PERIPHERAL DISCLOSURE

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The requirement that inventors disclose their inventions in return for a patent is one of the primary justifications for the patent system. Yet that justification has been subject to substantial criticism. Conventional disclosure scholarship focuses on an inventor's disclosure within the patent itself, a document that arguably fails to provide meaningful information to the public and future inventors. As a result, conventional disclosure theory has largely been relegated to the category of a straw man that scholars address perfunctorily when criticizing the patent system.

This article rejects the idea that patents serve little to no disclosure function, not by demonstrating that patents themselves convey useful information, but by pointing to the disclosure of information that would not occur in the absence of a patent system, a concept I call "peripheral disclosure." Examples of such disclosures are all around us: the inventor-employee who is only allowed to publish about ongoing research after patent protection has been secured; the marketing materials describing technical information that could not be shared in the absence of a patent; the mere existence of self-disclosing inventions–inventions whose technological underpinnings can be easily perceived or reverse engineered once those inventions are placed in the stream of commerce–that act as the seeds of future innovation, to name but a few.

This theory of peripheral disclosure offers a powerful justification for the patent system – one with profound implications for the perpetual discussion over whether the benefits of the patent system outweigh its costs in terms of promoting invention, and should be taken into account when debating the potential effects of new legislation, such as the recently enacted Leahy-Smith America Invents Act.

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Table of Contents

INTRODUCTION

It is no secret that information is the lifeblood of innovation. Each new discovery, each new invention, reveals previously hidden pathways for advancing science and technology. Information dictates the choices open to scientists and inventors; it identifies routes that were unsuccessfully attempted; it gives innovators the basic tools necessary to accomplish their work.[1]

[1] The fundamental role information plays in the innovation process is largely undisputed. Meaningful technological advancement simply cannot occur in its absence. The concept of building upon the work of others is traditionally captured by the image of standing on the shoulders of giants, a metaphor used most famously by Isaac Newton. This primacy of information in the innovation process holds notwithstanding suggestions that the most significant innovations may be conceived of by newcomers to a given field.

Given the critical role information plays in invention, it is unsurprising that scholars have argued that a primary justification for the patent system is that it encourages the disclosure[2] of information by requiring inventors to provide, in the patent document, information about how their invention works.[3] As Jeanne Fromer recently commented, "[p]atent disclosure is essential…[it] indirectly stimulates future innovation by revealing the invention's design so that others can use it fruitfully when the patent term expires and design around, improve upon, or be inspired by the invention, even during the patent term."[4] This view is echoed by scholars who believe in the importance of the disclosure function of the patent system, a concept often referred to as disclosure theory.[5] Nor is it of concern only to academics: the disclosure requirement of patents is commonly cited by courts as a justification for the patent system.[6]

See Thomas Kuhn, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS 89-90 (1962). Without the necessary conceptual tools and pre-existing scientific frameworks, such pioneers would themselves be unable to produce their revolutionary concepts.

[2] I distinguish between the *disclosure* of information and the *dissemination* of information. The former refers to information that the inventor provides to the public, including other inventors. It represents the inventor's own contribution to technological progress. I use information *dissemination* to refer to the spread of information once disclosed. The inventor who teaches another how to practice a new technology is an example of the former; the student who in turn teaches another how to practice the technology is an example of the latter. The distinction is important because while some rules may encourage information *disclosure*, they may in some ways hinder its further *dissemination*, an issue I address in Part __.

[3] The two traditionally advanced justifications for the patent system are disclosure theory and incentive theory. This Essay focuses primarily on disclosure theory. For a discussion of the various theories of the patent system, *see, e.g.,* Mark A. Lemley, *The Myth of the Sole Inventor* 35-54 (Stanford Public Law Working Paper No. 1856610, July 21, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1856610(forthcoming in MICHIGAN LAW REVIEW). (author's note: pages refer to a pre-publication draft).

[4] Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 541 (2009).

[5] In addition to Professor Fromer, scholarship in support of the value of patent disclosure includes: Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 627 (2010); Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?* (Yale U. L. Sch. Working Paper Series, July 15, 2011) *available at* http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=1762793; Dan L. Burk, *The Role of Patent Law in Knowledge Codification*, 23 BERKELEY TECH. L.J. 1009 (2008); Margaret McInery, Note, *Tacit Knowledge Transfer with Patent Law: Exploring Clean Technology Transfers*, 21 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 449 (2011). Others discussing disclosure theory take a more neutral approach while still recognizing the potential value of patent disclosure. *See* Benjamin Roin, Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007 (2005); Rebecca Eisenberg, *Patents and the Progress of Science*, 56 U. CHI. L. REV. 1017, 1028-30 (1989).

[6] *See, e.g*. Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 480-81, 484, 94 S.Ct. 1879,

Conventional disclosure theory is based on the information contained within the patent document itself.[7] That information is part of the quid-pro-quo exchange with inventors: in return for the exclusive right to practice their invention, inventors must describe that invention in the patent and explain how it is made and used.[8] Theoretically, this disclosure ensures that anyone may create the invention once the patent has expired, and permits future inventors to design around or build upon the invention during the patent term.[9]

Theoretically, that is. In practice, patent disclosures are perhaps not so beneficial. Criticisms abound.[10] Critics contend that the disclosures are often largely useless from a technical perspective, as applicants have an incentive to provide information that meets the minimum thresholds of patentability – but no more.[11] In practice, then, disclosures may be incomplete and opaque.[12] Applicants may disclose information about some aspects of their invention, but elect to maintain others as secrets.[13] These weaknesses are further compounded by the structure of the patent system itself, which through the willful infringement doctrine actively discourages companies from reading the patents of their competitors![14] Taken as a whole, these limitations suggest that patent law may do a poor job of effectuating the disclosure of technological information through patents.[15]

1886 (1974) ("In return for the right of exclusion-this 'reward for inventions,' the patent laws impose upon the inventor a requirement of disclosure. To insure adequate and full disclosure so that upon the expiration of the 17-year period 'the knowledge of the invention enures to the people, who are thus enabled without restriction to practice it and profit by its use,' the patent laws require that the patent application shall include a full and clear description of the invention and 'of the manner and process of making and using it' so that any person skilled in the art may make and use the invention.").

[7] *See generally* scholarship cited *supra* note 4.

[8] *See, e.g.,* Fromer, *supra* note 3, at 548; Pfaff v. Wells Electronics, Inc., 525 U.S. 55, 63, 119 S.Ct. 304, 310 (1998) (". . . the patent system represents a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology, in return for an exclusive monopoly for a limited period of time.")

[9] Fromer, *supra* note 3, at 549.

[10] *See, e.g.,* Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401, 410-411 (2010); Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123 (2006); Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81 (2004); *Roin*, *supra* note 4, at 2014-2026; Lemley, *supra* note 2, at 48-51; Jonas Anderson, *Secret Inventions*, 18-21 (forthcoming in BERKELEY TECH. L.J.).

[11] *See* Roin, *supra* note 4, at 2024-26.

[12] *See* Roin, *supra* note 4, at 2024-25.

[13] *See* Roin*, supra* note 4, at 2024.

[14] For a discussion of these criticisms, *see, e.g.,* Holbrook, *supra* note 8, at 139-43.

[15] Or as Mark Lemley recently suggested, "[t]he theory that patents are valuable for the

These criticisms are ultimately directed at two central precepts underlying conventional disclosure theory. First, conventional disclosure theory focuses entirely on the disclosure of the *patent*: the information contained in the document itself. Second, underlying conventional disclosure theory is the idea that patent law promotes information dissemination by *forcing* inventors to reveal the technological underpinnings of their inventions, a function it achieves through the requirements of enablement, written description, and best mode.[16]

In this article, I suggest that adherence to these two foundational precepts of conventional disclosure theory causes us to overlook an equally important role that patents play in the disclosure of technical information. Instead of continuing along this path, I propose a fundamentally different theory of disclosure. Rather than thinking about the disclosure function in terms of what patents themselves reveal, we should instead focus on the role patents play in causing the disclosure of valuable technical information through other vehicles. And rather than looking at the patent system as needing to *force* inventors to reveal their secrets, we should instead recognize that in many instances inventors *want* to share information about their inventions and the patent system frees them up to do so in ways that would not be possible in its absence.[17] Once these two elements are recognized, we can begin to appreciate the far greater role patents have played in technological advancement over the past two centuries than previously recognized.

Drawing upon this background, this article offers the first substantive articulation of a concept that I call "peripheral disclosure," a term that refers to the disclosure of information that would not occur in the absence of a patent system.[18] Examples of such disclosures are all around us: the

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information they disclose, then, doesn't seem to describe the real world – at least, not enough so to stand alone as a justification for having a patent system." Lemley, *supra* note 2, at 52.

[16] These requirements are laid out in 35 U.S.C. § 112. One might also add claim construction to this list, if one were to adopt Judge Lourie's view of its role as restricting patent scope based on the patent's disclosure. *See* Jason Rantanen, *Crown Packaging v. Ball Metal Beverage Container: The Problem-Solution Approach to Written Description Issues*, PATENTLY-O, April 12, 2011, 11:30 pm, http://www.patentlyo.com/patent/2011/04/crown-packaging-v-ball-metal-beverage-container-the-problem-solution-approach-to-written-description.html.

[17] In proposing the idea of peripheral disclosure, I recognize that not all inventors will have an incentive to share information about their inventions, an issue I address in Parts II and III.

[18] No prior author has ever developed the concept I refer to as peripheral disclosure in any depth. Although the broad idea of patents as facilitating (rather than forcing) information disclosure is one that is frequently mentioned in articles and texts, only a

inventor-employee who is only allowed to publish about ongoing research after patent protection has been secured; the marketing materials describing technical information that could not be shared in the absence of a patent; the mere existence of self-disclosing inventions–inventions whose technological underpinnings can be easily perceived or reverse engineered once those inventions are placed in the stream of commerce–that act as the seeds of future innovation, to name but a few.

This theory of peripheral disclosure offers a powerful justification for the patent system – one with profound implications for the perpetual discussion over whether the benefits of the patent system outweigh its costs in terms of promoting invention. Scholars have long debated the fundamental question of whether the existence of the patent system is justified.[19] Traditionally, to the extent this scholarship addresses disclosure,

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sentence or two is devoted to the idea without any source citation. *See, e.g.,* Craig Allen Nard & R. Polk Wagner, PATENT LAW 2 (Foundation Press 2007) (noting that patents may reduce the incentive to hide information); John M. Golden, *Principles for Patent Remedies*, 88 Tex. L. Rev. 505, 522 (2010) (commenting that the absence of patent rights might cause scientists, engineers, and their employers to fail to make many currently routine disclosures such as through trade shows and conventions, promotional materials and manuals); William M. Landes & Richard A. Posner, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 328 (Belknap Press of Harvard U. Press 2003) ("In the absence of a patent option, inventors would invest many more resources in maintaining trade secrecy (and competitors in unmasking them) and inventive activity would be inefficiently biased toward inventions that can be kept secret."). The concept of peripheral disclosures might be considered a form of patent spillover, *see* Brett M. Frischmann & Mark Lemley, *Spillovers*, 107 COLUM. L. REV. 257 (2007), although even in that context the idea of information spillovers resulting from patents is heavily under theorized. The most extensive discussion of which I am aware is by Mark Lemley in his recent article *The Myth of the Sole Inventor*, in which he briefly sketches the idea before rejecting it. Lemley, *supra* note 2*,* at 52. Timothy Holbrook likewise raises the possibility, although he limits it to pre-patent disclosures and publications. Holbrook, *supra* note 8, at 146 ("An inventor who anticipates obtaining a patent on an invention will be more willing to publish a scientific article or other sort of disclosure to the public, because she knows her invention will eventually be protected by a patent and not by a trade secret."). A few other commentators mention similar ideas, although no one has analyzed the issue in any depth. In his conclusion, for example, Benjamin Roin suggests that patents may allow "inventors to discuss and publicize their research freely." Roin, *supra* note 4, at 2227-28. *See also* Anderson, *supra* note 8, at 21 (making a similar comment and citing Roin). There is at least one specific behavior that could fall within the scope of "peripheral disclosure" that has been heavily theorized already, that being the role patents play in facilitating licensing transactions involving technical know-how, a concept I discuss in Part III.E.

[19] The literature relating to this debate could fill an entire article by itself. Major examples include Edmund Kitch, *The Nature and Function of the Patent System*, 20 J.L. & Econ. 265, 276 (1977) to 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);

it does so only in the form of conventional disclosure theory.[20] Peripheral disclosure theory offers a response to this critique of the patent system, and suggests that a system that encourages secrecy may have a detrimental effect on invention and innovation. Indeed, the idea of peripheral disclosure suggests that rather than failing, the patent system as a whole is providing significant informational benefits that cannot be identified simply by looking at the contents of the patent document itself.

The existence of peripheral disclosure also adds an important component to consider when examining the prospective impact of changes to the patent system, such as those implemented in the recently-enacted *Leahy-Smith America Invents Act* (the "AIA").[21] Much of the conversation among politicians, lawyers, and scholars both before and after passage of the AIA has focused on the effects that the new patents laws will have on the incentive to invent and the effects on competition.[22] Yet, as I discuss in

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Rebecca Eisenberg, *Patents and the Progress of Science*, 56 U. CHI. L. REV. 1017 (1989); Kenneth Dam, *The Economic Underpinnings of Patent Law*, 23 J. Legal Stud. 247 (1994); William Landes & Richard Posner, THE ECONOMIC STRUCTURE OF PATENT LAW (Belknap Press of Harvard U. Press 2003); and Lemley, *supra* note 2. Of these, Arrow comes the closest to a substantive exploration of the concept of peripheral disclosure, but even his analysis focuses only on the ability of patents to facilitate licensing transactions involving exchanges of technological knowledge, as opposed to the broader concept of peripheral disclosure presented here.

[20] In addition to the foundational literature cited above, more recent participants in this debate focus almost exclusively on conventional disclosure theory. *See, e.g.,* Anderson, *supra* note 8, at 3. Recent broad-based attacks on the patents system also fail to account for peripheral disclosure. *See generally* Adam B. Jaffe & Josh Lerner in INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS AND WHAT TO DO ABOUT IT? (Princeton U. Press 2004); James Bessen & Michael J. Meurer PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (Princeton U. Press 2008), and Michele Boldrin & David K. Levine, AGAINST INTELLECTUAL MONOPOLY (Cambridge U. Press 2008) (proposing the abolition of patent "monopolies."). Boldin & Levin, for instance, view the disclosure function of patents as having little value, but do not consider the peripheral disclosure effects of patents.

[21] Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284, 339 (2011).

[22] Discussion relating to the issue of disclosure has largely focused on the impact of the effective elimination of the best mode requirement. *See* Ryan Vacca *Patent Reform and Best Mode: A Signal to the Patent Office or a Step Toward Elimination?* 75 Albany Law Review 1, 16-17 (2012) (suggesting that the "best mode" requirement has been rendered toothless and applicants may actively conceal the best mode if the chance that the PTO catches the omission are low); Bron D'Angelo, *The America Invents Act: What Remains of Best Mode*, Gordon & Rees LLP Newsletter, *available at* http://www.gordonrees.com/documents/IPNewsletter-Nov2011-BestMode.pdf (Nov. 2011) (suggesting applicants may opt to disclose only so much of the "best mode" to satisfy the individual examiner, potentially preventing the public from knowing how the invention is best carried out).

Part V, the AIA is also likely to affect the degree to which inventors may be willing to engage in peripheral disclosures of their inventions.

The remainder of this article will expand upon these ideas. Part I describes the current state of conventional disclosure theory as viewed by both its proponents and critics. Part II explains the concept of peripheral disclosure, including why and how it functions. Part III presents several examples of peripheral disclosure in practice, while Part IV addresses potential criticisms of the theory. Finally, Part V explores the implications of peripheral disclosure.

I. THE LIMITATIONS OF CONVENTIONAL DISCLOSURE THEORY

If people are the organs of invention, information is its lifeblood. Without the sharing of information, we would be forced to constantly reinvent fire, sitting in our caves staring blankly at sticks. It stands to reason, then, that encouraging inventors to explain their inventions to the public promotes further invention.

A. Conventional Disclosure Theory

Courts and scholars typically offer two primary invention-related justifications for the patent system: it provides an incentive to invent and it offers an incentive for inventors to disclose the technological underpinnings of their inventions to the public.[23] The former justification revolves around the probabilistic reward that the patent system offers to those who invest resources towards invention.[24] The basic idea is that producing entities, be they people or firms, have a finite amount of resources.[25] They may choose to invest those resources in any of a number of ways, one being towards technological developments.[26] The patent system encourages investment in

[23] *See, e.g.,* Eldred v. Ashcroft, 537 U.S. 186, 226-27 (2003) (Stevens, J., dissenting); see also, e.g., Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 63 (1998) ("the patent system represents carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology, in return for an exclusive monopoly for a limited period of time" (emphases added)). *See also* Roin, *supra* note 4, at 2011-13. These two justifications are not exclusive. Examples of alternate theories include commercialization theory, which relates primarily to the commercialization of new inventions as opposed to their creation, and Mark Lemley's recently developed patent race theory. *See* Lemley, *supra* note 2, at 35-67.

[24] There is an extensive scholarly literature that revolves around the theory that the patent system promotes technological advancement by incentivizing inventors to invent. *See, e.g.,* Lemley, *supra* note 2, at 36-39. As with disclosure theory, scholars have raised any number of criticisms of the incentive to invent theory. *See id.*

[25] Examples of such resources include money, time, and materials.

[26] It is largely undisputed that greater investment in research and development leads to

technological development by giving those investors who are the first to successfully develop a new product or method the possibility of obtaining exclusive rights over that invention through a patent, thus allowing them to extract monopoly prices during the patent's life.[27] Thus, the theoretical explanation behind the incentive to invent justification is that by granting successful inventors a market-based financial reward, inventors are more likely to invest in (and thus develop) inventions, that, but for the existence of the patent system, would likely never have come into being, or at least would have come into being at a much later time.[28]

A second oft-recited justification for the patent system, and one more central to this Article, is that it encourages the disclosure of new inventions.[29] As no one seriously disputes the important role that dissemination of technological information plays in invention,[30] by requiring inventors to disclose information about their inventions in order to obtain a patent, the public receives a significant social benefit.[31]

The primary vehicle for disclosure of invention information under conventional theory is the patent document itself.[32] It is through the patent

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more new inventions. *See* Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 878 (1990). I note in passing Schumpeter's distinction between invention and innovation, *see* Eisenberg, *supra* note 5, at 1039-40 (discussing Schumpeter's distinction between invention, used to refer to post-invention development of new commercial goods, products, markets, etc.). Both invention and innovation, in my mind, are captured within the broad category of the creation of new technologies, and can be the subject of peripheral disclosures. For the most part, the precise delineation of technological development into invention and innovation is unnecessary for this Article; rather, it is the underlying activities that I focus on in applying the theory in Part IV.

[27] See, e.g., Kewanee Oil Co. v. Bicron Corp., 417 U.S. 470, 480 (1974) ("The patent laws promote this progress by offering a right of exclusion for a limited period as an incentive to inventors to risk the often enormous costs in terms of time, research, and development).

[28] The incentive justification is also commonly described in public goods terms, with the patent system offering a solution to the public goods problem associated with the creation of inventions, which are nonrivalrous, nonexcludable goods. For a fuller description of the public goods approach, *see, e.g.,* Anderson, *supra* note 8, at 16-18.

[29] *See Pfaff*, 525 U.S. at 63; Kewanee, 417 U.S. at 481 ("In return for the right of exclusion-this 'reward for inventions,' - the patent laws impose upon the inventor a requirement of disclosure."); Anderson, *supra* note 8, at 14-16.

[30] *See, e.g.,* supra note 1; *infra* note 65.

[31] These two social benefits, of new inventions and information about those new inventions, are not obtained without cost to the public. Patent rights extract a social cost in terms of the deadweight loss caused by monopolistic pricing, *see* Anderson, *supra* note 8, at 15.

[32] The primacy of the patent document to conventional disclosure theory is central to both proponents of conventional disclosure theory, *see* Fromer, *supra* note 3, at 554, and its

that the inventor must reveal the invention for all to see.[33] This emphasis on the patent document is congruent with the view of disclosure theory as involving a bargain with the public: the inventor provides information about the invention and receives, in return, the exclusive right to practice that invention for a limited period of time.[34]

Under this view, the patent system performs its disclosure function by requiring inventors to comply with three legal requirements: written description, enablement, and best mode, codified in 35 U.S.C. § 112.[35] Written description requires the inventor to describe the invention in a manner adequate to convey possession of the invention to a person having ordinary skill in the art as of the time that the patent application was filed.[36] Enablement requires the inventor to not just describe the invention, but also explain how it is made and used.[37] In other words, provided that a patent satisfies the enablement requirement, a person having ordinary skill in the art should be able to practice the invention using the information provided by the inventor in the patent.[38] Best mode requires an inventor to disclose what the inventor subjectively believes is the best method of practicing the invention.[39] In theory, this requirement operates to prevent patentees from engaging in a combination secrecy-patent approach to the invention, disclosing inferior methods of using the invention to the public while maintaining the best method as a secret.[40] Its effectiveness is somewhat questionable, however: even outside the broader issues with conventional disclosure theory discussed below, the best mode requirement has been strongly criticized,[41] and its time may be drawing to a close.[42] All three of these requirements relate to the patent document itself.[43]

The below diagram illustrates the concept of conventional disclosure

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critics, *see* Holbrook, *supra* note 8, at 131-32.

[33] Patent law requires disclosure through the legal doctrines of enablement, written description, and best mode. *See* Holbrook, *supra* note 8, at 126.

[34] Holbrook, *supra* note 8 at 131.

[35] Holbrook, *supra* note 8, at 127-131.

[36] 35 U.S.C. § 112 ¶1 (2010). Note that the paragraph numbering is by convention; the paragraphs of § 112 are not numbered in the text.

[37] 35 U.S.C. § 112 ¶2 (2010).

[38] Holbrook, *supra* note 8, at 128. While some level of experimentation may be required of the hypothetical person of skill in the art, it must not be undue. *Id.* at 129.

[39] 35 U.S.C. § 112 ¶3 (2010).

[40] Holbrook, *supra* note 8, at 130.

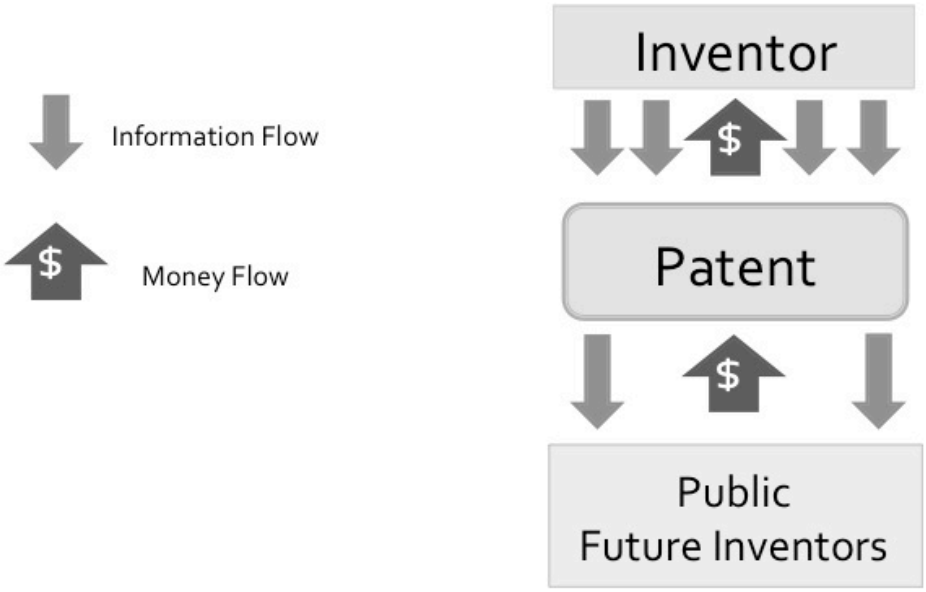
[41] Holbrook, *supra* note 8, at 130, n.37.

[42] The United States is currently the only country that contains a best mode requirement, *see* Holbrook at 130, and the America Invents Act arguably effectively eliminated that requirement.

[43] 35 U.S.C. § 112 (2010)(describing the requirements of the patent specification).

theory.

Figure 1: Conventional Disclosure Theory



In theory, these three requirements allow patent documents to fulfill the function of teaching technological information about new inventions to the public. Patent law lays out the types of information that must be taught: a description of the invention, how it is made and used, and the best way to practice the invention. Disclosure of this information in the patent document is not permissive; it is mandatory. Inventors *must* teach this information to the public if they desire a patent, or so goes conventional theory.

B. Criticisms of Conventional Disclosure Theory

Reasons to question the efficacy of the disclosure function of patents abound, however. These criticisms largely fall into two categories: the lack of useful information within the patent document itself and the unwillingness of other inventors to consult patent documents in order to obtain technical know-how. Perhaps most surprising is that these criticisms are widely accepted by both critics of conventional disclosure theory and its proponents!

1. Patents don't convey useful technological information

Even among proponents of conventional disclosure theory, there is a consensus that, at least under as under current law, patents do a lousy job of conveying useful technological information.[44] Patents often do not contain key pieces of information, fail to transfer tacit knowledge,[45] and may be virtually incomprehensible, even to those of skill in the art.[46]

The problem lies in the inability of patent law to *force* inventors to disclose meaningful information in the patent document. As the law is presently applied, inventors are able to disclose just enough information to meet the minimal threshold for patent allowance while keeping back crucial bits of technical information necessary to efficiently practice the invention.[47] Patents may also contain old information: applications are not published until a year and a half after filing, and may have been drafted substantially earlier.[48] Thus, they are unlikely to reflect the current state of the art.[49] Furthermore, patents are typically drafted by lawyers, not inventors, and any useful technical information is submerged in legalese.[50] Attorneys may include numerous meaningless examples for the purpose of maximizing claim scope; these examples may provide no substantive technical information.[51] Thus, even when useful technical knowledge is disclosed, it is often buried within worthless information added only to prevent courts from narrowing the scope of the patent right.[52] Taken together, these problems of not enough good information and too much

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[44] *See* Fromer, *supra* note 3, at 560-62; Roin, *supra* note 4, at 2024-25; *but see* Ouellette, *supra* note 4, at 17. This consensus is shared with critics of conventional disclosure theory. *See* Holbrook, *supra* note 8, at 131; Anderson, *supra* note 8.

[45] For a discussion of the ways in which patents fail to transfer tacit knowledge (equipment know-how and worker expertise), *see* Margaret McInerney, Note, *Tacit Knowledge Transfer with Patent Law: Exploring Clean Technology Transfers* , 21 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 449, 481 (2011)

[46] Roin, *supra* note 4, at 2024-25.

[47] Roin, *supra* note 4, at 2024-25.

[48] *See* 35 U.S.C. § 122 (requiring that most applications be published 18 months after filing). Applicants may be able to effective extend the time their application is kept secret through the use of a provisional application. *See* Dennis D. Crouch, *Is Novelty Obsolete? Chronicaling the Irrelevance of the Invention Date in U.S. Patent Law*, 16 MICH. TELECOMM. & TECH. L. REV. __ (2010)

[49] Holbrook, *supra* note 10, at 143 (stating that "Even absent the willful infringement doctrine, the reality is that disclosures in patents are not timely due to delays in the publication of the patent and also often due to the patent applicant's delays.").

[50] *See* Timothy Holbrook, *Patents, Presumptions, and Public Notice,* 86 IND. L.J. 779, 786 (2011) (describing patents as a "somewhat bizarre mix of the technical and legal.")

[51] Roin, *supra* note 4, at 2025.

[52] Roin, *supra* note 4, at 2025.

irrelevant information mean that patents are criticized as being ineffectual teachers of new technologies.[53]

2. Inventors don't consult patents to obtain technical know-how

Not only do patents fail to effectively provide information, their prospective audience is perhaps an unwilling one that rarely looks to patents for technical know-how. One of the main critics of conventional disclosure theory, Timothy Holbrook, has identified several reasons to suspect that inventors are unlikely to seek out patents for their technical information.[54] Foremost among them is the lack of an experimental use exception to patent infringement: follow-on inventors cannot practice the invention without infringing the patent, even for the mere purposes of studying how it functions in order to build improvements.[55] Of perhaps equal force is the risk of willful infringement, under which a person who deliberately copies a patented invention can be subject to treble damages for infringing the patent.[56] Given the problems associated with relying on the technical disclosure of a patent, Holbrook argues, follow-on innovators have little incentive to do so. This idea has broad consensus: commentators largely agree that prospective inventors rarely look to patents for technical information.[57]

As with conventional disclosure theory itself, both categories of criticism focus on the patent document: what it conveys and whether it is read. They also are largely targeted at the inability of current law to force inventors to disclose technical information about their invention in the patent. Critics assume that inventors are unwilling teachers who cannot and will not provide useful information in the patent document. This is not to

[53] Holbrook, *supra* note 8, at 146.

[54] Holbrook, *supra* note 8, at 139.

[55] Holbrook, *supra* note 8, at 139. Holbrook also points out that there is an extremely narrow right of experimental use, but it is so constrained as to be practically nonexistent. *See also* Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017 (offering suggestions for the proper scope of an experimental use exception).

[56] Holbrook, *supra* note 8, at 142. One wonders how serious the risk of willful infringement is post-*Seagate*, however. In re Seagate Technology, LLC, 497 F.3d 1360, 83 U.S.P.Q.2d 1865 (Fed.Cir. 2007); *See* Jason Rantanen, *An Objective View of Fault in Patent Infringement*, 60 Am. U. L. Rev. 1575, 1629-31 (2011) (arguing that the standard for willful infringement is extremely high post-*Seagate*).

[57] *See* Anderson, *supra* note 8, at 19; *see also* Fromer, *supra* note 3, at 560 (agreeing with the view that inventors rarely spend time reading others' patents); *but see* Ouellette, *supra* note 4 (offering data suggesting that inventors in at least one field do look at patents for their technical teachings).

say that patents are useless in terms of disclosure; they may play a crucial role in the codification of knowledge, for example.[58] But overall, there is reason to question whether patents themselves disclose new technologies, and critics of the patent system have leaped upon that suggestion.[59]

Yet, the disclosure story doesn't need to end there. There is another possibility: that disclosure of technical information about new inventions occurs outside the confines of patent document, and that inventors do not need to be *forced* to disclose information about their inventions; they need to be *freed* to do so instead. It is this alternative approach to disclosure that I explore in greater detail in the remainder of this essay.

II. A THEORY OF PERIPHERAL DISCLOSURE

As discussed in the preceding section, there is a strong argument that conventional disclosure theory does not, by itself, provide a particularly good justification for the patent system. Scholars have repeatedly attempted to stomp disclosure theory into the ground, and even its staunchest defenders rally only in the context of proposing changes to improve the quality of information provided by the patent document. These criticisms flow from two basic precepts on which the conventional view of disclosure is built: first, conventional disclosure centers on the patent document as the mechanism of disclosure, and second, it relies on the premise that the patent system promotes disclosure by *forcing* inventors to reveal the secrets of their inventions.

This section will explain why our understanding of the disclosure function of patents should not be so constrained. Rather than viewing the patent as the vehicle of information dissemination, we need to instead recognize that at least equally important are other sources of information that inventors would not provide but for the existence of patents. And rather than looking at the patent system as *forcing* inventors to disclose, we must instead recognize that patents *free* inventors to share information while still retaining the ability to monetize the invention. These two elements form the basis of the theory of peripheral disclosure.

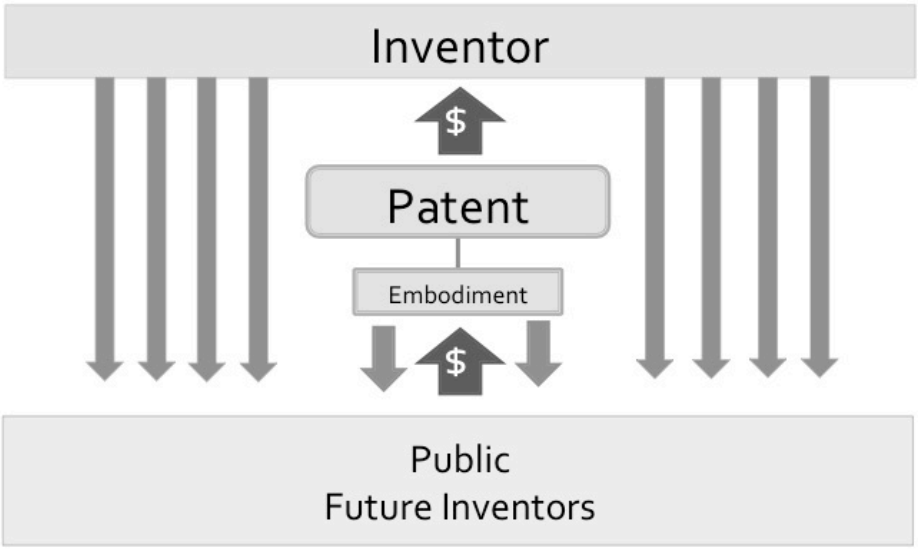
I will begin with a definition: the concept of peripheral disclosure refers to the non-patent sharing of information by an inventor (or the inventor's firm) about a new technological development that would not occur in the absence of a patent system. In other words, it is information

[58] For a detailed discussion of the role patents play in codifying knowledge, *see generally* Dan L. Burk, *The Role of Patent Law in Knowledge Codification*, 23 Berkeley Tech. L.J. 1009 (2008).

[59] See sources cited in fn. __.

that is being provided by an inventor in a form other than the patent document. It is not all information freely shared, however. It is information that an inventor could not share with the public without losing some ability to monetize[60] the invention under a regime relying on secrecy to appropriate the value of an invention.[61] The following graphic concisely expresses the concept of peripheral disclosure, with the lighter gray arrows illustrating the flow of information from both the inventor and the embodiment of the invention.

Figure 2: Peripheral Disclosure



A hypothetical exercise best illustrates the concept of peripheral

[60] By "monetize the invention" or "appropriate the value of the invention," I simply mean the ability to engage in supranormal pricing of embodiments of the invention (i.e.: the ability to charge a premium on goods due to the presence of the invention) or the ability to engage in licensing transactions for the underlying technology of the invention.

[61] It bears noting that not all inventors seek to directly monetize their inventions. Non-monetary factors may provide a powerful motivation for some inventors to invent. Katherine J. Strandburg, for instance, argues that user innovators may not just develop and use their own inventions – without seeking financial gain from exclusionary practices – but are also willing to freely reveal their inventions to others. *See* Katherine J. Strandburg, *Users as Innovators: Implications for Patent Doctrine*, 79 U. COL. L. REV. 467, 474-81 (2008). But while I agree with Professor Strandburg that nonpecuniary motivations to invent may be a significant force, in many instances investment in technological development is driven largely by the goal of financial reward.

disclosure. Picture, for a moment, a world without patents.[62] In this world, the only mechanism an inventor possesses for monetizing an invention is secrecy.[63] Invention will likely continue to occur – a secrecy regime still provides an incentive for prospective inventors to invest resources directed towards at least some forms of invention.[64] But inventors cannot share information about how their inventions work without giving away some or all of its monetary value, viz., their ability to appropriate at least enough of the incremental value of the invention to justify the investment.[65] If an inventor of a new chemical process wishes to share information about that process with the world, that inventor would lose the ability to exclusively practice that process.[66] Inventors in this patentless world are thus faced with a choice: maintain the invention in secrecy and preserve the ability to

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[62] This need not be a purely hypothetical exercise. The world of pre-patent Europe provides a rich example. One need look no further than the culture of secrecy among engineers and architects, in which information was rarely recorded and inventions were rarely shared – until a patent system came along, of course. For a detailed history of innovation and secrecy during this period, *see* Pamela O. Long, OPENNESS, SECRECY, AUTHORSHIP: TECHNICAL ARTS AND THE CULTURE OF KNOWLEDGE FROM ANTIQUITY TO THE RENAISSANCE, (The Johns Hopkins U. Press 2001); William Eamon, SCIENCE AND THE SECRETS OF NATURE: BOOKS OF SECRETS IN MEDIEVAL AND EARLY MODERN CULTURE (Princeton U. Press 1996).

[63] It does not matter whether or not this is a pure secrecy regime or a trade secrecy regime – in both systems, the goal is to avoid sharing of information in order to monetize the invention, and thus disclosure is antithetical to successful appropriation. Contracts might alleviate some issues of secrecy, especially the use of nondisclosure agreements, but these mechanisms are limited in terms of their effectiveness, *see* Part III.E, and ultimately are based on the concept of preventing the contracting parties from freely sharing information about the invention, viz., secrecy.

One alternative mechanism for promoting invention that does not rely on secrecy is that of a prize system. *See, e.g.,* Michael Abramowicz, *Perfecting Patent Prizes*, 56 Vand. L. Rev. 115 (2003) (discussing prize systems in detail). Yet there are weaknesses and limitations of a prize system that suggest that it is probably not an optimal mechanism for promoting most types of inventions that will directly interest consumers. *See* Devlin, *supra* note 4, at 416.

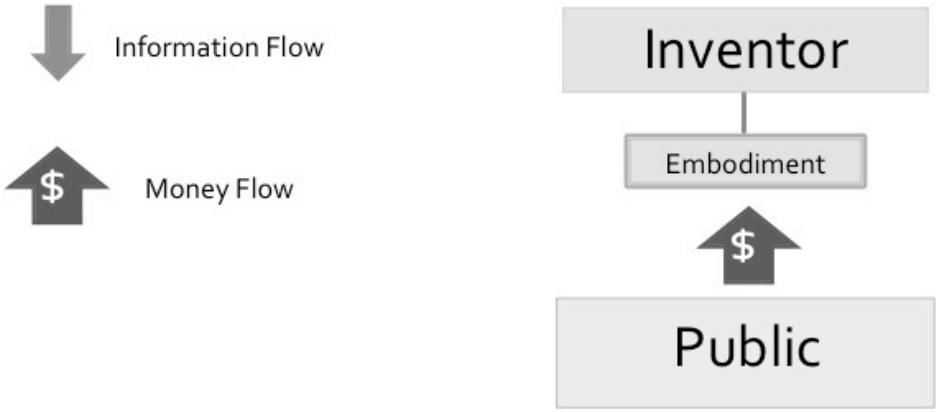
[64] *See* Anderson, *supra* note 8, at 16.

[65] *See* Michael Risch, *Trade Secret Law and Information Development Incentives*, at 5, *in* THE LAW AND THEORY OF TRADE SECRECY: A HANDBOOK OF CONTEMPORARY RESEARCH, (Rochelle C. Dreyfuss & Katherine J. Strandburg, eds. (2010) *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1411579) (noting that "disclosure of secret information for public use negates both secrecy and most of the value that could come from that secrecy.").

[66] Long provides the example of an explicit admonition of secrecy in a recipe for purple dye: "Keep this as a secret matter because the purple has an extremely beautiful luster," concluding that "Clearly, the author believed that the recipe should be kept secret to protect knowledge of how to produce the remarkable color that resulted." Long, supra note __, at 65.

monetize it, or share it with the world and lose the ability to obtain a farthing from its use.

Figure 3: A World Without Patents



Introduce the ability to patent new inventions, however, and the hypothetical changes completely. Now inventors are no longer faced with the dilemma of monetize or disclose – they can do both. The chemist can extract commercial value from the new chemical process *and* disclose how it works to the world.[67] The inventor's ability to share information about an invention while preserving its monetary value is what lies at the heart of the theory of peripheral disclosure.

But why would an inventor want to disclose an invention that he or she might not otherwise need to? The idea that inventors would *willingly* reveal information about their inventions flies contrary to all conventional views on patent disclosure.[68] Inventors need to be *forced* to disclose their inventions, or so conventional theory goes. I suggest, however, that

[67] The British chemist and industrialist Henry Perkin's development of mauve dye provides an early example of peripheral disclosure: after discovering how to create mauve dye, he both patented and published his result, while at the same time building a successful dye business around his invention. *See* Michaela M. Sousa et. Al., *A Study in Mauve: Unveiling Perkin's Dye in Historic Samples*, 14 Chemistry – A European Journal 8507 (2008).

[68] *See* literature cited in notes 4 and 8.

contrary to conventional thought, patentees often *want* to disclose their invention. Inventors frequently do not desire to keep their invention secret – but because of the tension with commercial reality, it may be a necessity in the absence of a patent system.

There are many reasons why inventors may want to freely share information about the technological workings of their inventions. One is well theorized already: commercialization of the invention and licensing transactions often necessitate that detailed information about the technology leave the immediate grasp of its inventor.[69] But there are many other reasons that inventors may desire to share information about their invention with the public. Inventors may seek the reputational rewards that flow from publications. Companies may need to share information about the invention for marketing purposes. The invention itself may be self-disclosing, in that it is easy to reverse engineer. Patents allow inventors to engage in activities that involve dissemination of information about an invention without losing the ability to monetize it.[70]

Just as it is important to understand what peripheral disclosure is, so too is it equally important to understand what it is not. Not every disclosure of new technical or scientific information in a form other than a patent is a peripheral disclosure. This is particularly true when the funding of invention is driven by something other than a desire to monetize the result. As Arti Rai has discussed in the context of biotechnology, inventors and their financial supporters may invent and disclose for reasons that transcend the raw desire to monetize a new technology.[71] Disclosures made in this context are necessarily not peripheral disclosures because there is no underlying desire to monetize the technology, and thus no restrictions on disclosure could arise as a result of that desire.

Even where a desire to monetize the new technology exists, however, a disclosure may not be a consequence of the existence of a patent

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[69] *See, e.g.,* 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).

[70] Patents also provide a related benefit in that they eliminate the costs involved under a secrecy regime. *See* Landes & Posner, *supra* note 16, at 328 ("In the absence of a patent option, inventors would invest many more resources in maintaining trade secrecy…"). These are the additional costs that are necessary under a secrecy regime to preserve the commercial value of the technology that do not exist under a patent regime. Patents are not costless, of course, but in the face of potentially extreme costs to maintain secrecy, such as in the case of inventions that are on the boarder of the self-disclosing category, they may be the more efficient for of protection for technological innovations.

[71] Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NORTHWESTERN U. L. REV. 77, 88 (1999). Rai frames her analysis

(or at least the possibility of obtaining a patent). If the value to the firm of disclosing the information exceeds the cost in terms of the risk that the disclosure will improve a competitor's relative position, a rational firm will disclose the information, even in the absence of a patent, as in the case of product marketing discussed below.

Thus, the concept of peripheral disclosure is not unbounded; to the contrary, in some instances few disclosures may be a consequence of the existence of patent system. And admittedly, it may be difficult to disentangle how much influence the patent possibility has on any one decision to disclose. Yet neither of these issues are anything new; every explanation of how the patent system promotes technological progress is subject to the same limitations.[72]

III. PERIPHERAL DISCLOSURE ALL AROUND US

Simply theorizing about the existence of peripheral disclosure does establish its existence. Better to identify and describe some examples of peripheral disclosure in action. The following sections lay out a handful of instances where the disclosure of technological information is a consequence of the patent system, and further refine the concept in the process.

A. Scientific Publications

Inventors, like legal academics, are often driven to publish. Sharing their knowledge with the world brings them personal fulfillment and reputational rewards.[73] Yet inventors also often need to monetize their inventions, either because they themselves need the income or because they are employees of firms (which generally are in the business of making money). The patent system allows inventors to do both.[74]

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[72] *See* Lemley, *supra* note __, at __ (Sole Inventor). Even Lemley's "patent race" theory of patenting has greater explanatory power in some contexts rather than others. *Id.* at 63-65.

[73] In addition to Rai, *supra* note __, William Hubbard suggests that social norms relating to invention provide a strong mechanism for encouraging inventors to invent. *See* William Hubbard, *Inventing Norms*, at 11 (forthcoming 44 CONNECTICUT L. REV.)) *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1713459. In order for these norms to have any effect, however, inventors need some mechanism for achieving recognition. Publication is one such mechanism – one that would be less viable in absence of patents. *See id.* at 39 (commenting that "Without patent protection, however, publication might be less frequent because competitors could copy technology from such publication.").

[74] This ability comes with a caveat – under the current legal regime, such publication will probably only occur after the application has been filed. The publication could be up

The story of Kary Mullis, the inventor of the polymerase chain reaction (PCR), illustrates the role patents play in allowing inventor-employees to share their discoveries with the world. In the early 1980's, the nascent biotechnology industry was faced with a fundamental problem: how to obtain the quantity of a specific fragment of DNA necessary to conduct further analysis and manipulation. Kary Mullis, a scientist at Cetus Corporation, hit upon the solution of repeatedly using DNA polymerase, an enzyme that synthesizes a new strand of DNA identical to an existing template strand, in order to create a chain reaction that would produce an exponential increase in the quantity of DNA fragments.[75] This amplification technique was critical to the growth of the biotechnology industry over the subsequent decades,[76] and it is now used in criminal forensic investigations, food science, ecological field studies, and diagnostic medicine, to name just a few applications.[77]

Leaving aside the obvious importance of PCR as a commercial product,[78] a significant portion of the social value of Mullis's invention lies in the information his scientific publications provided to other inventors and scientists. Even while Mullis's patents on PCR were pending, he published articles and made presentations that described the invention.[79] Mullis's

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to a year before the filing date, given the one-year grace period of 35 U.S.C. § 102(b) (1965), but if the inventor intends to file internationally, *any* pre-filing publication could prevent the inventor from obtaining a patent.

[75] This explanation of PCR, and Mullis's contribution, is grossly oversimplified.(For a slightly longer explanation of the invention of PCR, *see The History of PCR (RU 9577),* SMITHSONIAN INSTITUTE ARCHIVES, (Aug. 25, 2011, 6:54 pm), http://siarchives.si.edu/research/videohistory_catalog9577.html. For a detailed history and ethnographic account of the invention of PCR, *see* PAUL RABINOW, MAKING PCR: A STORY OF BIOTECHNOLOGY (1996).

[76] For example, more than 3% of all PubMed articles refer to PCR. *See* John M.S. Bartlett & David Stirling, *A Short History of the Polymerase Chain Reaction*, 226 METHODS IN MOLECULAR BIOLOGY 3, 5 (2003).

[77] *Id.* at 5. So ubiquitous is the technology that it is now used even in high school biology classes.

[78] The value of the PCR technique developed by Mullis is indisputable, as it comprises a foundational tool for modern genetic research. In other words, provided that Mullis and Cetus were able to preserve the secrecy of the PCR technique (as Mullis initially argued in favor of, *see* Rabinow, *supra* note 64, at 121), they likely would have had a commercially valuable product even in the absence of a patent system.

[79] The first of Dr. Mullis's patents on PCR, Nos. 4,683,195 and 4,683,202, issued in mid-1987; prior to that time the invention had already been widely described in co-authored publications. *See, e.g* Randall K. Saiki et. al., *Enzymatic Amplification of Beta-Globin Genomic Sequences and Restriction Site Analysis for Diagnosis of Sickle Cell Anemia*, 230 SCIENCE 1350 (December 20, 1985); R. Saiki et al., *A Novel Method for the Prenatal Diagnosis of Sickle Cell Anemia,* AMER. SOC. HUMAN GENETICS (1985); Kary Mullis et al. *Specific enzymatic amplification of DNA in vitro: the polymerase chain*

subsequent use of Taq polymerase, a thermostable enzyme that simplified the PCR process, had an equally great impact, as indicated by the thousands of times the article disclosing it has been cited in subsequent publications.[80]

The Mullis story is not atypical.[81] The publication of scientific and technical information by industry employees is the norm, not the exception. At first glance, this is unsurprising: after all, one of the driving forces for scientists is the desire to share the results of their research – to publish, speak at conferences, and in general disseminate their discoveries to the world.[82] Kary Mullis himself was later awarded the Nobel Prize in Chemistry for his work.[83] These publications and conferences lay the groundwork for the next set of developments and discoveries.[84] Nor are scientists alone: companies, too, want their scientists to publish. Letting scientists engage in self-promoting activities such as publication is a common motivational mechanism for managing professional employees.[85]

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reaction, 51 COLD SPRING HARBOR SYMP. QUANT. BIOL. (needs the starting page of the article)263–73 (1986); Saiki et al. "*Analysis of Enzymatically Amplified β-globin and HLA DQα DNA with Allele-Specific Oligonucleotide Probes*, 324 NATURE 163-6 (1986); Kary Mullis & Faloona FA, *Specific Synthesis of DNA in vitro via a Polymerase-Catalyzed Chain Reaction*, 155(F) METHODS IN ENZYMOLOGY, 335 (1987).

[80] According to Google Scholar, the Taq article, RK Salki et. al., *Primer-directed enzymatic amplification of DNA with a thermostable DNA polymerase*, 239 SCIENCE 487 (29 Jan 1988), has been cited by 12,548 scholarly publications as of June 28, 2011.

[81] There are numerous other examples of scientist-inventors whose contributions to the scientific or technical literature is perhaps at least as valuable as the commercial embodiments of their inventions. Another, perhaps less dramatic, example is John Edward Franz, the inventor of the glyphosate (Roundup®), who published extensively on his scientific research while employed by Monsanto.

[82] *See, e.g.,* RABINOW, *supra* note 64, at 31.

[83] *Id.*, at 4.

[84] *See, e.g.,* Stefano Breschi & Christian Catalini, *Tracing the Linkages Between Science and Technology: An Exploratory Analysis of the Research Networks Among Scientists and Inventors*, 39 RESEARCH POLICY 14 (2010) (reporting the central role of author-inventors in ensuring the connectivity between scientific research networks and private technology). Even commentators who are skeptical of the conventional disclosure function of patents acknowledge the importance of scientific publications. *See, e.g.,* Lemley, *supra* note 2, at 50.

[85] *See, e.g.,* PELZ, D. C. CREATIVE TENSIONS IN THE RESEARCH AND DEVELOPMENT CLIMATE. IN MANAGING PROFESSIONALS IN INNOVATIVE ORGANIZATIONS, 37–48 (R. KATZ,1988); THE HUMAN SIDE OF MANAGING TECHNOLOGICAL INNOVATION, 675-700 (R. Katz 2nd ed. 2003):,Ralph Katz, *Motivating Technical Professionals Today: To Thrive, Scientists and Engineers Need an Ambidextrous Environment that Can Support Motivational Dualism*, RESEARCH-TECHNOLOGY MANAGEMENT, (Aug. 25, 2011, 7:44 PM), http://www.allbusiness.com/management/611570-1.html; Fiona Murray, *The role of academic inventors in entrepreneurial firms: sharing the laboratory life*, 33 RESEARCH POLICY 643 (2004).

Early publication may help prevent others from obtaining patents of their own.[86] And scientific publications may be necessary for widespread adoption of new products.[87]

But imagine again a world without patents. Would Cetus have permitted Dr. Mullis to publish the results of his scientific research? Or would it instead have restricted his publications in order to maintain the monetary value of the PCR and Taq secrets for as long as it could?[88]

It is reasonable to at least suspect the latter. Firms exist to extract value from their intellectual and human capital. If the only way to monetize a technological invention is to maintain it as a secret, firms cannot afford to let that information escape. Regardless of the motivational impact of allowing employees to publish, regardless of the desires of the employees, in a world where the only mechanism for encouraging companies to invest in invention is a secrecy regime, employee publication is a nigh unaffordable luxury.[89] Although patents do not completely free inventors and their firms from the decision of secrecy versus disclosure, they make the latter possible while preserving the ability to monetize the invention.[90]

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[86] Rabinow suggests that this pressure may have been especially present in the biotechnology industry of the 1980's. *See* RABINOW, *supra* note 64, at 25-27; For a theoretical discussion of the concept, *see generally* Gideon Parchomovsky, *Publish or Perish*, 98 MICH. L. REV. 926 (2000); Rebecca S. Eisenberg, *The Promise and Perils of Strategic Publication to Create Prior Art: A Response to Professor Parchomovsky*, 98 MICH. L. REV. 2358 (2000).

[87] Dow Chemical is an example of a company that makes extensive use of scholarly publications. Examples available at DOW INITIATIVE, DOW, http://www.dow.com/innovation/knowledge/journal/.

[88] Of course, this decision may in part depend on how easy the invention would be to reverse-engineer. Perhaps, due to the nature of PCR, it might have been unable to maintain their secrecy; i.e.: they are self-disclosing inventions. In that instance, Cetus might not have invested resources towards their development at all, as discussed *infra* at Part III.C, if its primary purpose was to obtain profit from its investments in research. An alternative does bear consideration – perhaps Cetus and Dr. Mullins were motivated by other reasons to invent – reputational purposes, for instance, or humanitarianism. *See* William Hubbard, *Inventing Norms*, at 9-20 (forthcoming 44 CONN. L. REV.) Not Sure how to BB this. (discussing non-financial motivations to invent). But money clearly played an important role in this particular invention, as Cetus was a business - and not just a business, but a publicly traded company with investors to satisfy and a profit to generate. *See* RABINOW, *supra* note 64, at 45–46.

[89] This hypothetical result is arguably too extreme. Certainly companies may be forced by valuable employees to allow *some* publication, although it may lack useful technical details. But in a world without patent, such publications would be the rare exception, as the need to monetize innovations would in most instances grossly outweigh the value of an individual employee.

[90] Note that patents free inventors to publish about their inventions not just after the patent issues but even while the application is pending, as note 58 illustrates in the case of

The category of scientific and technical publications also illustrates the limitations of peripheral disclosures. The existence of patent-facilitated publication lies against a backdrop in which publication of technological developments occurs even in the absence of any possibility of direct financial gain, however. Numerous scientific articles are published every day, many of which have nothing to do with any monetizable technology.[91] As Arti Rai has discussed in the context of biotechnology, inventors and their financial supporters may invent and disclose for reasons that transcend the raw desire to monetize a new technology.[92] Consider, for example, Watson, Crick, and Franklin, who discovered the double-helical structure of the DNA molecule.[93] Watson and Crick published their groundbreaking discovery in a climate of non-commercialization, well before the science of molecular biology was ready for practical application.[94] Social norms – particularly those in basic scientific fields – have long stimulated scientists to research and disclose their ideas and discoveries to the public even in the absence of any possibility of monetizing the discovery or invention.[95] And even potentially monetizable inventions are published without patent protection; much of the early work in biotechnology was published without patents,[96] as is much of the software developed today.

It stands to reason, then, that while in some circumstances patents may be encouraging peripheral disclosures, in others patents may be unnecessary. One possible way to separate the two is to look at variations in the scientific fields themselves. As Robert Merges and Richard Nelson

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Mullis. *See also* Holbrook, *supra* note 8, at 146 (making this point). For a discussion of how firms embrace patents, *see* Brenda Sandburg, *Cisco Patent System Demonstrates Growing Use of Legal Tech Tools*, THE RECORDER (Aug. 25, 2011 8:08 PM) , http://www.law.com/jsp/ca/PubArticleCA.jsp?id=900005437299&slreturn=1&hbxlogin=1)

[91] Take, for example, the journal ECOLOGY, published by the Ecological Society of America. The vast majority of articles published in that journal, although providing social benefit in that they enhance our understanding of our ecosystem, are unlikely to directly lead to a monetizable product or process.

[92] Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NORTHWESTERN U. L. REV. 77, 88 (1999). Rai frames her analysis

[93] For two viewpoints on the discovery of the double-helical structure of DNA, *compare* James D. Watson, *The Dobule Helix: A Personal Account of the Discovery of the Structure of DNA* (1968) *with* Anne Sayre, *Rosalind Franklin and DNA* (1975).

[94] *See* Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NORTHWESTERN U. L. REV. 77, 88 (1999) (describing the discovery and publication of the structure of DNA in a noncommercial environment).

[95] Rai, *supra* note __, at 1119. Other examples abound, such as the numerous publications by German chemists in the nineteenth century that played a crucial role in the development of organic chemistry. **[**

[96] *See* Mark Lemley, *Patenting Nanotechnology*, 58 STANFORD L. REV. 601, 609 (2005).

have pointed out, not all technological areas behave the same when it comes to the effects patents may have on technological development in general.[97] This is perhaps equally true when dealing with disclosures. In some technological areas publication and disclosure may occur in the absence of patents, and thus peripheral disclosure effects may be weaker.

Variations in social norms unlinked to particular technological fields may also affect the prevalence of peripheral disclosures. Rai's discussion of the effect of basic scientific norms on early molecular biology research illustrates this point: these norms "promote a public domain of freely available scientific information, independent choice in the selection of research topics, and (perhaps above all) respect for uninhibited scientific invention."[98] Yet, with changes in the legal structure of intellectual property that occurred in the mid-1970's and beyond and a movement towards academic-industry collaboration came a weakening of traditional scientific norms in favor of communalism and against secrecy.[99] In this vacuum, peripheral disclosures arguably became more important. Government or academy-funded researchers may traditionally have been willing to publish their inventions even in the absence of patents; industry-funded researchers may be less willing or unable to do so without that security.

B. Product Marketing

Just as inventors are driven to publish about their work, so too are firms compelled to market their goods and services in a way that achieves maximum market saturation. While some marketing practices by firms require little disclosure of technological information, other marketing efforts are helped by, and may even necessitate, the revelation of information about how a product or process works. These disclosures may take the form of general information that is readily available to the public or of specific technical documents that are directly targeted at sophisticated consumers.

General marketing practices that are enhanced by the revelation of technical information that a firm could otherwise elect to keep secret exist everywhere. For example, firms often offer tours of their manufacturing facilities.[100] During these tours, members of the public may enter the

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[97] Robert P. Merges and Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 843 (1990).

[98] Rai, *supra* note __, at 89-90.

[99] Rai, *supra* note __, at 115.

[100] Numerous companies offer tours of their factories. Examples include HARLEY-DAVIDSON, http://www.harley-

premises and observe how the company makes its products.[101] The company may even explain interesting details about its manufacturing process. These tours provide a marketing benefit for the company in that they augment interest in its products; they also disseminate potentially useful technical information to the public.[102]

Other types of marketing activities directed towards the general public may also involve the disclosure of technical information. Attracting publicity, especially free publicity, typically requires the inventor to share the innovative secret that makes their product special. Take, for instance, the viral publicity obtained by the Bottoms Up Draft Beer Dispensing System in early 2011.[103] The product captured the public's imagination precisely because its inventors revealed the clever trick: the use of a magnet placed in the bottom that lifted while the cup was being filled and dropped back down when the dispenser finished releasing product. It is the invention that distinguishes the product; thus, that is the feature that most readily lends itself to marketing efforts and journalistic stories.[104] The Dyson vacuum cleaner provides another example; its website urges consumers to "Find out why a Dyson vacuum cleaner is different," providing illustrations and videos explaining the components of heavily patented vacuum.[105] In the absence of a patent system, firms would be unable to employ such marketing efforts without losing the value of the

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davidson.com/en_US/Content/Pages/Factory_Tours/york.html (last visited Aug. 25, 2011); BEN & JERRY'S, http://www.benjerry.com/scoop-shops/factory-tours/factory (last visited Aug. 25, 2011); JET PROPULSION LABORATORY, http://www.jpl.nasa.gov/events/tours/views/index.cfm (last visited Aug. 25, 2011); BOEING, http://www.boeing.com/commercial/tours/index.html (last visited Aug. 25, 2011).

[101] On a tour of Boeing's Everett factory, for example, visitors are permitted to observe the construction of Boeing planes, including its not-yet available 787 Dreamliner.

[102] I do not suggest that a visitor would be able to build a 787 Dreamliner after attending a Boeing tour, merely that information about some of the innovations in the product and manufacturing process are described during such a tour. Similar to the factory tour are documentary television programs explaining how various products are manufactured. While these programs do not reveal every manufacturing secret, they often demonstrate useful and novel techniques, some of which may be protected by patents. An example is the television program "How It's Made" on the Science channel. DISCOVERY SCIENCE, http://science.discovery.com/tv/how-its-made/ (last visited Aug. 25, 2011).

[103] *See* Dan Wetzel, *The Death of the Beer Line,* THEPOSTGAME (Jan. 18, 2011 10:43 PM), http://www.thepostgame.com/features/201101/death-beer-line; BottomsUpBeer,*Beers Filling Up Through the Bottom!*, YOUTUBE, (Oct. 29, 2010), http://www.youtube.com/watch?v=wiu_IX14wLI.

[104] Legendary pitchman Billy Mays springs to mind, with his call that "The secret is in the …" while touting some new gadget.

[105] http://www.dyson.com/vacuums/default.asp.

invention.[106]

Marketing activities may also be directed at sophisticated consumers. With such an audience in mind, these materials necessarily contain detailed technical information about product and process. Dow Chemical is a company that employs a high-information disclosure marketing strategy. Its website, for example, provides numerous technical publications.[107] One technical paper, for example, describes the development of a new generation of novel olefin block copolymers, an flexible polymer that performs under high temperatures while maintaining its other mechanical properties.[108] The paper details the stepping stones that led to the new product, and describes some of its properties.[109] These types of marketing materials serve the company's purpose of educating participants in the relevant markets about Dow's products; they also reveal information that the company could have elected to keep secret.

Patents make these technological disclosures for marketing purposes possible. Unsurprisingly, Dow has a substantial history of patenting, with over 18,000 granted U.S. patents since 1920.[110] But for its ability to seek patent protection for its new olefin block copolymer technology, for instance, it is questionable whether it would employ a disclosure-requiring marketing technique.[111]

Just as with the publications discussed in the previous section, however, so too may disclosures for marketing purposes occur even in the absence of a patent system. If the value to the firm of disclosing the information exceeds the cost in terms of the risk that the disclosure will improve a competitor's relative position, a rational firm will disclose the information. Peripheral disclosure suggests, however, that such disclosures are more likely when the possibility of a patent is present because the risk that the disclosure will improve a competitor's relative position is lower.[112]

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[106] The centrality of the inventive aspect of a product is also shown in advertisers' frequent assertions that their products are "patented" or "patent pending." *See* Goldman, *supra* note 62, at 15. It is the inventive aspect that makes the product appealing.

[107] *See* DOW, www.dow.com (last visited Aug. 25, 2011).

[108] Kurt W. Swogger, Edmunt M. Carnahan, Wendy D. Hoenig, Anthony R. Frencham, *The Development of a New Generation of Novel Olefin Block Coplymers: From Molecular Design to Market Development*, http://www.dow.com/scripts/litorder.asp?filepath=infuse/pdfs/noreg/788-00301.pdf.

[109] *See id.*

[110] *See Dow Innovation,* DOW, http://www.dow.com/innovation/achievements/patents/.

[111] The Swogger technical paper notes that Dow Chemical has filed patent applications on the new technology described in the paper. *See* Swogger et. al., *supra* note 88, at 11.

[112] To this it should be added that not every technological disclosure in marketing materials falls into the sphere of peripheral disclosure; rather, its is only disclosures about new technological developments. Technological information that is already available to

The software industry illustrates this counterbalance to peripheral disclosure. In the software industry, moving first may offer a substantial advantage by itself.[113] First movers may thus be able to monetize their inventions without the need for patents, and thus may be free to disclose information about their technologies through marketing materials and support documents. Thus, in technological fields characterized by strong first mover effects, information disclosures are likely to occur even in the absence of patents, and even despite the risk of eventual copying by others.

C. Creation of self-disclosing inventions.

In his criticism of conventional disclosure theory, Alan Devlin argues that conventional theory does not provide a primary justification for the patent system because it suffers from flaws that render it a poor vehicle for encouraging the dissemination of information.[114] Rather, he suggests, the main justification for the patent system is that it incentivizes the invention and commercialization of self-disclosing inventions—inventions whose technological underpinnings can be easily perceived once those inventions are placed in the stream of commerce—that would not otherwise be created in the absence of the patent system.[115]

As Devlin notes, "[t]he patent system is designed to induce invention that would otherwise take place at suboptimal rates."[116] It solves the public goods problem associated with nonrivalrous, nonexcludable information goods, and in particular, inventions that can be easily reverse engineered.[117] The problem is that such inventions can be readily copied once created, and thus prospective inventors of public goods will be reluctant to devote capital to the process of developing such self-disclosing inventions, knowing that they will be unable to recoup their investment.[118] Unlike inventions that could be protected through secrecy, then, self-disclosing inventions are the types of inventions most appropriate for patent protection because without a patent system the public would be deprived of

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the public is a separate issue. For example, a product manual that contains basic information about electricity is not the type of information at issue. On the other hand, an installation manual that explains how to disassemble and service a new type of dishwasher may be.

[113] *See* Ted Sichelman, *Patenting by Entrepreneurs: An Empirical Study*, 17 Mich. Telecomm & Tech. L. Rev. 111, 137fn 141 (noting that "First-mover advantages are particularly relevant in fast-moving industries, such as software and the Internet.").

[114] Devlin, *supra* note 8, at 417-18.

[115] *Id.*, at 404.

[116] *Id.* at 412.

[117] *Id.*. at 413-14.

[118] *Id.*. at 414.

these important products.[119]

Devlin is correct in his view that patents incentivize the creation of a certain type of invention into which few resources would be allocated in a world where secrecy is the only mechanism for protecting technological ideas, although I view this purpose as more of a shift in where resources directed at invention are allocated than as an incentive to invent theory.[120] But there is another level to the analysis. Self-disclosing inventions are not valuable simply as new products or processes whose existence provides a benefit to users, i.e.: their functional utility. Self-disclosing inventions are also valuable because of the information they provide to the world: to inventors, to competitors, to the public at large.[121] By favoring development of self-disclosing inventions over non-self-disclosing inventions, the patent system causes information to be disseminated in the form of self-disclosing inventions, providing the groundwork for the next iteration of invention.

Picture again a world in which there is no patent system. If the value of two inventions is otherwise equal, an inventor would choose to develop a non-self-disclosing invention rather than a self-disclosing invention because the former have a greater value in a patentless world. Think, for example, of the innovative medieval smith. Are his efforts best placed into developing a new forging technique that he can keep as a secret, but use to produce exceptionally strong plough blades? Or into developing a novel plough shape that is particularly effective?[122] The former, presumably, because once the plough is placed on the market it can be easily copied by others, perhaps at a lower cost, whereas the smith can continue to reap a benefit from the forging process for the remainder of his

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[119] Devlin, *supra* note 8. at 418.

[120] Devlin's theory thus is less a traditional incentive story, and more about the *type* of inventions towards which inventive activity is being directed. In other words, one effect of the patent system is not that it necessarily encourages inventors to invest in invention – inventors might do so in the absence of a patent system; they just invest in non-self disclosing inventions. Instead, the availability of patents cause inventors to shift where they allocate those resources: rather than investing in non-self-disclosing inventions, they may elect to invest them in the creation of self-disclosing inventions, which in individual instances may offer social benefits that are greater than investments in secret inventions. This, then, is

[121] In economic terms, if one assumes that a self-disclosing invention and a non-self-disclosing invention have equal functional utility, than the former necessarily has a greater society benefit, because it provides both its functional utility as well as the benefit of its informational component to the public.

[122] For this example, it is a given that plough blades constructed via the new process or made in the new shape have equal functional utility; i.e.: they are equally effective at ploughing.

life.

But which of these inventions provides a more socially optimal outcome? The forging process that dies with the smith? Or the plow, that is copied and improved upon by countless generations? Under the utilitarian principles underlying the analysis in this essay, the latter is unquestionably the better invention, and resources invested towards its development are better spent, from society's perspective, than resources spent developing a secret process.

In a world with a patent system, investment in self-disclosing inventions is placed on an equal – or perhaps even greater – footing with secret inventions. Patents shift investment in invention towards self-disclosing inventions as opposed to secret inventions.[123] And by encouraging the preference of self-disclosing inventions over the alternative, more of these information-providing seeds are created, feeding technological advancement.[124]

D. Litigation

In order to protect their intellectual property, companies sometimes must resort to litigation. Ultimately, it is the ability to enforce intellectual property rights through application of the judicial system that gives such rights their substance. One aspect of litigation is that it is generally a relatively public affair; the public has a strong interest in transparency in the judicial system, after all.[125] As a result, technical details about companies' products and processes may be revealed, especially during trials.[126]

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[123] Nor is this concept purely theoretical; Petra Moser's study of world fairs indicates that patent systems shift inventive activity more towards the creation of self-disclosing inventions. *See* Petra Moser, *Innovation Without Patents – Evidence from the World Fairs.* This shift has profound consequences in terms of the informational content these inventions provide to the public.

[124] Admittedly, just as with the product marketing discussed in Part III.B., it would be absurd to claim that every self-disclosing invention was a consequence of a patent system. The heavy plow was invented long before the advent of even the Venetian patent system. White, Lynn T., MEDIEVAL TECHNOLOGY AND SOCIAL CHANGE at 50 (Oxford University Press 1962) (". . . once the Slavs got the heavy plough, we have no reason to date its arrival among them very long before the Avar invasion of 568 [AD]. . ."); Edward C. Walterscheid, *The Early Evolution of the United States Patent Law: Antecedents (Part 1)*, 76 J. Pat. & Trademark Off. Soc'y 697, 707-09 (1994). That is not the point; the point is that the existence of a patent system exerts some pressure, at least at the margins, on the willingness of potential inventors to invest in self-disclosing inventions as opposed to secret inventions. The extent of that effect is necessarily the subject of future, likely empirical, research.

[125] *See* In re violation of Rule 28(D), 635 F.3d 1352 (Fed. Cir. 2011).

[126] Most firms will undoubtedly seek protective orders to preserve the confidentiality

Patents play an important role in these disclosures. A firm that protects its technical inventions through patents must use the courts to enforce its patents; a firm relying on a secrecy regime to protect its inventions would be highly unlikely to do so.[127] Thus, patents push firms towards use of the judicial system to protect their intellectual property, and the existence of patents may free a firm to disclose more information during litigation than it might otherwise be willing to do in their absence.[128] This may take the form of less need to seek draconian protective orders, for example, or a greater willingness to offer technical testimony in open court. Litigation, then, can be a form of peripheral disclosure.

E. Licensing

Patents may also encourage the dissemination of information through private transactions that would not occur but for the existence of patents. Kenneth Arrow's Information Paradox theory posits that it may be difficult or impossible for sellers of technological information about new inventions to engage in technology transfer transactions absent some form of property right in the technology.[129] Patents provide an escape from the

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of their technical information, and such devices work – to a point. *See* Alan Lawrence, *The Value of Copyright Law as a Deterrent to Discovery* Abuse, 138 U. PENN. L. REV. 549, 565-69 (1989) (discussing the limitations of protective orders in protecting trade secrets). Regardless of the potential leakages of protective orders, however, courts are as a general matter reluctant to limit public access to their proceedings. While such access is not absolute, neither is it nonexistent, even when alleged business secrets are involved. Furthermore, the more advanced the stage of litigation, the more difficult it is to shield such information from public eyes. *See* In re violation of Rule 28(D), 635 F.3d 1352, 1358 (Fed. Cir. 2011) (commenting that "Where the party seeks to limit the disclosure of information actually introduced at trial, an even stronger showing of prejudice or harm may be required to warrant limitations on disclosure."). *Id.*

[127] To clarify: here I refer to a firm relying on *secrecy* as opposed to trade secrecy. A firm that relies solely on secrecy to monetize its inventions would necessarily be utilizing an extrajudicial mechanism. A legal doctrine of trade secrecy changes this somewhat – although even there, innovator firms may be less willing (although not entirely unwilling) to resort to the courts and, once there, less willing to fight public access to technological information than when a patent is involved.

[128] Note the difference between disclosure and litigation discovery provided solely to an opponent or its counsel. Firms are subject to broad discovery obligations during litigation, under which they must often provide highly sensitive information to opposing counsel, typically under the confines of a highly restrictive protective order. Such private exchanges are different from disclosures that are made in publicly filed documents. It is the latter to which I refer, although there is reason to question the degree to which confidentiality of this information will be maintained. *See supra*, note 127.

[129] Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in NAT'L BUREAU OF ECON. RESEARCH, THE RATE AND DIRECTION OF

paradox, as they allow inventors to disclose information about the technology in the context of these transactions without giving away the ability to monetize the invention.[130] Although this type of information exchange may be difficult to prove in practice,[131] given the confidential nature of licensing transactions, there is a sound basis for questioning the effectiveness of the principal alternative, the use of nondisclosure agreements.[132] In a related fashion, technology pooling arrangements may allow companies to share technologies; these arrangements are made more feasible by patents.[133]

F. Dissemination of technology

Patents do not simply free inventors to publish about their inventions; they do not merely allow companies to describe the inner workings of their technology in marketing materials without fear of losing its commercial value; they do not just encourage investment in self-disclosing inventions. They also incentivize inventors to disseminate information[134] about their inventions as widely as possible by offering a reward to inventors who engage in this behavior.

One of the leading proponents of treating patents as property rights, Scott Kieff, theorizes that patents play an important role in encouraging inventors to commercialize their inventions.[135] Patents do so by facilitating investment in the costly and risky commercialization activities necessary to turn new inventions into actual goods and services.[136] Property rights, with

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INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS, 615 (1962).

[130] Lemley, *supra* note 2, at 52–53.

[131] *See id.* at 54 (asserting that whether or not the licensing rationale for patent law is true is ultimately an empirical question).

[132] For instance, it is frequently difficult to prove that a NDA has been breached, or a critical third party may refuse to sign a NDA. *See* Stuart J.H. Graham & Ted Sichelman, *Why Do Start-Ups Patent?*, 23 BERKELEY TECH. L.J. 1063, 1082 (2008). This may be particularly true when the refusing third party has significant power relative to the inventor, such as in the case when an inventor is dealing with a large corporation that may be the only viable licensee of the technology. Furthermore, nondisclosure agreements are unable to bind third parties who come into possession of the technology, and thus patents can provide security even against these entities. *Id.* (positing that "Patents may offer a stronger "fix" to information disclosure than merely using NDAs.")

[133] *See* Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CAL. L. REV. 1293, 1347-48 (1996).

[134] Here, I am specifically referring to dissemination, rather than just simple disclosure, as discussed in footnote __.

[135] F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions,* 85 MINN. L. REV. 697 (2001).

[136] *Id.* at 736.

their clear boundaries and strong rights of exclusion, permit investors to expend the resources necessary to commercialize novel inventions, and then to recover the commercialization costs.[137] For example, investment in commercialization of new inventions in areas such as biotechnology might be heavily curtailed in the absence of a patent system because of the large difference between average cost and marginal cost, thus granting a competitive advantage to copyists of new commercial products.[138] Patents thus function, not just as an incentive to create new inventions, but also as a mechanism to encourage inventors to engage in the post-invention activities necessary to provide those new inventions to consumers in a useful and practical form.

In much the same way as patents encourage inventors to commercialize their inventions, so too do they incentivize inventors to invest in sharing information about their technological invention in order for it to be broadly adopted by others, thus producing rents for the inventor that flow from the use of a patented technology.[139]

There are two principal ways in which inventors can monetize their inventions: through self-use, such as in the production of a new commercial product made by the inventor or the inventor's firm, or through use by others. An inventor may obtain revenue via the latter route by engaging in a licensing transaction or, alternately, by enforcing a patent in litigation,[140] categories that can be broadly described as patent rents. In either case, an inventor seeking to monetize the invention through patent rents is best

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[137] *Id.* at 747.

[138] Kieff, *supra* note 101, at 747. "Marginal cost" represents the incremental cost associated with each new use of the invention. "Average cost" includes the marginal cost, but also takes into account the fixed costs of inventing and commercializing. Average costs are thus necessarily greater than marginal costs. Inventors must charge at least average cost in order to break even; copyists may frequently be able to charge a price much closer to marginal costs. *See id.* at 728.

[139] In addition to the way in which patents encourage inventors to disseminate technology if they intend to exert a rent-taking approach to monetization of the invention, patents may also create an additional incentive for inventors to develop knowledge and know-how around their patented inventions and offer to share that information with licensee. *See* Michael Risch, *supra* note 58, at 23 ("Because patents and other technology often require additional information to be useful to the licensee (whether intended by the creator or not), a desire to license or sell the underlying asset will incentivize the creation or improvement of know-how that can be licensed as well.").

[140] Not all inventors may choose to monetize their patents through third party uses of the technology. This category of peripheral disclosure thus may not apply to these self-use inventors. But many, many inventions are monetized through licensing transactions and other third-party uses. *See* Ted Sichelman, *Commercializing Patents*, 62 STANFORD L. REV. 341, 368 n.158 (2010) (citing reports of licensing transactions in the hundreds of billions of dollars annually).

served when others adopt the new technology. The patent system creates a legal form of exclusivity that rewards inventors whose technology is adopted by others.

It is precisely because the patent system offers exclusive rights to new technologies that inventors are encouraged to share that underlying technology as widely as possible.[141] Inventors following the 'use by others' path of monetizing their invention have little to lose, and everything to gain by disseminating their new technology as broadly as possible. Show off the new gadget; explain how it words and why it's so great; tout your invention on the internet, complete with video showing the clever trick that makes it work. Patent rights encourage inventors to do all this in the hopes that others will adopt their new technologies, an adoption that may result in the payment of rents.

This idea of incentivizing the dissemination of technology in order to encourage its adoption for patent rent purposes may bear a superficial similarity to prospect theory, but the two are analytically quite distinct. Prospect theory offers a justification for patent rights based on the idea that inventors are in the best position to make decisions about future research in their area – in other words, patents allow inventors to "stake their claim" to a particular area of technology, giving them an incentive to maximize the value of future research in that area.[142] Prospect theory is thus focused on the ability of patent holders to exercise direct control over downstream research flowing from their upstream invention, offering benefits such as coordinated research plans and avoidance of duplicate efforts.[143]

Critics of prospect theory argue that this is actually a highly inefficient practice in terms of furthering future research, pointing both to the historical inability of early inventors to continue to innovate, as well as early inventors' lack of need for allowing any further invention.[144] Thomas Edison provides a classic example, transitioning from an inventor-entrepreneur to an established manufacturer and opponent of future

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[141] Of course, patents may be used for a variety of purposes – to block competitors, maintain open markets, protect specific products or process used by the patent holder in order to secure a competitive advantage. But the patent system does operate as a bit of a carrot to encourage the dissemination of information for those who choose to follow a disclose and license strategy – the more firms that adopt the inventor's technology, the greater the potential licensing revenue base.

[142] *See* Edmund Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977).

[143] *Id.*

[144] Merges & Nelson, *supra* note 23, at 876–78; John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439 (2004);

refinements of electrical technology.[145]

Regardless of whether these criticisms of prospect theory are correct, they do not impact the interests of the inventor in encouraging adoption of the present novel technology. The key distinction between the dissemination incentive discussed in this Part and prospect theory is that latter relates to who controls prospective research, while the former relates to the dissemination of the newly invented technology. Inventors who seek to derive revenue from patent rents are best served by disseminating that technology as broadly as possible with the goal of broad adoption by others. As Merges and Nelson note, before becoming an opponent of the new "alternating current" technology, Edison was "a "maverick trying to get incandescent lighting accepted as feasible."[146] Patents encourage this behavior by providing a probabilistic reward in return for aiding the dissemination of new technology.[147]

G. Quality limitations of peripheral disclosures

In addition to the limitations on peripheral disclosures discussed above, these disclosures suffer from an additional limitations: that of quality variation. Unlike conventional disclosure requirements, which attempt to mandate a minimum level of disclosure quality,[148] peripheral disclosures will be of vastly different qualities.[149] Incentives to voluntarily disclose

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[145] Merges & Nelson, *supra* note 23 , at 872, fn. 141.

[146] *Id.*

[147] Note that while this concept may provide some theoretical support for the existence of a patent system, it is not costless, at least as the patent system is currently structured. Under the current regime, patentees need not disclose the existence of patents at the same time as they disclose their technology, thus allowing the patentee to spring its patents on a perhaps unsuspecting adopter of its technology once that technology has been widely adopted – the quintessential patent troll. *See* Jason Rantanen, *Slaying the Troll: Litigation as an Effective Strategy Against Patent Threats*, 23 SANTA CLARA COMPUTER AND HIGH TECH. L.J. 159, 164-66 (exploring the concept of patent trolls). Furthermore, patentees may extract rents from users of their technology even if that technology was developed independently; Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 NORTH CAROLINA L. REV. 1421, 1425 (2009) (explaining that copying is not required to prove liability for patent infringement). Consequently, the probabilistic reward of patent rights is available even to inventors who decline to disseminate their technology but later choose to assert their patent rights against those who independently developed the technology. This Essay does not purport to offer a solution to either type of patent trolls, merely to point out that it is logical to expect that under a patent system entities are encouraged to disclose their technology in order to hasten its adoption by others as opposed to maintain that technology in secrecy.

[148] It does so through the enablement, written description, and best mode requirements of 35 U.S.C. § 112.

[149] This is true of all disclosures, of course, not just peripheral disclosures. A scientific

technical information may be greater or lesser depending on the circumstances, and the amounts of useful information necessary that must be disclosed in order to satisfy those incentives may be large or small. The quality and quantity of all peripheral disclosures may not be the same: for a licensing transaction involving transfer of core technical know-how, the amount of information disclosed may be great; in an advertisement for a new product, it may be relatively small. Furthermore, characteristics of the medium may differ. Scientific journals, for instance, may have their own disclosure obligations required for publication that necessitate open revelation of the technology. Marketing materials, on the other hand, may not need to convey much of the technology at all. Companies might offer factory tours, but not allow visitors to get close to important equipment or may shroud critical components. Other barriers might impede the quantity or type of information that is being disclosed.[150]

Overall, however, peripheral disclosures will-and do-occur. Their quality may not all be the same, but even a nominal disclosure of technical information is more information than provided by a nondisclosure.

V. IMPLICATIONS OF THE THEORY

A. As a Response to Criticisms of the Patent System

On a policy level, the fundamental question for patent scholars, the courts, and Congress is whether the patent system effectively promotes invention. One incarnation of this discussion is the debate over whether the patent system is better at promoting invention than a world without patents. Nor is this debate trivial: there are numerous critics of the patent system who argue that our society would have more invention in a world without patents.[151] Implicit in these criticisms is an endorsement of secrecy as a

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article may provide useful information about a new development, or it may not; an advertisement may be worthless puffery or impart valuable technical information, regardless of whether the patent system played a role in its production.

[150] *See* Seymore, *supra* note 4.

[151] A summary of current critics of the patent system can be found in Goldman, *supra* note 62, at 43–44. Examples include Jaffe & Lerner, *supra* note 19; Boldrin & Levine, *supra* note 19. Boldrin & Levine's work is particularly noteworthy-they suggest abolishing the patent and copyright system altogether to spur innovation. *Id.* at 253. Yet the effective consequence of their proposal would be more firms investing in secrecy, a consequence that they themselves acknowledge. *Id.* Greater secrecy necessarily leads to less availability of information. Of course, there may be non-monetary reasons why inventors invent, as discussed in note __, that do not necessitate some form of secrecy, and circumstantial mechanisms that allow for monetization of inventions without relying on either secrecy or patents. *See* Sichelman, *supra* note __, at 136-37 (describing alternate ways to monetize an invention such as first mover advantages and complementary assets). I am not convinced,

mechanism for monetizing invention.[152] While inventors and scientists may engage in technology-progressing activities for reasons unrelated to the desire to monetize their inventions and discoveries,[153] the further one moves away from basic research towards practical technologies, the less force these alternatives are likely to have. Thus, rejections of the patent system as a mechanism of technological progress are generally implicit endorsements of secrecy as a primary mechanism for monetizing inventions and encouraging investment in research and development.

The difficulty is that under a secrecy-based system, inventors *cannot* share information about their inventions without losing some or all of the ability to monetize their inventions; voluntary disclosure, then, is less likely than under a patent system. This effect may not be perfect, but it is directionally indisputable: under a patent system, participants are able to share at least some invention-promoting information; under a secrecy regime, they are unable to share any information at all. Patents do not offer perfect peripheral disclosure; they merely offer significantly more than the alternative.[154]

Shifting the law to favor secret inventions as opposed to non-secret inventions thus carries with it a considerable risk in terms of the amount of information that is disclosed by inventors.[155] Such a move would have the effect of reducing peripheral disclosures. Not in as extreme a fashion as a complete abolition of the patent system, but at least on the margins. Furthermore, the effect of such a policy shift would be to favor investment in the creation of non-self disclosing inventions over self-disclosing inventions. Recall that as between self-disclosing inventions and non-self-disclosing inventions, only the latter are protectable through any type of secrecy regime. Thus, the de facto effect of a shift towards secrecy would be to encourage investment in non-self-disclosing inventions. And since the pool of resources that can be devoted to invention is finite, the effect will be to reduce investment in self-disclosing inventions. Yet, as this article has explained, as a whole society derives greater informational benefits from

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however, that alternative reasons for inventing are, by themselves, sufficient drivers of technological progress, or that money isn't a motivating factor for many inventions. Obtaining profit is, after all, the central purpose of our modern market-based economy.

[152] Here I use the term "secrecy" to refer to both pure secrecy and trade-secrecy regimes.

[153] *See supra*, footnotes __.

[154] Anderson also argues that trade secrecy promotes more efficient disclosure to the proper individuals, i.e.: the small number of individuals to whom the inventor intends to reveal the information. *Id.* at 22. But this limited disclosure pales in significance to the broader peripheral disclosures allowed under a patent system.

[155] Anderson, *supra* note 8, at 3.

self-disclosing inventions than those that are not. It would be a great mistake, in my view, to favor the creation of non-self-disclosing inventions over their counterparts and eliminate or reduce these building blocks of future progress.

Just as peripheral disclosure offers an alternative justification for the patent system as a whole, so too does it provide a policy argument that may be raised in the context of litigation around individual patents. In many circumstances, such as those discussed in this article, inventors may have made public disclosures about their technology due to the existence of patents that protect that technology. Such a factor may weigh in the patentee's favor when equitable considerations are being made.[156]

B. As a Basis for Abolishing Mandatory Disclosure Obligations

Given the peripheral disclosures that patents produce, one possible conclusion would be that we should eliminate inventors' mandatory disclosure requirements. Surely complying with these obligations – preparing a detailed specification, for instance, consumes both attorney and inventor time that might better be spent elsewhere, especially if the criticisms discussed in Part I are accurate.

A better approach, however, is to recognize that both conventional disclosures and peripheral disclosures have value in causing the dissemination of information about new inventions. Mandatory disclosures establish a minimum level of technical information about the information that inventors must provide to the public. These disclosures are hardly perfect, and inventors may chafe at their obligations and comply with less than full enthusiasm, but they nonetheless set a minimum threshold for information disclosure. Moreover, criticisms to the contrary, patents *do* have disclosure value, regardless of the theoretical criticisms.[157]

Peripheral disclosures, on the other hand, may be greater or lesser than mandatory disclosures. Some inventors may elect to follow a practice of disclosing as little as possible on the belief that this maximizes the value

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[156] Such as in the context of a preliminary injunction. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 126 S.Ct. 1837 (2006).

[157] *See* Oullette, *supra* note 4. In response to an early draft, I received several comments arguing that the criticisms of Section I.B. were unfounded, and that patents do provide significant technical information, although perhaps less so in certain fields. *See* PATENTLYO (August 09, 2011) (http://www.patentlyo.com/patent/2011/08/peripheral-disclosure.html). Indeed, simply picking a few patents at random and reading them has taught me a surprising amount about areas of technology that I previously knew little about. Perhaps this information is already known to persons of skill in the art in those fields, but to me, it was novel, readable, and, while not practically useful to me personally, nonetheless enlightening.

of their invention; other inventors may, for the reasons discussed in this paper, decide that the value of the invention is maximized (or other incentives are satisfied) by broad peripheral disclosure. Mandatory disclosures and peripheral disclosures thus work hand in hand to ensure a steady stream of information is provided to the public about new inventions.

C. As a Tool for Understanding the Impact of Patent Legislation

On September 16, 2011, President Obama signed the Leahy-Smith America Invents Act into law. Congress passed this law ostensibly to "promote industries to continue to develop new technologies that spur growth and create jobs across the country which includes protecting the rights of small businesses and inventors from predatory behavior that could result in the cutting off of innovation."[158] While this avowed purpose goes directly to the incentive effects the AIA will purportedly have, it overlooks the disclosure effects of the act – particular the effect if may have on peripheral disclosures. This section examines the impact specific sections of the AIA are likely to have on this type of disclosure.

1. Changes to novelty rules

The cornerstone of the AIA is its shift from a system in which priority and novelty is based on the first person to invent to one in which it is based on the first person to file or disclose their new invention. Under the new 35 U.S.C. 102(a)(1), which will take effect on March 16, 2013, a person is not entitled to a patent if the invention "was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the *effective filing date* of the claimed invention."[159] The effective filing date limitation creates a powerful new statutory bar, one based on the filing date rather than the previous one-year before filing framework.[160]

This new rule comes with a major exception, however: prior art does not include disclosures[161] made within one year of filing if "the subject matter disclosed had, before such disclosure, been publicly disclosed by the inventor or another who obtained the subject matter disclosed directly or indirectly from the inventor or a joint inventor."[162] In other words,

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[158] AIA, section 30 ("Sense of Congrress").

[159] *See* 35 U.S.C. 102(a)(1) (2011) (emphasis added)

[160] *See* 35 U.S.C. 102(b) (2011).

[161] I interpret this term as referring to any of the categories of prior art discussed in the new 102(a). There is disagreement as to whether it will be this broad, or how some of the 102(a) categories would be interpreted in the context of 102(b).

[162] [new 102(b)(1)(B)] (The section also contains an exception for disclosures by the

inventors will have the ability to negate any prior art from the one-year period prior to filing by engaging in public disclosure.

This provision strengthens patent-driven reasons to disclose by encouraging disclosures that trigger the safe-harbor of new 102(b). It may also encourage a disclosure race. If, as Gideon Parchomovsky has suggested, inventors involved in a patent race sometimes engage in strategic disclosures to stymie their competitors,[163] the new 102(b)(1)(B) may fuel this behavior. Through early disclosure, inventors who are racing to develop a new technology can not only block their rivals from obtaining a patent—because the disclosure would operate as prior art against the rival's patenting attempts—but can also negate any subsequent attempt by the rival to disclose patent-blocking information of equivalent content. Rather than a race to invent, perhaps this will produce a race to engage in early public disclosures. Unfortunately, any such effects are likely to be largely limited to inventors who desire to only file in the United States due to the lack of a similar self-disclosure exception in the rest of the world.[164]

2. Creation of a Prior User Defense

Even as the changes to the novelty rules seem to create a new category of peripheral disclosures, at least for US-only inventors, the creation of a prior user defense pushes towards less disclosure. New 35 U.S.C. 273 carries with it the potential to reduce peripheral disclosures, at least at the margins.

New U.S.C. 273 creates a defense to infringement based on prior commercial use. The defense applies when to a person who "commercially used the subject matter in the United States, either in connection with an internal commercial use or an actual arm's length sale or other arm's length commercial transfer of a useful end result of such commercial use…at least 1 year before the earlier of either" the patentee's effective filing date or disclosure under 102(b).[165]

This defense is most applicable to technologies that are capable of monetization through secrecy. A prior user defense is far less relevant for for inventions whose workings are readily understandable once they are placed on the market because these products already represent potentially invalidating prior art. Under pre-AIA law, inventors who developed non-

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inventor or another who obtained the subject matter from thes inventor, as well as exceptions to the 102(a)(2) category of prior art.

[163] Gideon Parchomovsky, *Publish or Perish*, 98 MICH. L. REV. 926, 929-30 (2000).

[164] Europe, for example, has a much more limited disclosure exception. *See*, e.g., European Patent Convention art. 55, Oct. 5, 1973, 13 I.L.M. 268, 286.

[165] New 35 U.S.C. 273 (a).

self disclosing inventions are faced with a difficult choice: maintain the process as a trade secret, and run the risk of being blocked later by an inventor who obtains a patent, or file for a patent and disclose the process to the public.[166] Both options have significant costs associated with their selection, but the patent and disclose option is hardly foreclosed.

A prior user defense reweights this decision in favor of maintaining secrecy by lowering the risk that the secret-keeper will be blocked by a later inventor. The directional effect of this change is to reduce the number of patents that are filed on secret inventions, and thus reduce the number of mandatory disclosures that accompany those patents.

Of course, not everyone accepts that these mandatory disclosures provide useful technological information.[167] Consider, however, the effects on peripheral disclosures - specifically, the impact on investment in self-disclosing inventions. The creation of a prior user defense re-calibrates the scale as between secret inventions and self-disclosing inventions. By making secrecy a more valuable protection strategy for inventors to pursue, inventors are likely to focus their efforts towards the creation of secret inventions as opposed to self-disclosing inventions, at least when the social utility that the inventor can monetize is otherwise equal. But self-disclosing inventions are inherently valuable for the information that they provide to the public and future inventors - a spillover that inventors cannot fully capture. The directional result may be the creation of fewer of these valuable inventions, thus diminishing the peripheral disclosures that accompany them.

Indeed, if an invention is being monetized through secrecy, the likelihood of public disclosures of the underlying technology is lower for the reasons discussed above in Part III. Secrecy is, after all, the antithesis of disclosure.

CONCLUSION

The idea that patents further invention by requiring that technological information be disclosed through the patent document is a good one in theory, but perhaps less so in practice. There is good reason to suspect that patents fail to fully disclose useful information about new inventions within the confines of the patent itself. The weakness of conventional disclosure theory suggests that perhaps the existence of a patent system cannot be justified on that ground alone.

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[166] Anderson, *supra* note __, at 4 ("An innovator that chooses to patent cannot simultaneously enjoy trade secrecy because the patent application reveals her secret to the world.").

[167] See *supra* Part I,B.

The disclosure function of patents need not be so narrowly circumscribed, however. The patent system does not merely attempt to force inventors to reveal their secrets, it frees them to do so without losing the ability to monetize their inventions. This freedom is not necessarily used in describing the invention within the patent document itself, but rather in a multitude of other activities: scientific publications, product marketing, even the existence of self-disclosing inventions themselves.

I do not contend that peripheral disclosure provides the sole explanation as to why the patent system works, or even that it its effects are uniform and consistent across all fields and people. There is no one monolithic answer. But it does stand on its own as a powerful, and previously unexplored, justification for the patent system. More than anything else, it may also help explain the rapid technological advancement of the last few centuries, and its interactions with specific areas of technological progress are fertile ground for future analysis.