context, who is behind a patent demand or lawsuit has tactical and strategic implications. Who owns the patent and is funding the litigation has relevance for the case's predicted outcome.

Despite the importance of ownership information, recording ownership is voluntary. Even if the original owner is disclosed, the patent may change hands, and there is no requirement that changes in assignment information be updated, though current law protects against certain types of fraud if such updating occurs.<sup>149</sup> Because there is no recordation requirement, it is impossible to know with certainty who owns a patent. Although the PTO, implementing an executive action of the White House, recently undertook an initiative to close the gap in ownership information, it ultimately concluded that legislative authority was the best way to impose this requirement.<sup>150</sup>

Even when there are rules requiring the production of contextual information, they are not necessarily followed. According to 35 U.S.C. § 290, trial courts must let the PTO know when a patent is litigated, as well as when a judgment on this litigation is issued.<sup>151</sup> The PTO is required, in turn, to include this information in the file of each

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149. 35 U.S.C. § 261 (2012).

150. Attributable Ownership, U.S. Pat. & Trademark Off. (Feb. 5, 2015), <https://www.uspto.gov/patent/initiatives/attribution-ownership> [<https://perma.cc/3WRC-TRZN>] (describing the agency's promotion of a draft rule that would require patent applicants and owners to regularly update ownership information and choose to withdraw the draft rule based on the public comments received).

151. *See* 35 U.S.C. § 290 (2012).



patent.<sup>152</sup> However, in an empirical review of six thousand online files for patents known to have been in litigation, only sixty-five percent contained the requisite notice of litigation.<sup>153</sup> Yet, knowing if a patent has been previously litigated—and the outcome of this litigation—clearly has significance for an invention’s dissemination. If the patent’s claims are invalidated as a result of the litigation, for example, they essentially enter the public domain, and are no longer the subject of the patentee’s exclusive rights. Astoundingly, this information is not reported anywhere.

Patent information has also been underreported in the context of federally funded inventions. The Bayh-Dole Act allows recipients of federal research funding, such as universities, to take title to inventions created using federal funds. While the Act affords universities with considerable latitude when exercising their patent rights, it contains a number of accountability safeguards to ensure that federally funded intellectual property is used appropriately. Specifically, grantees must report any subject invention<sup>154</sup> developed based on federal funding, and also, at the behest of the funding agency, periodically report on utilization and efforts at obtaining utilization.<sup>155</sup> But an analysis of academic biomedical patents focused on the 1980 to 2007 period found *prima facie* evidence of underdisclosure of even the government interest in patents,<sup>156</sup> with a reporting rate of sixty to ninety percent among known government-funded patents in the same period.<sup>157</sup> Utilization data, which could be used to drive greater dissemination of federally funded invention, is even harder to come by, due to concerns about secrecy.<sup>158</sup>

Yet this information is essential to several functions that directly bear on how the invention is disseminated. Without it, it is difficult for the government to determine whether to compel licensing as it is entitled to in cases where the invention has not achieved practical application.<sup>159</sup> More generally, the federal government cannot

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152. *See id.*

153. Robin Feldman, Tom Ewing & Sara Jeruss, *The AIA 500 Expanded: The Effects of Patent Monetization Entities*, 17 UCLA J.L. & TECH. 1, 65 (2013). The PTO started switching to online patent files called “file wrappers” in the early 2000s. *Id.* at n.99. While the authors did not explore the offline patent files, it is not expected that these files would have greater compliance with the reporting requirements, and in fact, they may have worse compliance.

154. 35 U.S.C. § 202(c)(1) (2012).

155. 35 U.S.C. § 202(c)(5) (2012) (reporting obligations). Most agencies require reporting. *See Rai & Sampat, supra* note 142, at 954.

156. Rai & Sampat, *supra* note 142, at 954.

157. *Id.* at 955.

158. *Id.* at 954–55.

159. *Id.* at 953.

effectively carry out its oversight role—as it has been said, if you can't measure, you can't manage.<sup>160</sup>

The poor state of reporting about federally funded inventions has not gone unnoticed. Pointing to a U.S. Government Accountability Office study that found institutional reporting of patent information to be incomplete and access-restricted, the National Academy of Sciences has recommended that federal research agencies should require research institutions to reliably and consistently provide information licensing agreements and utilization efforts.<sup>161</sup> The university community, which would need to provide this information, has suggested, in turn, that making the underlying databases with this information more accessible and usable would induce better reporting.<sup>162</sup> Currently, uniform search tools and ways of linking potential users with federal and non-federal data and information do not exist.<sup>163</sup>

Another context in which the lack of information has arguably inhibited the diffusion of technology is licensing. Actual transfer of technology from one setting to another through a technology license requires a number of steps. Not only must the parties be willing to talk to each other, a step arguably made easier for the seller by the protective presence of patents, but the parties also need to find each other, and then go through a series of other steps, including agreeing on scope, price, and term before a deal can be signed.

Corporate patent holders are willing to license sixty percent more patents than are currently licensed;<sup>164</sup> the number is likely even higher among university patent holders. There is room for reducing duplicative research. The European Union estimates that twenty billion dollars are spent every year to develop innovations and technologies that have already been built.<sup>165</sup> But to prevent this duplication, the parties need to be aware of each other and willing to transact, and they must agree on the terms of transfer.

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160. NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *MANAGING UNIVERSITY INTELLECTUAL PROPERTY IN THE PUBLIC INTEREST* 10–11 (Stephen A. Merrill & Anne-Marie Mazza eds., 2011).

161. *Id.* at 11.

162. Higher Education Association, Comment Letter in Response to Request for Information on the White House's Strategy for American Innovation (Sept. 23, 2014), [https://www.whitehouse.gov/sites/default/files/microsites/ostp/compiled\\_rfi\\_responses\\_redacted.pdf](https://www.whitehouse.gov/sites/default/files/microsites/ostp/compiled_rfi_responses_redacted.pdf) [https://perma.cc/AK3C-SYR6] (responding to Question 23).

163. *Id.*

164. Alfonso Gambardella et al., *The Market for Patents in Europe*, 36 RES. POL'Y 1163, 1164, 1180 (2007) (reporting that while eighteen percent of European patents are offered for licensing, only eleven percent are actually licensed).

165. Ashish Arora et al., *Markets for Technology and Their Implications for Corporate Strategy*, 10 INDUS. & CORP. CHANGE 419, 424 n.5 (2001).

Why are technology transactions not happening more readily? Some of the most frequently cited obstacles to licensing include search costs in finding a technology licensee and friction in the licensing transaction. There is no “universal marketplace” for technology in which patentees can signal their willingness to license their technology or potential buyers can express their desire to purchase technology or patents. Specialized public and private platforms exist to advertise patent purchase opportunities,<sup>166</sup> but the market has been characterized as fragmented and “blind,”<sup>167</sup> and it is difficult to connect willing buyers and sellers.

Deal friction is also a problem. Within commercial contexts, Professors Ashish Arora and Alfonso Gambardella cite the buyer’s fear of a “winner’s curse” because technology sellers can negotiate with a number of potential technology buyers at the same time, leading the winner to overpay. While this dynamic is not necessarily limited to technology transactions, because of the unique nature of intangible goods and the lack of an agreed-upon approach to technology valuation, the parties lack a common price anchor, and therefore may be separated by an unbridgeable distance in negotiations.<sup>168</sup> University intellectual property negotiations are often accompanied by similar friction and delays.<sup>169</sup> But if license data were reported more consistently and available more readily, more data would be available and, through transparency, would create greater trust between the parties. Licensing data exists in pockets throughout the federal government, such as in court records, SEC filings, PTO records, and government legal departments monitoring outbound and inbound licenses. This data, however, is very difficult to access, as it is hard to find and often, even though it is government data, is locked behind confidentiality barriers created, for example, by oversealing of court records and FOIA exemptions. However, making license data available in sanitized form, or limiting disclosure to expired licenses, could overcome some of these barriers. Enabling publicly reported licensing data to be more readily found and federated could go far to fill the gaps in our quantitative understanding of how patents are valued and licensed.

The good news is that, under the auspices of the Open Government Data movement, greater attention has been paid to the importance of making existing patent data more accessible and

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166. See, e.g., *Patent Marketplace*, IDEA CONNECTION, <https://www.ideaconnection.com/patents/> (last visited Oct. 1, 2016) [<https://perma.cc/7G8G-2BW4>].

167. Mark A. Lemley & Nathan Myhrvold, *How to Make a Patent Market*, 36 HOFSTRA L. REV. 257, 257 (2007).

168. Arora & Gambardella, *supra* note 107.

169. NAT’L RESEARCH COUNCIL OF THE NAT’L ACADS., *supra* note 160, at 9, 10.

transparent. The PTO, under the auspices of the Office of Chief Economist, has moved to make large quantities of contextual patent data, such as prosecution facts, maintenance fee data, and assignment and licensing data, more readily available.<sup>170</sup> The market has responded, seeding over one hundred companies with open patent data as of 2016,<sup>171</sup> many aggregating contextual data from different sources and making it more accessible to various communities of interest. To cite just two examples, the company Covalent Data, which is focused on supporting and encouraging technology transfer deals, aggregates data not only on patent grants, but related applications, publications, grants, adjacent technologies, and licensing policies associated with technologies in order to help venture capitalists and other investors determine whether they want to license technology from universities.<sup>172</sup> The company Innography combines U.S. prosecution, licensing, and litigation data with international patent data, creating the ability to do comparative analyses of coverage and technology trends.<sup>173</sup>

Other government agencies with troves of patent data should follow suit and enforce existing reporting requirements, take steps to ensure its quality, and default to opening up this data in accessible and meaningful ways on the earliest practicable timeframe. Across various datasets, ensuring that data can be connected to each other, for example, by patent number or unique patentee identifier ID, will increase the usefulness of the contextual information.

Finally, capturing more contextual data from patent holders, particularly about their uses of and intents for patents, could do much to improve the diffusion of technical teaching. The marking requirement suffers from gaps in coverage and use, and existing marking data is not available except on a piecemeal basis. Yet knowing what patents cover a technology can improve understanding of it. Similarly, enabling patent pledges to be recorded in a registry, including by third party beneficiaries, would make them more reliable

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170. *Research Datasets*, U.S. PAT. & TRADEMARK OFF. (Oct. 28, 2016), <https://www.uspto.gov/learning-and-resources/ip-policy/economic-research/research-datasets> [https://perma.cc/XUR8-33BT] (describing numerous patent dataset releases “to support the study of the economics of patents and trademarks”).

171. See Comment Letter from Colleen V. Chien, Assoc. Professor of Law, Santa Clara Univ. Sch. of Law, and Brian J. Love, Assistant Professor of Law, Santa Clara Univ. Sch. of Law, to the Hon. Michelle K. Lee, Director, U.S. Patent & Trademark Office (Feb. 12, 2016), [http://www.uspto.gov/sites/default/files/documents/casestudies\\_f\\_chien%26love\\_12feb2016.pdf](http://www.uspto.gov/sites/default/files/documents/casestudies_f_chien%26love_12feb2016.pdf) [https://perma.cc/94D5-QBKP].

172. COVALENT DATA, <https://covalentdata.com/> (last visited Sept. 4, 2016) [https://perma.cc/T77M-VVWV].

173. *Who We Are*, INNOGRAPHY.COM, <https://www.innography.com/who-we-are> (last visited Sept. 4, 2016) [https://perma.cc/ET5B-DTAF].

and legally enforceable.<sup>174</sup> Beyond that, creating more options for patentees to express their intents for patents, by electing into a “defensive only” option, or by indicating that their patents are available for licensing, would also help technology producers and adopters more readily find each other.

The PTO currently offers an option to list patents in the Official Gazette as available for license or sale, upon payment of the fee set forth in 37 C.F.R. § 1.21(i).<sup>175</sup> In 2014, the PTO sought public comment on expanding its capability to support the voluntary reporting of licensing offers and related information for the PTO to make available to the public. Such licensing information could include

willingness to license, as well as licensing contacts, license offer terms, or commitments to license the patent, e.g., on royalty-free or reasonable and non-discriminatory terms. In accordance with best practices in technology transfer, this information could also include permitting a patent applicant or owner to include keywords, technical fields, and/or descriptive information about the underlying technology, related technical papers and publications, and desired attributes in a technology partner.<sup>176</sup>

However, no action has been taken since that initial request. Since 2012, the World Intellectual Property Organization (“WIPO”) has offered a similar option to report licensing terms and information to PCT applicants in order to promote voluntary licensing.<sup>177</sup> In November 2013, it introduced the WIPO GREEN online marketplace, to promote innovation and diffusion of green technologies.<sup>178</sup> Part of the problem with these initiatives, however, may be that if patentees publicly declare the availability of their patent for licensing, they may lose rights to injunctive relief, as money damages should be adequate to compensate for infringement of the plaintiff’s intellectual property. However, offers to exclusively license or to license on particular terms,

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174. This idea is advanced by Jorge L. Contreras in *Patent Pledges*, 47 ARIZ. ST. L.J. 543 (2015).

175. See U.S. PATENT AND TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE 1703 (9th ed. 2014) [hereinafter MPEP]. For examples of such listings, see U.S. Patent & Trademark Office, *Patents and Serial Numbers Available for License or Sale*, OFF. GAZ. PAT. & TRADEMARK OFF. (Jan. 10, 2012), <http://www.uspto.gov/web/offices/com/sol/og/2012/week02/TOC.htm#ref18> [<https://perma.cc/5TAY-7QH3>]; and U.S. Patent & Trademark Office, *Serial Numbers and Patents Available for License or Sale*, OFF. GAZ. PAT. & TRADEMARK OFF. (Dec. 11, 2007), <http://www.uspto.gov/web/offices/com/sol/og/patlics.htm> [<https://perma.cc/G6TB-QT6B>].

176. See U.S. Patent & Trademark Office, *Changes To Require Identification of Attributable Owner*, OFF. GAZ. PAT. & TRADEMARK OFF. (Mar. 4, 2014), <https://www.uspto.gov/web/offices/com/sol/og/2014/week09/TOC.htm> [<https://perma.cc/4S2U-579F>].

177. *New PCT Licensing Feature*, WORLD INTELL. PROP. ORG.: PCT NEWSLETTER (Dec. 2011), [http://www.wipo.int/pct/en/newslett/2011/12/article\\_0001.html](http://www.wipo.int/pct/en/newslett/2011/12/article_0001.html) [<https://perma.cc/H88Q-9CEQ>].

178. *WIPO GREEN—The Marketplace for Sustainable Technology*, WIPO, <https://webaccess.wipo.int/green/> (last visited Oct. 1, 2016) [<https://perma.cc/7TFL-LT5U>].

which indicate a *conditional* willingness to license, should not necessarily give rise to such an inference.

#### IV. IMPROVING THE CONTEXT FOR READING PATENTS

##### A. *Removing Obstacles to Reading Patents*

Two other changes to the contexts in which patent disclosures are accessed could improve the ability and desire of innovators to read patents without additional investments in the ways patents are written and examined. The first would be to address obstacles to reading patents historically posed by the willfulness doctrine, which has historically assigned treble damages to the knowing infringement of patents.<sup>179</sup> While the extent of this deterrent effect is unknown, the practice in some industries of largely “ignoring patents,”<sup>180</sup> in part because of a fear of the consequences, does not support learning from patents. Like others, I recommend that this structural impediment to patent disclosure be addressed.<sup>181</sup>

In *Halo*, the Supreme Court, interpreting 35 U.S.C. § 284, held that courts have the discretion to treble damages in cases of “egregious infringement behavior.”<sup>182</sup> In reaching its decision, it eschewed the previous, rigid two-step test of willfulness, which required proof of objective recklessness by the infringer, and that the risk of infringement “was either known or so obvious that it should have been known to the accused infringer.”<sup>183</sup>

Though much will depend on how the Court’s decision will be interpreted by the lower courts, the decision seems to cut in two ways with respect to reading patents. On one hand, *Halo* makes it easier for courts to find willfulness, increasing the risks associated with infringement and any acts that could contribute to the appearance of deliberate copying.<sup>184</sup> On the other hand, however, the decision also

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179. *Halo Elecs., Inc. v. Pulse Elecs., Inc.*, 136 S. Ct. 1923, 1928 (2016) (citing the standard for willfulness set forth by the Federal Circuit’s decision in *In re Seagate Technology, LLC*, 497 F. 3d 1360, 1371, i.e., that the patentee must demonstrate “that the risk of infringement ‘was either known or so obvious that it should have been known to the accused infringer’ ”); see also Fromer, *supra* note 12, at 588; Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 142 (2006) (describing the penalty for reading patents embedded in the willfulness standard).

180. See Lemley, *supra* note 48; see also FED. TRADE COMM’N *supra* note 84, at 80 (asserting, based on testimony, that “IT firms frequently do not perform clearance searches when introducing products, instead essentially ‘ignor[ing] patents’ ”).

181. Fromer, *supra* note 12; Holbrook, *supra* note 179.

182. *Halo Elecs. Inc.*, 136 S. Ct. at 1932.

183. *Id.* at 1930 (citing *In re Seagate Tech., LLC*, 497 F. 3d 1360, 1371 (2007) (en banc)).

184. *Id.* at 1932–34.

relaxed the connection between treble damages and specific knowledge of the patent by shifting the focus from *knowledge* of the risk of infringement of the patent (the second prong of the *Seagate* test) to willful and deliberate copying and appropriation, in several of the cited examples, of the plaintiff's product.<sup>185</sup> If lower courts clarify that mere knowledge of the patent, without indicia that the patentee took advantage of the knowledge within the patent, won't trigger treble damages,<sup>186</sup> this could further reduce the risks associated with reading patents. As a complement to such an action, administrators could make it easier for patentees to search among expired and lapsed patents, which members of the public should feel free to be able to read freely, without penalty. There is currently no easy way to access just these patents. To make the determination of whether a patent is in force, members of the public need to go through a series of steps, including checking the maintenance fee record associated with a patent and checking the file history of the patent to see if the PTO gave any extra term to the patent. These additional costs raise barriers to learning from even expired patents.

### *B. Default to Open (Early Publication and Publication of Provisionals)*

What also seems clear is that the most useful disclosures within patents are, unsurprisingly, those that do not appear elsewhere, for example, details from practice, protocols, and early disclosures of products before they appear on the market. Though the built-in bias of the patent system towards early disclosure results in less information being available to the inventor at the time of filing, it also has the advantage of producing a description of the invention that predates the commercial embodiment.

Thus, another way to improve patent disclosure is to leverage the temporal advantage of patents by creating options to make patent disclosures available as early as practicable. Currently, certain patent applications are never published, and patent applications that are subject to publication requirements generally only publish eighteen months after the first filing of the application. However, some product cycles are short, and researchers sometimes do not read patent specifications because they consider the information contained in them

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185. *Id.* at 1932–34. The idea of shifting the willfulness standard to one that penalizes the adoption of technology with knowledge that it was derived from the patentee, whether from the patent or another source was previously described by Mark A. Lemley & Ragesh K. Tangri in *Ending Patent Law's Willfulness Game*, 18 BERKELEY TECH L.J. 1085, 1116–19 (2003).

to be outdated by the time it is publicly available.<sup>187</sup> To the extent that early publication does not undermine the incentive to patent, and may even be helpful to the inventor, it should be encouraged.

Historically, publishing patent applications that have not yet matured into patents has been disfavored in the United States. Other countries have long required patent applications to be published after eighteen months of filing, but the United States has resisted this rule in the past on the basis that it would undermine the incentives to invent and to disclose provided by the patent system. When the United States finally adopted the international rule, as part of a package of measures to harmonize U.S. and international law called the American Inventors Protection Act, a group of twenty-four Nobel laureates harshly criticized the change, claiming that it would be “very damaging to American small inventors and thereby discourage the flow of new inventions.”<sup>188</sup> Though the change went forward, it did so with qualification, reserving to applicants the option to elect secrecy if a patent is not foreign-filed. Provisional patent applications are never published, also presumably to keep inventors’ secrets.<sup>189</sup>

But despite the strong rhetoric, it is unclear that patentees actually desire secrecy. According to a recent study of 1.8 million granted patents filed at the PTO from 1995 to 2005, eighty-five percent of inventors filing a patent since 2000 with the option of keeping their patent applications secret chose not to,<sup>190</sup> and even paid to have their secrets revealed.<sup>191</sup> Small inventors, about whom critics were particularly concerned, were actually more willing to have their applications published than large inventors.<sup>192</sup>

To the extent patent disclosures are useful, earlier disclosure benefits the public.<sup>193</sup> But early disclosure can also benefit patentees. First, it can enable patentees to stake out their position in a

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187. Holbrook, *supra* note 179, at 143–45.

188. *An Open Letter to the U.S. Senate*, EAGLE FORUM, [http://www.eagleforum.org/patent/nobel\\_letter.html](http://www.eagleforum.org/patent/nobel_letter.html) (last visited Sept. 1, 2016) [<https://perma.cc/P6A5-RSPA>].

189. *1129 Request for Early Publication [R-11.2013]*, U.S. PAT. & TRADEMARK OFF. (Nov. 4, 2015), <http://www.uspto.gov/web/offices/pac/mpep/s1129.html> [<https://perma.cc/3F82-WNGT>].

190. Stuart Graham & Deepak Hegde, *Do Inventors Value Secrecy in Patenting? Evidence from the American Inventor’s Protection Act of 1999*, at 2 (2013) (unpublished manuscript).

191. Courtenay C. Brinckerhoff, *Can You Wait to Take Advantage of USPTO Fees Decreasing January 1, 2014?*, FOLEY & LARDNER LLP (Oct. 23, 2013), <http://www.pharmapatentsblog.com/2013/10/23/uspto-fees-decreasing-january-2014/> [<https://perma.cc/EX9C-LVUD>] (reporting the three-hundred dollar fee that, until 2014, accompanied publication of a patent).

192. Graham & Hegde, *supra* note 190, at 7 (reporting that large inventors choose disclosure over fifty percent of the time and U.S. small inventors choose disclosure over sixty percent of the time).

193. Peter S. Menell & Michael J. Meurer, *Notice Failure and Notice Externalities*, 5 J. LEGAL ANALYSIS 1, 30 (2013).



technological area,<sup>194</sup> in some cases, leading to earlier licensing of the invention. A study compared biomedical patent inventions published eighteen months after the patent application with inventions that were not disclosed until the patent issued.<sup>195</sup> Pre-issuance publication was associated with an average reduction in the time to licensing by 8.5 months.<sup>196</sup> This difference was attributed to the earlier clarification of the inventor's rights. Another benefit of publication is that it enables applications that never mature into patents to be used as references that the PTO can rely on when examining other patents, and thereby prevent others from patenting the same idea by another. Currently, forty-eight percent<sup>197</sup> of an estimated two million provisional patent applications<sup>198</sup> are never even released to the public<sup>199</sup> because they do not mature into utility patent applications. Further, a number of utility applications are abandoned prior to publication. Assuming the patent applicant does not otherwise intend to patent the idea, giving applicants the option to publish the now-secret applications provides a way to prevent others from doing so.

For these reasons, it is worthwhile to consider resetting the defaults that apply to the publication of patents.<sup>200</sup> While the option to publish a patent application upon filing, or "early publication," technically exists for utility applications,<sup>201</sup> the PTO could do more to publicize and encourage the election of this option. For example, it could make publication upon filing the default but enable applicants to opt out. Government agencies that fund patented research, likewise, could prioritize early publication for the inventions that they support and fund. The PTO could also publish provisional applications upon submission or after the one-year priority period has passed, but with

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194. Scott Baker & Claudio Mezzetti, *Disclosure as a Strategy in the Patent Race*, 48 J.L. & ECON. 173, 175 (2005).

195. Deepak Hegde & Hong Luo, *Imperfect Information, Patent Publication, and the Market for Ideas* 3 (Harvard Bus. Sch. Strategy Unit, Working Paper No. 14-019, 2013).

196. *Id.*

197. Dennis Crouch, *Abandoning Provisional Applications*, PATENTLYO (Jan. 2, 2013), <http://patentlyo.com/patent/2013/01/abandoning-provisional-applications.html> [https://perma.cc/Q7RD-QK] (reporting a forty-eight percent provisional abandonment rate in 2011).

198. Dennis Crouch, *Claiming Priority to Provisional Applications*, PATENTLYO (Apr. 8, 2014), <http://patentlyo.com/patent/2014/04/priority-provisional-applications.html> [https://perma.cc/RY39-FRU2].

199. When a patent application claims benefit to a provisional application, the provisional application is accessible through the public electronic record of the application; however, such applications are not available in bulk.

200. Many of these ideas are discussed in Colleen Chien, *Why It's Time to Open Up Our Patent System*, WASH. POST (June 30, 2015), <https://www.washingtonpost.com/news/innovations/wp/2015/06/30/why-its-time-to-open-up-our-patent-system/> [https://perma.cc/MRQ8-AN6G].

201. *See 1129 Request for Early Publication [R-11.2013]*, *supra* note 189.

the option for applicants to opt out of this publication. A combination of these options would, in effect, create a “default to open” that would still allow applicants to opt out of if they so choose.

### CONCLUSION

In order to get a patent, an inventor, through her patent lawyer or agent, must describe an invention in enough detail so that others can make and learn from it. But the learning that the patent system supports depends critically on a host of factors—for example, whether the patent is in force, is commercially important, can be found by follow-on innovators or potential licensing partners, is held for defensive or offensive reasons, and is published early enough and with enough detail to matter.

In this Article, I have argued that we need to enlarge the concept of patent disclosure to encompass not only the content of the patent, but its context and to consider how the greater availability of contextual information about the patent can promote the progress. This contextual information represents not only the final “product” of a patent as issued, but the “process” by which it is made and used, the timing and terms on which it is provided to the world, and the publicly reported transactions in which the patent is involved. Making contextual information more accessible, defaulting to the publication of provisional applications after they expire and the publication of utility applications upon filing, and removing the penalty for reading patents would do much to reinvigorate the disclosure function of the patent system—in many cases, using already existing information.