ESSAY

IMPROVING PATENT NOTICE AND REMEDIES: A CRITIQUE OF THE FTC'S 2011 REPORT

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INTRODUCTION

2011 was an eventful year for those interested in patent law. In March, the Federal Trade Commission ("FTC") released a report that urges the Patent and Trademark Office ("PTO") and courts to remedy perceived inadequacies underlying the U.S. patent system.[1] The FTC observes that people of skill in the art routinely encounter difficulty in determining the meaning, and hence exclusive scope, of a patent's claims. Not only does this failure of notice stymie the efficient dispersion of technology throughout the economy, the FTC argues, but the judicial process can aggravate the problem by granting inappropriate remedies in patent-infringement cases.[2] Then, in September, Congress passed comprehensive patent-reform legislation for the first time in almost sixty years.[3] The Leahy-Smith America Invents Act (the "AIA") changed the patent landscape in a number of significant ways, introducing a first-to-file system, post-grant opposition proceedings, certain prior-user rights, and other material changes.[4]

These developments are remarkable, not least because they arrived at a time when some considered legislative reform of the patent system to be both unlikely and ineffective.[5] Skepticism about such reform was far from surprising, as commentators cannot even agree whether the patent system, as a whole, spurs or hinders innovation in the U.S. economy.[6] Yet, although many academics and people in industry perceive the patent regime to be in crisis,[7] the system's specific, problematic features have eluded universal definition.[8] Observers also disagree about the magnitude of the harm associated with various controversial features of the patent regime.[9]

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1. FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION (2011) [hereinafter FTC REPORT], *available at* http://www.ftc.gov/os/2011/03/110307patentreport.pdf.

2. *Id.* at *passim*.

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

4. *Id.*

5. *See, e.g.*, DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT (2009) (exploring problems with the patent system, arguing that the courts are best placed to resolve those difficulties, and outlining ways in which the judiciary might accomplish the same).

6. *Compare, e.g.*, MICHELE BOLDRIN & DAVID K. LEVINE, AGAINST INTELLECTUAL MONOPOLY (2008) (advocating the abolition of the patent system), *and* JAMES BRESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2008) (exploring problems with the contemporary patent system), *with* Gerald J. Mossinghoff & Vivian S. Kuo, *World Patent System Circa 20XX, A.D.*, 38 IDEA 529 (1998) (advocating a strong patent regime).

7. *See, e.g.*, Michael J. Burstein, *Rules for Patents*, 52 WM. & MARY L. REV. 1747, 1747 (2011) ("There is widespread agreement that the patent system in the United States is in need of reform.").

8. *See, e.g.*, Shamnad Basheer & Prashant Reddy, *The 'Experimental Use' Exception Through a Developmental Lens*, 50 IDEA 831, 835 (2010).

9. *See, e.g.*, James F. McDonough III, Comment, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189,

As a result, little consensus had emerged as to the contours of an effective, comprehensive solution.[10] The AIA and the FTC Report mark a welcome point of departure from this pre-existing trend of disagreement and discord.

As between the two developments, the AIA is likely to overshadow the FTC Report. Yet, due in part to the fact that the AIA does little to address the problem of inadequate patent notice, the Report is itself of considerable importance. This Essay explores the backdrop, substantive provisions, and likely impact of the Report, concluding that the FTC's recommendations, though generally well founded, are unlikely in themselves to resolve the most worrying features of the patent crisis.

This Essay argues that the FTC proposals are excessively restrained with respect to controversial tenets of proposed reform, though they are appropriately ambitious in other quarters. The agency takes care to distinguish patent-assertion entities ("PAEs"), which eschew commercialization and engage only in *ex post* technology licensing, from other non-practicing entities, such as universities and semiconductor-design firms, which actively disseminate their technology *ex ante* to third parties that commercialize the technology.[11] The FTC urges courts to be sensitive to the innovation-reducing conduct of the former group of patentees, contrasting their activities with the welfare-enhancing practices of inventors that engage in *ex ante* technology transfer.[12] Among its bolder provisions, the Report calls on the International Trade Commission ("ITC") to deny exclusion and cease-and-desist orders to prevailing PAEs.[13] In making this recommendation, the FTC seeks to close a loophole in the Supreme Court's 2006 decision in *eBay, Inc. v. MercExchange, L.L.C.*, which held that the law does not automatically entitle patentees to injunctive relief in the event of established infringement.[14] That loophole effectively enables certain patentees to obtain injunctive relief from the ITC in circumstances where they could not do so through the courts.

Outside the realm of the ITC, the Report advises judges to be mindful of the economic costs of utilizing property rules in lieu of liability rules in cases of hold out, and to employ the four-factor test in equity for an injunction in

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194–95 (2006) (articulating the counter-majoritarian view that a patent-troll problem does not exist); Michael Risch, *Everything Is Patentable*, 75 TENN. L. REV. 591, 595 (2008) (arguing for expansive patentable subject matter in contrast to academics who argue that fields of innovation such as business methods, computer software, and gene sequences should not be subject to patent protection).

10. *Compare, e.g.*, BURK & LEMLEY, *supra* note 5 (arguing that the judiciary should take the lead in solving the patent crisis), *with* Scott Baker, *Can the Courts Rescue Us from the Patent Crisis?*, 88 TEX. L. REV. 593, 609 (2010) (questioning whether the courts can serve the role that Professors Burk and Lemley envision).

11. FTC REPORT, *supra* note 1, at 31–72.

12. *Id.*

13. *Id.* at 239–43.

14. eBay, Inc. v. MercExchange, L.L.C, 547 U.S. 388 (2006).

light of those costs.[15] More generally, the Report asks courts to introduce more-rigorous economic analysis into damages determinations in patent cases, urging renewed focus in particular on the hypothetical-negotiation framework for determining damages.[16] It also urges the judiciary to jettison the entire-market-value rule and dual awards, both of which are inconsistent with economic theory.[17] Lastly, the FTC articulates a variety of proposals aimed at ameliorating the current situation in which many patents, especially in the information-technology sector, fail to disclose useful information concerning both the contours of the relevant patents' scope and the nature of the claimed technology.[18]

The Report represents an important development in U.S. innovation policy. This Essay explores the material features of the patent crisis and explains the crucial roles that patent notice and remedies play in fueling the crisis. It examines the Report's probable efficacy, laudable provisions, and material shortcomings. The Essay concludes that, although the Report's recommendations are generally well founded, the Report is unlikely to have a major impact on the patent system's most significant problems. It thus appears likely that more significant reforms will be necessary.

This Essay proceeds as follows. Part I briefly recounts the controversial features of the patent system that lead some commentators to believe that the patent system is in crisis. Part II explores the interrelated functions of notice and remedies by comparing the laws of tangible and intellectual property. Drawing on that discussion, Part III addresses the Report's most notable recommendations and singles out a subset of them for particular praise. Part IV details the Report's limitations, opining that its decision not to make formal recommendations with respect to the most contested, but arguably most important, aspects of the patent system means that the Report is unlikely to have more than a modest impact on the crisis. Part IV also discusses technical deficiencies that underlie the FTC's analysis. A brief conclusion follows.

I. The Patent Crisis

One must view the FTC's recommendations in the context of the crisis that the agency seeks to address. The controversial features of the patent system are well known. The fact that inventors are motivated by divergent

15. FTC Report, *supra* note 1, at 213–44. The four-factor test for obtaining an injunction is: (1) irreparable injury; (2) inadequate remedy at law; (3) the balance of hardships favors granting an injunction; and (4) granting an injunction would serve the public interest. *eBay*, 547 U.S. at 391.

16. *Id.* at 159–76; *see infra* text accompanying notes 169–171.

17. *Id.* at 154–58; *see infra* text accompanying notes 154–155, 172.

18. *Id.* at 73–136.

incentives poses a challenge to those who seek to foster innovation.[19] As the relationship between patents and innovation differs dramatically from industry to industry, features of the patent system that are problematic in some quarters are desirable in others.[20] As a result, proposed solutions to perceived frailties in the system invariably attract protest from stakeholders who favor the status quo, which can stymie effective reform.[21] As but one example, the argument that courts should liberally grant injunctive relief in the event of established infringement found favor in the pharmaceutical industry, but invoked the ire of companies in the information-technology industry that commercialize technology.[22] Consensus remained elusive for some time.[23] An important exception, of course, occurred in September 2011 when, after several years of failed attempts, Congress passed patent-reform legislation in the form of the AIA.[24]

That shortcomings in the patent regime have emerged should hardly be surprising. Conceived in a time when mechanical devices were a central component of industrial innovation and when marketed products rarely incorporated more than a modest number of patent-eligible technologies,[25] the patent regime has since ballooned to encompass such exotic subjects as biotechnology, nanotechnology, computer software, semiconductors, and telecommunications.[26] Few would think that a twenty-year exclusive right would consistently impart efficient incentives over such an eclectic range of industries, and yet a one-size-fits-all system continues to prevail.[27]

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19. *See* Ofer Tur-Sinai, *Cumulative Innovation in Patent Law: Making Sense of Incentives*, 50 IDEA 723, 736–40 (2010).

20. *See* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1615–30 (2003).

21. *See* William C. Rooklidge & Alyson G. Barker, *Reform of a Fast-Moving Target: The Development of Patent Law Since the 2004 National Academies Report*, 91 J. PAT. & TRADEMARK OFF. SOC'Y 153, 153 n.10 (2009) (citing Daniel R. Cahoy, *An Incrementalist Approach to Patent Reform Policy*, 9 N.Y.U. J. LEGIS. & PUB. POL'Y 587 (2006)) ("Professor Cahoy urges an incrementalist approach to patent reform because, in his view, the complexity of the patent system combined with reasonable disagreement over the system's most important goals and ambiguity regarding the economic incentives, dooms comprehensive legislative reform efforts to failure.").

22. *Compare* Brief for Pharmaceutical Research and Manufacturing of America as Amicus Curiae Supporting Respondent, eBay, Inc. v. MercExchange, L.L.C., 126 S. Ct. 1837 (2006) (No. 05-130), *with* Brief for Business Software Alliance, et al. as Amicus Curiae Supporting Petitioners, eBay, Inc. v. MercExchange, L.L.C., 126 S. Ct. 1837 (2006) (No. 05-130).

23. *See* BURK & LEMLEY, *supra* note 5, at 95–100.

24. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284-341 (2011).

25. *See* BURK & LEMLEY, *supra* note 5, at 38; Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 574 n.152 (2009); Sarah A. Geers, Comment, *Common Sense and the Fact Finder Without Skill in the Art: The Role of Objective Evidence in Achieving Proper Technology Specificity*, 40 SETON HALL L. REV. 225, 257 (2010).

26. *See* Burstein, *supra* note 7, at 1762.

27. *See* Gideon Parchomovsky & Michael Mattioli, *Partial Patents*, 111 COLUM. L. REV. 207, 223 (2011) ("At present, our patent system is predicated on a binary, one-size-fits-all,

The policy challenges that have arisen are industry specific, with the most severe crisis in information technology ("IT"). The larger field of IT includes computer hardware and software, database design and applications, and telecommunications.[28] Many of the products in this field combine hundreds, even thousands, of discrete, patent-eligible technologies.[29] As the rights to these constituent technologies are fragmented, anticommons effects—which occur when one must aggregate many separate property rights to market a technological product, and are most likely to arise when the PTO awards a large number of narrow patents over discrete technologies—can result. These anticommons effects create high transaction costs that frustrate *ex ante* bargaining and commercialization.[30] The amorphous language often used to claim IT inventions, facilitated by the Federal Circuit's lax disclosure requirements, compounds the problem by creating a thicket that allows multiple parties to lay claim to the same technology.[31] The thicket effect also magnifies transaction costs. To make matters worse, the overwhelmed PTO routinely issues patents that do not meet the novelty, nonobviousness, or enablement conditions of patentability, resulting in patents asserted in the marketplace that would not withstand scrutiny in court.[32]

The sheer volume of IT patents, many of which are of dubious quality and indiscernible meaning, has created a bizarre phenomenon: companies that manufacture IT products routinely ignore patents and independently develop requisite technologies themselves.[33] Meanwhile, a large secondary market for IT patents has developed in which specialized entities acquire patents not to obtain technology to include in marketed products, but simply to bring infringement actions against companies that sell goods to consumers.[34] Many policymakers condemn these "patent trolls" for contributing nothing to consumers and for instead creating a tax on the welfare-

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design."); *see also* BURK & LEMLEY, *supra* note 5, at 79–92 (explaining how different theories of innovation may affect different industries).

28. *See* Linda M. Beale, *Is* Bilski *Likely the Final Word on Tax Strategy Patents? Coherence Matters*, 9 J. MARSHALL REV. INTELL. PROP. L. 110, 116 (2009).

29. *See* Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1992 (2007) ("In the information technology sector in particular, modern products such as microprocessors, cell phones, or memory devices can easily be covered by dozens or even hundreds of different patents.").

30. *See* Sapna Kumar & Arti Rai, *Synthetic Biology: The Intellectual Property Puzzle*, 85 TEX. L. REV. 1745, 1757 (2007).

31. *See* Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools and Standard-Setting*, *in* 1 INNOVATION POLICY AND THE ECONOMY 119, 119–26 (Adam B. Jaffe et al. eds., 2001).

32. *See* Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 46–51 (2007).

33. *See* Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 22.

34. *See* Anne Kelley, *Practicing in the Patent Marketplace*, 78 U. CHI. L. REV. 115, 117–18 (2011); *see also* Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571 (2009).

promoting technology commercialization of others.[35] For this criticism to be accurate, however, one must distinguish between two forms of "non-practicing entities" ("NPEs"). First, there are NPEs that license patents *ex ante* to companies that employ the relevant technology in designing and manufacturing goods for downstream consumption. Such laudable NPEs include universities and technology start-ups.[36] Other NPEs, however, add little or nothing to *ex ante* commercialization of technology, but instead initiate infringement proceedings after infringing sales have taken place.[37] As such *ex post* actions occur after investment in and development of a new product, the NPE has greater leverage to extract greater royalties than it could have obtained *ex ante*.

NPEs of the latter sort, which Professor Colleen Chien aptly named "patent assertion entities"[38] ("PAEs"), justify their business model by arguing that they create a market for inventors who would otherwise lack opportunities to sell their technological discoveries. Empirical evidence does reveal that IT manufacturers display little interest in patents if their owners have engaged in little or no post-grant development.[39] To the extent that individual or other inventors have limited access to capital, the absence of a market for their technologies deprives them of a financial return. Such inventors, PAEs claim, also lack the requisite capital to assert their intellectual property ("IP") rights in court given the formidable costs of patent litigation.[40]

Nevertheless, these facts do not justify the conduct of PAEs. Not only do IT patents offer notoriously poor disclosure, but also many IT companies actively ignore patents and consistently engage in independent invention.[41] As a result, the welfare benefits associated with the PAE business model are dubious. By providing a market for IT patents that does not require development sufficient to demonstrate commercial viability, and by failing to transform acquired rights into sold products, PAEs may simply be fueling a "patent bubble." PAEs may spur the generation of many IT patents, but few

35. *See* Amy L. Landers, *Liquid Patents*, 84 DENV. U. L. REV. 199, 201 (2006) (describing such criticism).

36. *See, e.g.*, Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 629 (2008) (explaining that, although universities are non-practicing entities, they are not patent trolls because "most university licenses have a major technology transfer component"); *see also* Leslie T. Grab, *Equitable Concerns of* eBay v. MercExchange*: Did the Supreme Court Successfully Balance Patent Protection Against Patent Trolls?*, 8 N.C. J.L. & TECH. 81, 82 (2006).

37. *See* eBay, Inc. v. MercExchange, L.L.C., 547 U.S. 388, 396 (2006) (Kennedy, J., concurring).

38. Colleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and its Implications for the Patent System*, 62 HASTINGS L.J. 297 (2010).

39. FTC REPORT, *supra* note 1, at 69–70.

40. *See* Sannu K. Shrestha, *Trolls or Market-Makers? An Empirical Analysis of Non-Practicing Entities*, 110 COLUM. L. REV. 114, 126–30 (2010).

41. *See* Lemley, *supra* note 33, at 22.

of these are likely to enhance consumer welfare. Meanwhile, firms that market IT products have had to undertake costly measures to defend themselves. For example, commercializing firms have enlisted the services of defensive patent aggregators that purchase patents to prevent NPEs from later asserting them.[42]

Beyond the problems of PAEs, indeterminate claim language, questionable patent validity, and illusory disclosure requirements in IT industries, numerous commentators have railed against computer software and business method patents, contending that inventors enjoy sufficient incentives independent of the patent system to develop these technologies.[43] The rapid rate of technological advancement in these settings, the disproportionate importance of cumulative innovation, the non-self-disclosing nature of these inventions, and (in the case of software) the presence of copyright protection counsel against patent eligibility. In these contexts, too, the norm is for inventors to ignore patents and to innovate independently. First-mover advantage, bolstered by trade secret protection and amplified by network effects, appears to be the principal driver of innovation in these settings.[44]

Collectively, these traits paint a picture of a patent system adrift. The economic justification for patent awards rests on public goods theory, which teaches that scientific knowledge is vulnerable to third-party appropriation. Specifically, public goods refer to goods (often ideas) that are nonexcludable, as it is difficult to prevent others from consuming them, and nonrivalrous in consumption, which means that a person's consumption of the resource does not detract from the consumption of others.[45] If competitors can readily reverse engineer an inventor's technology, the latter will lack an incentive to invest in research and development ("R&D"). Remarkably, fewer than eleven percent of patent-infringement complaints even *allege* copying.[46] As a result, the contemporary patent system has taken on a life independent of its economic mandate. An IP regime that principally operates as a tax on independent invention rests on dubious economic footing.[47]

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42. FTC REPORT, *supra* note 1, at 66–67.

43. *See, e.g.*, Pamela Samuelson, Benson *Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1029–30 (1990); *see also* Alan Devlin & Neel Sukhatme, *Self-Realizing Inventions and the Utilitarian Foundation of Patent Law*, 51 WM. & MARY L. REV. 897 (2009).

44. *See, e.g.*, Siddharth Khanijou, *Patent Inequity? Rethinking the Application of Strict Liability to Patent Law in the Nanotechnology Era*, 12 J. TECH. L. & POL'Y 179, 190 n.58 (2007); Katherine J. Strandburg, *What if There Were a Business Method Use Exemption to Patent Infringement?*, 2008 MICH. ST. L. REV. 245, 249–50.

45. *See, e.g.*, Rita Heimes, *Trademarks, Identity, and Justice*, 11 J. MARSHALL REV. INTELL. PROP. L. 133, 139 (2011).

46. *See* Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421 (2009).

47. Economic theory might nevertheless approve of a patent system on the ground that it creates an incentive to commercialize. Although patents play a crucial role in this respect in industries that involve high levels of capital expenditures on post-invention product development—paradigmatically, the biopharmaceutical industries—in others fields,

Separately, patent breadth may be excessive in some industrial settings.[48] Economic theory justifies the grant of a broad exclusive right on the ground that the original inventor can best guide the path of his technology.[49] This "prospect theory" of patents contends that granting a party an exclusive right—that is, a prospect—over an idea or invention will spur that entity to extract the value of that idea, to commercialize the same into a marketable product, and to guide any improvements over the technology, if necessary via third parties that have the ability and inclination to do so.[50] In this respect, prospect theory comports with the Coase Theorem, which states that, in zero-transaction-cost environments, the initial allocation of property rights will have no effect on efficiency.[51] Prospect theory, however, loses force when follow-on innovation is rapid, of greater value than the initial invention, and entails the efforts of many separate parties.[52] In such settings, transaction costs will be high, and so society cannot be confident that initial inventors in whom the law bestows prospect rights will efficiently contract with third-party improvers. The inventions of IT companies display these traits, suggesting that exclusive rights in this field, if awarded at all, should be narrow.[53]

These problems are sufficiently severe to lead one to question the legitimacy of the patent system itself. Recent studies suggest that patents' net effect in certain fields, especially IT, may act as a drain on innovation, operating in opposition to the patent regime's *raison d'être*.[54] This quagmire has led some economists to call for the abolition of the patent system.[55] Other less radical possibilities include introducing an independent-invention defense[56] or broad prior-user rights (which the AIA has partially done).[57] Other

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and especially IT, patents play only a modest role, at best, in spurring commercialization. *See* BURK & LEMLEY, *supra* note 5, at 38–46.

48. *See, e.g.*, Lorie Graham & Stephen McJohn, *Thirty-Two Short Stories About Intellectual Property*, 3 HASTINGS SCI. & TECH. L.J. 1, 42 (2011); Oscar Liivak, *Maintaining Competition in Copying: Narrowing the Scope of Gene Patents*, 41 U.C. DAVIS L. REV. 177, 222 (2007).

49. *See* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977) (introducing the famous "prospect theory" of patents).

50. *See id.*; *see also* John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 486–91 (2004).

51. *See, e.g.*, RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 64–66 (8th ed. 2011).

52. *See* BURK & LEMLEY, *supra* note 5, at 72, 92.

53. *See id.* at 156–70.

54. *See* Wesley M. Cohen, Richard R. Nelson, & John P. Walsh, *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)* 9 (Nat'l Bureau of Econ. Research, Working Paper No. 7552, 2000); *see also* Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 18 BROOKINGS PAPERS ON ECON. ACTIVITY 783 (1987).

55. *See, e.g.*, BOLDRIN & LEVINE, *supra* note 6.

56. *See, e.g.*, Stephen M. Maurer & Suzanne Scotchmer, *The Independent Invention Defense in Intellectual Property*, 69 ECONOMICA 535 (2002); Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 MICH. L. REV. 475, 479 (2006).

57. 35 U.S.C. § 273(b)(1) (2011); *See* Carl Shapiro, *Prior User Rights*, 96 AM. ECON. REV. 92 (2006).

possibilities include co-ownership of an initial inventor's patent,[58] restricting the scope of patentable subject matter,[59] curtailing damage awards,[60] or narrowing patent rights by increasing disclosure requirements, which would more closely align the reach of a patent's claims with the technology revealed by the specification.[61]

Despite these difficulties, one must exercise caution in addressing the problems facing the patent regime. Although patents operate as an imperfect driver of innovation, they serve a vital function in some critical areas of the economy. The biopharmaceutical and chemical industries, in particular, depend on the patent regime for their survival and are sensitive to that system's operation, as the 2011 "patent cliff" demonstrates.[62] Although these fields are not devoid of problems, economists generally agree that patents work well within them and are indeed an essential prerequisite of ongoing innovation.[63] Controversial issues in these fields tend not to question the legitimacy of patent protection. Instead, concerns implicate the optimal structure of patent protection in light of such complementary policy tools as Food and Drug Administration ("FDA") regulatory exclusivity,[64] the availability of prizes,[65] and government funding for medical research.[66] An exception to the

58. *See* John S. Leibovitz, Note, *Inventing a Nonexclusive Patent System*, 111 YALE L.J. 2251 (2002).

59. *See* David S. Olson, *Taking the Utilitarian Basis for Patent Law Seriously: The Case for Restricting Patentable Subject Matter*, 82 TEMP. L. REV. 181, 231 (2009).

60. *See* David W. Opderbeck, *Patent Damages Reform and the Shape of Patent Law*, 89 B.U. L. REV. 127, 132–34 (2009).

61. *See, e.g.*, Fromer, *supra* note 25; Michael J. Walsh, Comment, *The Disclosure Requirements of 35 U.S.C. § 112 and Software-Related Patent Applications: Debugging the System*, 18 CONN. L. REV. 855, 872–74 (1986). *But see* Robert E. Thomas, *Debugging Software Patents: Increasing Innovation and Reducing Uncertainty in the Judicial Reform of Software Patent Law*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 191, 234–37 (2009).

62. *See Buying Time: Will Swallowing Wyeth Cure Pfizer?*, THE ECONOMIST, Jan. 31, 2009, at 77. Indeed, breakthrough drug innovation has stalled in recent years, as the number of new molecular entities (NMEs) approved by the FDA has dropped off. The government has responded in a variety of ways, including by making permanent a tax credit for R&D and by creating a one billion dollar center run by the National Institutes of Health (NIH) to help promote initial discoveries into viable targets worthy of commercial development by private pharmaceutical companies. *See* Jeremy Hsu, *U.S. Rolls the Dice on Pharmaceutical Drug Innovation*, INNOVATIONNEWSDAILY (Apr. 12, 2011), http://www.innovationnewsdaily.com/203-nih-translational-center-pharmaceutical-drugs-innovation.html.

63. *See* Benjamin N. Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 TEX. L. REV. 503, 507–08 (2009).

64. *See, e.g.*, Andrew J. Paprocki, Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc., *Can the Patent Term Extension of the Hatch Waxman Act Be Used as Leverage in Drug Patent Infringement Settlements?*, 46 JURIMETRICS J. 471, 485–86 (2006); Sarah Sorscher, Note, *A Longer Monopoly for Biologics?: Considering the Implications of Data Exclusivity as a Tool for Innovation Policy*, 23 HARV. J.L. & TECH. 285 (2009).

65. *See, e.g.*, James Love & Tim Hubbard, *The Big Idea: Prizes to Stimulate R&D for New Medicines*, 82 CHI.-KENT L. REV. 1519 (2007); Steven Shavell & Tanguy Van Ypersele, *Rewards Versus Intellectual Property Rights*, 44 J.L. & ECON. 525 (2001).

66. *See* Joel West, *Policy Challenges of Open, Cumulative, and User Innovation*, 30 WASH. U. J.L. & POL'Y 17, 29–33 (2009).

accepted propriety of patents in the biopharmaceutical field, beyond the usual objection to monopoly pricing of life-saving drugs, concerns ethical opposition to gene patents, in particular.[67]

Some academics claim that anticommons effects may extend beyond the telecommunications, computer-software, and semiconductor industries to biotechnology.[68] They worry that biotech researchers experience Cournot-complements problems—that is, problems associated with having to aggregate large numbers of narrow rights that are collectively required to achieve a larger purpose—because those holding gene patents upstream may hinder downstream uses by refusing to license.[69] The Federal Circuit's demanding disclosure requirements over gene patents, which limit claims to the sequence or structure actually disclosed, add to the danger by creating a large number of narrow rights that downstream users may need to combine in order to innovate.[70] Nevertheless, empirical evidence to date suggests that anticommons effects, if they exist, are not significant, if only because of a culture of nonenforcement in the research setting.[71] Furthermore, and notwithstanding this concern, there is no question that patents are an important component of innovation in the biotechnology industry given its risk-filled and capital-intensive R&D profile.[72]

Construing the preceding spheres of innovation on a collective basis, one can appreciate the challenges currently facing policymakers in the patent field. Due to the patent system's one-size-fits-all nature, changes in patent doctrine and practice designed to induce favorable consequences in problem hot spots such as IT may have pernicious effects elsewhere.[73]

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67. *See* Ass'n for Molecular Pathology v. U.S. Patent & Trademark Office, 702 F. Supp. 2d 181, 209 (S.D.N.Y. 2010).

68. *See* Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 698 (1998). Empirical evidence of anticommons effect in biotechnology, however, has been lacking. *See* John P. Walsh, Ashish Arora, & Wesley M. Cohen, *Working Through the Patent Problem*, 299 SCIENCE 1021, 1021 (2003); *see also* Fiona Murray & Scott Stern, *Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge? An Empirical Test of the Anti-Commons Hypothesis*, 63 J. ECON. BEHAV. & ORG. 648 (2007).

69. *See* David W. Opderbeck, *The Penguin's Genome, or Coase and Open Source Biotechnology*, 18 HARV. J.L. & TECH. 167, 219 (2004).

70. *See* Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology Specific?*, 17 BERKELEY TECH. L.J. 1155, 1156 (2002); Steven Carlson & Lauren Murphy Pringle, *High Hurdles for Biotechnology Patents: The Written Description*, 4 INDUS. BIOTECHNOLOGY 337 (2008).

71. *See* Andrew W. Torrance, *Synthesizing Law for Synthetic Biology*, 11 MINN. J.L. SCI. & TECH. 629, 659 (2010).

72. *See Stifling or Stimulating—The Role of Gene Patents in Research and Genetic Testing: Hearing Before the Subcomm. on Courts, the Internet, and Intellectual Property of the H. Comm. on the Judiciary*, 110th Cong. 59 (2007) (prepared statement of Jeffrey P. Kushan on behalf of the Biotechnology Industry Organization); Jay P. Kesan, *Transferring Innovation*, 77 FORDHAM L. REV. 2169, 2195 (2009).

73. *See, e.g.*, Ben Klemens, *The Rise of the Information Processing Patent*, 14 B.U. J. SCI. & TECH. L. 1, 37 (2008).

It is against this background that the FTC released its March 2011 Report on patent law and competition. The Report does not attempt to address the full panoply of problems afflicting the patent system, but instead takes aim at two major components of the current dilemma: patent notice and damages. It advocates a series of notable recommendations for improvement, though, as this Essay points out, the Report is most notable for what it does not recommend.

II. The Economic Function of Notice and Remedies with Respect to Property Rights

The FTC's 2011 Report does not target the full array of deficiencies afflicting the patent system. Instead, it addresses the more circumscribed issues of notice and optimal remedies in the event of infringement. Why are these fitting subjects of analysis? Perhaps counterintuitively, it is illuminating to examine the law of tangible property and the economic principles that underlie the same.[74]

To undertake this comparative analysis, we must first understand why we, as a society, recognize property rights over physical objects. Economists advance the following exposition: first, property rights induce owners to devote scarce resources to improving land and physical objects by reducing (though not eliminating) third-party appropriation of the relevant benefits.[75] Second, property rights permit scarce resources to move efficiently from lower- to higher-value uses as measured by people's willingness to pay.[76]

The property system governing realty and personalty (that is, land and personal property) works well for at least two reasons. First, property rights are well defined. One can readily determine the metes and bounds of one's ownership of land. Even though uncertainty may occasionally arise regarding precise boundaries and lead to potential disputes, the extent of any uncertainty is typically limited.[77] Second, although divided ownership is possible, those who hold freehold or leasehold interests in a particular piece of property are typically few in number. It is therefore usually straightforward to identify who owns a piece of property.[78] These attributes are important because they facilitate efficient use of market mechanisms, which

74. For the author's broader discussion on the relationship between physical and intellectual property, see Alan Devlin, *Indeterminism and the Property-Patent Equation*, 28 Yale L. & Pol'y Rev. 61 (2009).

75. *See* Posner, *supra* note 51, at 40–42.

76. *See id.*

77. *See, e.g.*, Peter S. Menell, *The Property Rights Movement's Embrace of Intellectual Property: True Love or Doomed Relationship?*, 34 Ecology L.Q. 713, 746 (2007).

78. *Cf.* Joseph William Singer, *No Right to Exclude: Public Accommodations and Private Property*, 90 Nw. U. L. Rev. 1283, 1462–63 (1996).

permit Pareto-superior bargaining,[79] create legal certainty, and obviate the need to resort to the costly and error-filled judicial process *ex post*.

To move from the tangible to intellectual domain, consider why the law creates property rights in information and technology through the patent system. The reasons are closely related to the justification for such rights in real and personal property. First, exclusivity enables inventors to limit third-party appropriation of knowledge.[80] This function is particularly important in the intellectual realm. The free-riding problem is acute with respect to technology that exhibits public-good characteristics[81] because it is harder to maintain exclusive control over the use of an idea than it is to guard the borders of one's land.[82] Second, as with land and physical goods, information may be more valuable in some hands than others, and so property rights facilitate technology transfer consistent with the Coase Theorem.[83]

How well does this patent system work? It certainly does not work as well as the exclusive rights that govern traditional property. The extent of the shortcoming, however, depends on the context. Deficiencies in the patent system arise where the conditions accompanying a patent grant differ from those accompanying traditional property rights. The patent system works best when the conditions underlying a patent grant are similar to those that underlie exclusive rights over physical resources. The system works least well when the differences are most pronounced.

Consider the pharmaceutical field, which is a paradigm for successful application of the patent system. Why do patents work well in this field? First, property rights are well defined because a claimed chemical structure has a defined meaning to one skilled in the art.[84] Furthermore, pharmaceutical products are subject to a small number of patents. An inventor of a new

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79. Pareto-superior bargains make at least some parties better off—that is, the arrangements satisfy the benefitted parties' preferences—without leaving any party worse off. *See* POSNER, *supra* note 51, at 17.

80. *Id.* at 48.

81. *See* Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1032 (2005).

82. Hence the mantra: "information wants to be free." *See* R. Polk Wagner, *Information Wants to Be Free: Intellectual Property and the Mythologies of Control*, 103 COLUM. L. REV. 995 (2003).

83. This observation, however, comes with an important caveat. Specifically, the fact that technology is nonrivalrous in consumption means that, subject to the constraint of maintaining incentives to invent, improve, and commercialize, the law should make technological know-how freely available to all. In this respect, the economic function of the patent system in facilitating efficient allocation of ownership rights over technology is legitimate only insofar as exclusivity is necessary to impart desirable incentives.

84. However, biologic drugs also involve structures that people skilled in the art have difficulty defining, which has led some to argue that inventors should employ process-based limitations to ensure that patented biologics meet the enablement requirements of Section 112. *See* Dmitry Karshtedt, *Limits on Hard-to-Reproduce Inventions: Process Elements and Biotechnology's Compliance with the Enablement Requirement*, 3 HASTINGS SCI. & TECH. L.J. 109 (2011).

chemical entity will invariably obtain a drug substance patent covering the active pharmaceutical ingredient, and may seek further protection in the form of drug product and method-of-use patents.[85] These rarely account, however, for more than a few patents over a single drug.[86]

In contrast, consider IT industries where property rights, as defined by the claims, are amorphous and indeterminate.[87] Furthermore, a single IT product may use thousands of patented inventions.[88] These traits lie at the opposite end of the spectrum from the traits typically attendant on property grants over physical resources. Thus, it is unsurprising that a system of private ownership rights over IT technologies operates imperfectly.[89]

It is clear that notice is a principal factor in explaining the widely varying impact of patents on innovation. When parties interested in a resource can determine the scope of that resource as easily as the owner of the resource, *ex ante* bargaining is both feasible and cost-effective. When the borders of an ownership right are vague, however, and especially when multiple parties lay claim to that right, significant transaction costs can frustrate bargaining. These principles underlie both tangible and intellectual property.

A number of important fields of commercial innovation subject to the patent system experience significant notice problems. A "patent thicket" has emerged in IT because vague claims make it difficult to determine the boundaries of a claimed invention.[90] As a result, overlapping rights routinely claim the same technology.[91] This phenomenon arises not only from vague claim language, but also from weak disclosure rules that permit inventors to claim more than what they actually invented.[92] Also in IT, one encounters

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85. Pharmaceutical companies have engaged in so-called "evergreening" practices by obtaining new drug product patents over reformulations or different methods of use, sometimes in a bid to frustrate generic competition. *See, e.g.*, Michael R. Herman, Note, *The Stay Dilemma: Examining Brand and Generic Incentives for Delaying the Resolution of Pharmaceutical Patent Litigation*, 111 COLUM. L. REV. 1788, 1789 (2011).

86. *See* Gregory K. Leonard & Mario A. Lopez, *Patent Damages*, 2 LANDSLIDE 37, 37–38 (2010); Lisa Larrimore Ouellette, Note, *How Many Patents Does It Take to Make A Drug? Follow-On Pharmaceutical Patents and University Licensing*, 17 MICH. TELECOMM. TECH. L. REV. 299, 300 (2010).

87. *See* BURK & LEMLEY, *supra* note 5, at 5, 157.

88. *See* Mark A. Lemley, *Ten Things to Do About Holdup of Standards (And One Not to)*, 48 B.C. L. REV. 149, 150 (2007).

89. There is a consensus among economists that the patent system is far more effective in the pharmaceutical setting than it is in the sphere of IT. Indeed, recent studies suggest that IT patents may affirmatively depress innovation. *See supra* note 54 and accompanying text. Such a phenomenon is a remarkable indictment of an exclusive rights system that accepts the social costs associated with monopoly for the larger gain achieved in spurring research, development, and the commercialization of technology. *Id.*

90. *See* Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 640 (2010).

91. *See id.* at 641.

92. *See, e.g.*, Christina Bohannan, *IP and Antitrust: Reformation and Harm*, 51 B.C. L. REV. 905, 951 (2010). Stricter disclosure requirements under Section 112 limit patent scope by preventing inventors from using broad claim language that conceivably embraces products

anticommons effects, which result when a large number of fragmented rights are necessary components of a final downstream product. This causes a Cournot-complements problem, as a company wishing to market a product must seek permission from a large number of separate owners in order to do so.[93] Economic theory reveals that separate ownership of complements creates inefficiencies as each owner sets a private-profit-maximizing price that fails to account for the fact that lowering prices increases demand for complementary products.[94] Fragmented ownership thus leads to lower output and higher prices downstream, which is why vertical integration is often desirable.[95]

Thicket effects, which arise in significant part from inadequate notice,[96] as well as anticommons problems, stymie *ex ante* bargaining. This causes many companies either to abandon commercial projects or to ignore patents and worry about infringement proceedings later.[97] Inadequate notice is the principal culprit; hence, the importance of the FTC's Report is clear.

If poor notice feeds high transaction costs, and improving the notice function is not feasible, what can policymakers do? In answering this question, traditional property law is illuminating because it employs separate remedies in the event of unauthorized incursions upon exclusive rights. Courts typically use a property rule, which grants an owner an unfettered right to exclude—that is, an automatic right to injunctive relief.[98] As a matter of economic theory, such relief is likely to be appropriate where the legal rights and identities of the relevant parties are clear.[99] In such cases, an automatic right to an injunction induces prospective licensees to obtain a

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or processes far removed from the written description of the claimed invention contained in the patent specification. *Id.*

93. *See* Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151, 1160 (2009).

94. *See* Richard A. Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 927 (1979).

95. *See* Pietro Crocioni, *Leveraging of Market Power in Emerging Markets: A Review of Cases, Literature, and a Suggested Framework*, 4 J. COMPETITION L. & ECON. 449, 458 n.18 (2008).

96. *See* Amit Makker, Note, *The Nanotechnology Patent Thicket and the Path to Commercialization*, 84 S. CAL. L. REV. 1163, 1175 (2011); Allen K. Yu, *Why It Might Be Time to Eliminate Genomic Patents, Together with the Natural Extracts Doctrine Supporting Such Patents*, 47 IDEA 659, 674 n.65 (2007).

97. *See* Amy Yancey & C. Neal Stewart, Jr., *Are University Researchers at Risk for Patent Infringement?*, 25 NATURE BIOTECH. 1225, 1225 (2007).

98. For the classic discussion of the economics of property vis-à-vis liability rules, see Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972).

99. *See* Henry E. Smith, *Property and Property Rules*, 79 N.Y.U. L. REV. 1719, 1782 (2004); *see also* Richard A. Epstein, *A Clear View of the Cathedral: The Dominance of Property Rules*, 106 YALE L.J. 2091, 2097 (1997). *But cf.* Stewart E. Sterk, *Property Rules, Liability Rules, and Uncertainty About Property Rights*, 106 MICH. L. REV. 1285 (2008) (arguing that property rules can incentivize excessive expenditures in ascertaining the scope of legal rights).

license *ex ante*. According to traditional law and economics theory, this is desirable because it induces parties to avail themselves of market mechanisms in low-transaction-cost settings.[100] These coordination benefits contrast with the costly and potentially error-prone *ex post* proceedings in court that are necessitated by liability rules.

Nevertheless, and instructively, the law occasionally employs a liability rule in the event of a violation of a person's exclusive rights. This remedy denies a property owner the legal right to exclude, instead allowing third parties to freely intrude upon another's property so long as they pay the relevant access fee set by a third party.[101] Usually, that fee translates to damages awarded by another court. Other things being equal, in high transaction cost settings, liability rules are superior because the associated litigation costs are less than the cost of using market mechanisms *ex ante*.[102]

More recent scholarship has revealed, however, that the normative quality of liability versus property rules is more complex than orthodox theory suggested. In particular, the question of whether property or liability rules are optimal in a given case depends on not only the level of transaction costs, but also the level of judicial-error costs.[103] Indeed, in certain cases, conditions that create preclusive transaction costs, which suggest the propriety of a liability rule, can also stymie judicial efforts to calculate optimal damages, thus rendering both rules inefficient.[104] Law and economics scholars have also suggested that a liability rule may be desirable in situations of asymmetric information because it creates greater incentives for parties to divulge private information than would a property rule.[105] This last view may justify the use of liability rules in low transaction cost settings where private information creates the potential for strategic behavior. As others have pointed out, however, this is most likely to be the case with respect to contractual bargaining rather than property-based disputes between relative strangers.[106]

Importantly, it is not the case that traditional property law always uses property rules. Nuisance is the classic example in which victims may obtain damages but not an injunction.[107] Transaction costs in such settings are high

100. *See* POSNER, *supra* note 51.

101. *See* Smith, *supra* note 99, at 1720.

102. *See* Sterk, *supra* note 99, at 1295 ("The existing literature, thus, suggests that whatever advantages liability rules might have in overcoming *ex post* strategic bargaining are generally overwhelmed by the *ex ante* advantages that property rules generate.").

103. *See id.* at 1290–91.

104. *Id.*

105. *See* Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade*, 104 YALE L.J. 1027 (1995).

106. *See* Eric R. Claeys, *Exclusion and Exclusivity in Gridlock*, 53 ARIZ. L. REV. 9, 16 (2011).

107. *See* Spur Inds., Inc. v. Del. E. Webb Dev. Co., 494 P.2d 700 (Ariz. 1972); Boomer v. Atl. Cement Co., 257 N.E.2d 870 (N.Y. 1970).

due to the large number of parties involved.[108] In related fashion, the law creates reciprocal easements for low-level interference with others' land, such as moderate music and conversations that transcend a person's property to affect a neighbor's property.[109] Perhaps the most illuminative example involves the power of eminent domain, which allows the government to appropriate private property without obtaining the owner's permission so long as it pays compensation equal to the market value of the property.[110] The danger of *ex post* hold out justifies this ostensibly draconian rule.[111]

Consistent with these principles, economic theory suggests that the optimal remedy in the event of patent infringement depends intimately on the transaction costs at issue, where those costs comprise identification costs, the number of potential parties, and the certainty of ownership rights. In situations where notice is clear, where the number of rights over the relevant resource is limited, and where one can readily identify the relevant owners, transaction costs are low and so the law should induce parties to avail of the market. Injunctive relief is therefore appropriate with respect to biopharmaceuticals, chemicals, and mechanical devices.[112] Conversely, where significant transaction costs exist due to the indeterminate nature of patents' scope and the preclusive number of patents that either lay claim to the same technology or to the many constituent parts of the ultimate product, courts should be cautious in granting injunctions. The opportunity to shut down an infringer's operations allows a patentee credibly to extract value beyond the technological contribution of the relevant invention. For the same reason that property owners cannot prevent government appropriation through the power of eminent domain, so courts should not necessarily allow patentees, e.g., PAEs, to enjoin an infringer's operations when the infringer had no opportunity to negotiate a license *ex ante*.[113]

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108. *See* George P. Smith, II, *Nuisance Law: The Morphogenesis of an Historical Revisionist Theory of Contemporary Economic Jurisprudence*, 74 NEB. L. REV. 658, 700 (1995).

109. *See* Richard A. Epstein, *Intellectual Property: Old Boundaries and New Frontiers*, 76 IND. L.J. 803, 816 (2001).

110. *See* Sally Brown Richardson, *Nonuse and Easements: Creating a Pliability Regime of Private Eminent Domain*, 78 TENN. L. REV. 1, 35 (2010).

111. *See* Scott J. Kennelly, *Florida's Eminent Domain Overhaul: Creating More Problems Than It Solved*, 60 FLA. L. REV. 471, 496–97 (2008).

112. FTC REPORT, *supra* note 1, at 218–19. *But cf.* D. Alan White, Comment, *The Doctrine of Equivalents: Fairness and Uncertainty in an Era of Biologic Pharmaceuticals*, 60 EMORY L.J. 751, 792 (2011) (arguing that "injunctive relief should certainly be denied in biologics cases involving the doctrine of equivalents").

113. Although the analogy between physical and intellectual property explains some of the vexing issues afflicting the patent system, the principles underlying traditional property cannot answer every question of note in the domain of patent law for several reasons. First, the cost of accessing the legal system is greater in the patent realm, as litigating such a case to trial typically costs in the realm of three to five million dollars. This results in significant underenforcement, which one might characterize as a quasi fair-use right. Second, a critical, complicating distinction concerns the public goods nature of innovation. Unlike a piece of land or other physical resource, an idea is not subject to a supply constraint. This means that

III. The Report

Having thus explored the relationship between notice and remedies, and having explained the instructive value of traditional property law in determining optimal policy in the patent realm, this Part turns to material aspects of the Report. Consistent with the preceding analysis, this Essay construes the Report as seeking to reorient the patent system to realize more of the benefits associated with the traditional property system. It does so by articulating a variety of proposals aimed at improving notice, thus promoting *ex ante* bargaining, optimal patentee compensation, efficient commercialization, and desirable levels of follow-on invention. Recognizing, however, that certain fields of innovative activity do not, and perhaps cannot, lend themselves to sufficiently high levels of notice, the FTC recommends incorporating a liability rule approach where appropriate. The Report thus addresses a critical component of the infrastructure that one must put in place to induce optimal rates of innovation.

It bears emphasizing at the outset that the Report, which benefitted from eight days of hearings, conducts an authoritative analysis of important features of the contemporary U.S. patent system.[114] It will doubtless inform courts for many years to come in cutting-edge analysis and will constitute an important point of reference for ongoing research in the academic field. As this Essay could not possibly recount each detail of the Report, it seeks to draw attention to some of the Report's most important features.

The Report begins by explaining the growing economic importance of "open innovation," a now widely used, though perhaps unfortunately phrased,[115] term that describes the phenomenon of companies that eschew the traditional model of conducting all R&D in-house and instead acquire valuable technology from third parties.[116] Technology transfer is obviously integral to this process, and the FTC correctly observes that the patent system serves an important role in its facilitation.[117] The agency places a particular emphasis on *ex ante* transactions, which are by definition efficient and conducive to innovation.[118] Pre-commercialization licensing allows product-manufacturing companies to shop among competing purveyors of substitute technologies to find the qualitatively superior or best-value tech-

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the law can maximize social welfare by adopting a parsimonious approach, limiting patentee compensation to the level necessary to induce *ex ante* invention and commercialization, and then making the idea freely available. *See* Alan Devlin, *Law's Parsimony Principle*, 25 Berkeley Tech. L.J. 1693 (2010). Economics generally teaches that property rights over technology should be ephemeral while those over physical resources should be perpetual. *See* Posner, *supra* note 51, at 52–53.

114. FTC Report, *supra* note 1, at 2.

115. In the sphere of intellectual property, "open" often refers to nonproprietary.

116. FTC Report, *supra* note 1, at 31–48.

117. *Id.* at 32–45.

118. *Id.* at 32–48.

nology and to agree on a royalty that reflects the licensed technology's marginal contribution in value to the end product.

The FTC contrasts such arrangements with the increasingly prevalent phenomenon of *ex post* arrangements in which a company already uses a patented technology when approached by the patentee.[119] Although the law must allow patent holders to enforce their rights in such situations—lest third parties purposefully ignore IP rights when they could have bargained, thus denying inventors their due reward—after-the-fact infringement proceedings are generally undesirable because they result in inefficient duplication and, in the presence of sunk costs, allow patentees to extract greater value than they could have obtained *ex ante*.[120] No one could reasonably contest the Report's conclusion that the law should favor *ex ante* technology-transfer transactions to *ex post* ones and that improving the notice function of patents would promote the former. The increasing prevalence of IT industry PAEs—which neither manufacture goods nor engage in before-the-fact technology transfer, but specialize in asserting patents against companies that sell products to consumers—is emblematic of this problem.[121]

Chapter 3 of the Report explores the heart of the notice dilemma, which frustrates *ex ante* technology transfer and fuels PAE activity.[122] The Report observes that notice problems occur due to the inherent imprecision of language, the lack of clear nomenclature in certain fields, the problem-inducing practice of functional claiming, the difficulty of reviewing myriad patents that exist in some fields, and the danger of "submarine" patenting, by which inventors can keep patents secret for the first eighteen months of prosecution (and sometimes longer)[123] and can use continuations to amend claims to cover products that competitors have recently marketed.[124] The FTC expresses particular concern about the lax enforcement of the Patent Act's definiteness requirement in Section 112; the Federal Circuit merely asks whether a claim is "insolubly ambiguous"—a standard that all but the most hopelessly unclear claims can meet.[125] The FTC applauds the Board of Patents Appeals and Interferences' 2008 view that a claim is insufficiently

119. *Id.* at 49–72.

120. Both of these observations are correct, but are subject to qualifications. For instance, multiple acts of independent invention may give rise to positive spillover effects that outweigh the costs of wasteful competition. This is most likely when innovation is not capital intensive but rapid and cumulative. Furthermore, hold out does not necessarily occur in every *ex post* transaction and is not present when the patent did not face competition from technological substitutes *ex ante*.

121. FTC REPORT, *supra* note 1, at 60–72.

122. *Id.* at 74–135.

123. If an inventor does not file a patent application outside of the United States, she can keep her pending U.S. application secret beyond the eighteen–month term. 35 U.S.C. § 122(b)(2)(B)(i)(2000).

124. FTC REPORT, *supra* note 1, at 74–135.

125. *Id.* at 98–102.

definite at the prosecution stage if it is "amenable to two or more plausible claim constructions."[126] The Report urges the PTO to adhere to that stricter standard.[127] It also encourages courts to place increased emphasis on definiteness in the context of computer-implemented means-plus-function claims with respect to which courts, to date, have required minimal details regarding the relevant algorithm for performing the claimed function.[128]

The FTC also explores the optimal characteristics of the "person having ordinary skill in the art" ("PHOSITA") for disclosure purposes.[129] This conceptual entity plays a key role in the patent system.[130] Perhaps counterintuitively, the PHOSITA is not a proxy for the median scientist or engineer in the relevant field, but is instead a judicial construct.[131] The PHOSITA acts as a policy tool that courts can mold to better align incentives imparted by the patent system with the innovation characteristics of the industry at hand. The Report correctly reminds courts of the consequentialist function performed by this "policy lever."[132] By viewing the role of the PHOSITA in this light, the judiciary can avoid falling prey to a formalistic jurisprudence that would treat the PHOSITA identically across fields and across inquiries.

In this latter respect, it bears emphasizing that the person of skill in the art need not, and generally should not, bear the same traits for the purposes of nonobviousness and enablement.[133] The Federal Circuit has lost sight of this distinction in its modern biotechnology jurisprudence.[134] In light of the capital-intensive, though occasionally predictable, nature of R&D in this field, the court correctly applies a low nonobviousness bar, thus treating the PHOSITA for Section 103 purposes as being of diminished capacity.[135] The Federal Circuit, however, views that person similarly in the context of enablement, requiring a detailed disclosure that essentially requires a patentee to reveal the claimed gene sequence or structure at hand.[136] This results in a large number of narrow patents, which are easy to avoid and hence nonvalu-

126. *Ex parte* Miyazaki, No. 2007-3300, 2008 WL 5105055 (B.P.A.I. Nov. 19, 2008).
127. FTC REPORT, *supra* note 1, at 101–02.
128. *Id.* at 100–01.
129. *Id.* at 107–09.
130. *See, e.g.*, J. Peter Paredes, *Written Description Requirement in Nanotechnology: Clearing a Patent Thicket?*, 88 J. PAT. & TRADEMARK OFF. SOC'Y 489, 494 (2006) ("[T]he legal principle of the PHOSITA analysis is perhaps the most important of all the legal principles[.]").
131. *See, e.g.*, Sean B. Seymoure, *Atypical Inventions*, 86 NOTRE DAME L. REV. 2057, 2067 n.40 (2011).
132. *See* Burk & Lemley, *supra* note 20, at 1648–51.
133. *See* BURK & LEMLEY, *supra* note 5, at 149.
134. *See id.*
135. *See* BURK & LEMLEY, *supra* note 5, at 146, 149–50.
136. *See, e.g.*, Matthew A. Chivvis, *Improving Innovation by Reducing the Risk of Investing in Biotechnology: Fixing the Enablement Standard*, 11 INTELL. PROP. L. BULL. 205, 205–25 (2007).

able.[137] Some commentators worry that this may both reduce the incentive to invent and aggravate the supposed anticommons effect in this industry.[138] These problems result from the judiciary's excessively literal interpretation of the PHOSITA, and so the Report sensibly directs courts to recognize the policy-based—and hence malleable—foundation of this aspect of patent jurisprudence.[139]

Attacking the overarching problem of inadequate notice, the FTC proposes a series of possible improvements. In IT industries, it suggests that the PTO should require patent applicants either to designate a dictionary for assigning meaning to claims or to accept a PTO-designated default dictionary.[140] It further counsels the PTO to set up a task force to explore policies that would yield more objective claim language over software inventions.[141] Appealing to Congress, the FTC suggests an amendment in the law to require publication of all pending applications eighteen months after filing, even for inventors who have not filed patent applications abroad.[142]

A particularly sensible recommendation is that the Federal Circuit should revisit the manner in which it applies the written-description requirement of Section 112.[143] The traditional test asks whether the specification provides "adequate support" for the claims.[144] This inquiry creates problems in the prosecution process when applicants engage in subsequent applications that relate back to earlier ones. When an inventor seeks to add new claims in a subsequent application, the PTO will allow her to do so if the specification accompanying the original application adequately supports the new claim.[145] The FTC correctly points out, however, that the terms in which the law frames this inquiry improperly distort the crucial role of notice. The Report properly argues that "a true predictability inquiry would move in the opposite direction—starting with the specification, it would look forward to ask whether a PHOSITA would predict that these claims would emerge."[146] Were the PTO to apply the standard in this manner, it would likely restrict the number of unforeseeable claims that emerge from the prosecution process.

More controversially, but staying with the theme of improving notice, the FTC argues that Congress should enact legislation to shield third parties who "(i) infringe properly described claims only because of claim

137. *See* BURK & LEMLEY, *supra* note 5, at 149–50.
138. *See id.*
139. FTC REPORT, *supra* note 1, at 12, 107–12.
140. *Id.* at 109–10.
141. *Id.* at 112.
142. *Id.* at 125.
143. *Id.* at 12, 15, 104–09, 119–22, 125.
144. *See, e.g.*, Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1561 (Fed. Cir. 1991).
145. *See, e.g.*, Michael Risch, *A Brief Defense of the Written Description Requirement*, 119 YALE L.J. ONLINE 127, 129 (2010).
146. FTC REPORT, *supra* note 1, at 121.

amendments (or new claims) following a continuation and (ii) developed, used, or made substantial preparation for using, the relevant product or process before the amended (or newly added) claims were published."[147] Although such an amendment would provide companies that commercialize technology with some protection against ambush, it would harm applicants who struggle to articulate claims that accurately convey the nature and contours of the relevant invention. If a marketed product employs a technology that an applicant legitimately invented first, then, in at least some circumstances, the law should allow the applicant to amend his claims to capture the commercialized product. There ought to be only two limits on this right. In the first place, the specification associated with the original application must be sufficiently detailed to allow a PHOSITA to predict the later-added claim. Second, the applicant must have encountered some legitimate difficulty in properly describing the relevant technology through claim language.

The Report does not ignore the PTO's funding plight. It calls on Congress to provide the agency with the resources it needs to tackle the intimidating backlog of pending applications and to perform a competent gatekeeping role in doing so.[148] As noted below, Congress has partially heeded this call through the AIA, which both bestows the PTO with fee-setting authority and creates a specific fund for the agency.[149]

As part of improving the prosecution process, the FTC encourages the PTO to adopt an industry-based classification system to make prior-art searches more effective.[150] Chapter 3 concludes by advising Congress to enact legislation that requires public recordation of patent assignments, thus allowing prospective licensees to identify the relevant parties with whom they must bargain to obtain rights to the desired technology.[151]

The remainder of the Report addresses the critical issue of patent remedies. After explaining the risks of both over- and under-compensation, the FTC explains the relevant principles of economics that underlie calculation of the two forms of damages: lost profits and reasonable royalties.[152] The agency's recommendations in this regard are of great importance for the courts, not least because the counterfactual nature of computing damages leads many judges who are not versed in economic theory astray. The Report's principal recommendations with respect to calculating lost profits are (1) advising courts to be lenient with plaintiffs in offering evidence of the but-for world,[153] (2) urging the judiciary to eliminate the entire-market-value rule,[154] and (3) encouraging judges not to recognize dual awards of lost prof-

147. *Id.* at 16.
148. *Id.* at 16, 117.
149. *See infra* Part IV.B.1.
150. FTC REPORT, *supra* note 1, at 126.
151. *Id.* at 131.
152. *Id.* at 137–212.
153. *Id.* at 184.
154. *Id.* at 211.

its and reasonable-royalty damages.[155] In determining reasonable royalties, the FTC urges courts to rely on the willing-licensor/willing-licensee model as the relevant conceptual framework, and to recognize that the often-misconstrued *Georgia-Pacific* factors[156] are but a list of evidence categories, rather than an objective formula for computing optimal damages.[157]

Last, but certainly not least, the FTC goes to great lengths to warn courts about the danger of hold out.[158] It points out that reasonable royalties reflect the *ex ante*, as opposed to *ex post*, value of technology.[159] The agency warns against allowing injunctive relief in cases involving PAEs and provides specific advice about patent-infringement suits in the standard-setting arena. In this latter respect, the FTC suggests that a patentee's prior agreement to license on "reasonable and nondiscriminatory" ("RAND") terms should preclude injunctive relief should the patentee and prospective licensee fail to reach agreement after a standard has emerged.[160] Finally, the FTC seeks to close a loophole in the Supreme Court's 2006 decision in *eBay*, which held that the law does not automatically entitle a patentee to injunctive

155. *Id.* at 19, 156–57.

156. The fifteen *Georgia-Pacific* factors are as follows: (1) The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty; (2) the rates paid by the licensee for the use of other patents comparable to the patent in suit; (3) the nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold; (4) the licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly; (5) the commercial relationship between the licensor and licensee, such as whether they are competitors in the same territory in the same line of business, or whether they are inventor and promoter; (6) the effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales; (7) the duration of the patent and the term of the license; (8) the established profitability of the product made under the patent, its commercial success, and its current popularity; (9) the utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results; (10) the nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention; (11) the extent to which the infringer has made use of the invention, and any evidence probative of the value of that use; (12) the portion of the profit or selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions; (13) the portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer; (14) the opinion testimony of qualified experts; and (15) the amount that a licensor (such as the patentee) and a licensee would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement. Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116 (S.D.N.Y. 1970).

157. FTC Report, *supra* note 1, at 21, 179–85. *See also infra* text accompanying notes 174–178.

158. *Id.* at 229.

159. *Id.* at 64, 144–48, 194.

160. *Id.* at 194.

relief should the latter prevail at trial.[161] As the International Trade Commission can only grant relief in the form of exclusion or cease-and-desist orders, the FTC worries that PAEs are availing themselves of the ITC as a superior forum in which to extract supraoptimal royalties.[162] If such patentees can obtain an order from the ITC that is akin to an injunction, they can credibly extract greater royalty payments than they could have negotiated *ex ante*. The Report recommends that the ITC read the domestic-industry requirement and public-interest prong of determining the availability of relief to deny exclusion or cease-and-desist orders to PAEs.[163]

IV. Judging the FTC's Recommendations

The Report articulates a wide number of sensible policy suggestions, which mirror in important respects the work of Dan Burk and Mark Lemley. Those leading academics recommend that courts engage in art-specific analysis to tailor the tenets of the patent system to reflect the characteristics of the innovation process at hand.[164] In the short time since the Report's release, criticism has emerged to the effect that the Report improperly focuses on policy rather than doctrine.[165] Such disapproval, of course, would apply equally to the work of those scholars who advocate malleable jurisprudence that is sensitive to the tenets of the relevant technology before the court.

This broad attack on the Report provides an appropriate starting point for analysis. Is the criticism that the Report is too policy focused well founded? The answer is no. In the first place, such criticism fails to appreciate current Federal Circuit practice, for it is widely understood that the judiciary has already developed an art-specific jurisprudence.[166] Second, and more importantly, in a consequence-critical field such as innovation policy, we do not want those charged with operating the patent system to blindly follow a course founded on a dogmatic reading of statute or uncritical adherence to custom. Of course, this does not mean that we should be free to adopt rules or policies inconsistent with the relevant statutory framework, but instead that policymakers should remember that interpretation of a prin-

161. eBay, Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

162. FTC Report, *supra* note 1, at 239–43.

163. *Id.* A patentee can satisfy the domestic-industry requirement by showing "substantial investment in [the patent's] exploitation, including engineering, research and development or licensing." *Id.* at 30 (quoting 19 U.S.C. § 1337(a)(3)).

164. *See* Burk & Lemley, *supra* note 5, at 143–44, 162.

165. *See* Benjamin Levi & Rodney R. Sweetland, *The Federal Trade Commission's (FTC) Recommendations to the International Trade Commission (ITC): Unsound, Unmeasured, and Unauthoritative*, 2011 Patently-O Patent L.J. 1, *available at* http://www.patentlyo.com/files/levi.ftcunsound.pdf.

166. *See* Burk & Lemley, *supra* note 70, at 1156–57. As just one example, early biotechnology jurisprudence went to significant lengths to find medical-diagnostic tests founded on monoclonal antibodies to be nonobvious despite the prior-art literature to the contrary. *See* Burk & Lemley, *supra* note 5, at 144–46.

ciple or a standard necessarily lends itself to a range of legitimate answers. In this respect, the correct answer constitutes a spectrum rather than a point. In choosing the appropriate answer, a pragmatic, consequence-based approach is prudent. This is especially true with respect to patent law given its utilitarian focus grounded in the explicit terms of the Constitution.

Having addressed this broad indictment of the Report and the policy bases upon which it stands, there is little reason to recount the Report's well-articulated reasons for making its recommendations. The FTC clearly devoted considerable thought, founded on both economic theory and actual industry conditions as established through eight days of hearings, in formulating its conclusions. Instead, this Essay explores a small number of notable omissions and challenges certain questionable policy prescriptions.

A. *Avoiding Controversy*

Restraint is a defining feature of the FTC's 2011 Report. The pressing issues pervading the patent system have invited a series of proposed solutions, the scale and ambition of which differ considerably. As a positive matter, the more radical the proposed change to the patent regime, the less likely it is that its proponent can achieve the requisite consensus to effect the change. Against this practical constraint, however, one must weigh the fact that the more modest, and hence widely acceptable, the proposed prescription, the less likely it is to provide an effective solution. Conversely, the cost of error increases in proportion with the radical nature of the suggested amendment. In addition, the sharply heterogeneous nature of industrial innovation makes it unlikely that a broad alteration in the patent system will have uniformly beneficial effects. Thus, from a policy perspective, there is a tension between introducing changes to the patent regime in a modest, incremental, and cautious manner, and doing so on a potentially more effective, though risk-filled and controversial, large-scale basis. It is clear that the FTC's recommendations fall on the former side of the spectrum.

The Report does make a number of material, and somewhat controversial, policy prescriptions. Of these, the most divisive may be the view that the International Trade Commission should: (1) take the position that a patentee whose sole exploitation of its patent involves *ex post* licensing does not satisfy the domestic-industry condition of filing suit with the ITC and (2) use Section 337 of the Tariff Act of 1930's requirement that the ITC consider "the public health and welfare" in determining whether the relief it grants would cause, or facilitate, hold up.[167] As a practical matter, were the ITC to embrace these suggestions, it would deny PAEs a remedy in that forum. In addition, the ITC can only take remedial actions akin to granting injunctive relief: specifically, it can grant an exclusion order, which prohibits

167. FTC REPORT, *supra* note 1, at 40–42, 239–44.

importation of the relevant articles, or a cease-and-desist order.[168] The FTC's recommendation in this respect, then, may be somewhat divisive because it would deny certain patentees access to the ITC. The proper response to criticism of this sort is to point out that federal district courts remain open to such patentees. Those courts offer remedies properly tailored to the actions of PAEs—that is, damages properly calibrated to reflect the *ex ante* value of the patented technology.

Another aspect of the Report that may be divisive is the call for courts to adhere strictly to the hypothetical-negotiation model in calculating reasonable royalties in the event of proven infringement.[169] Some consider this mode of computing damages, which asks what the parties would have agreed to had they bargained for a license *ex ante*, to be intolerably abstract.[170] Without accurate judicial determination of reasonable royalties, however, the incentives generated by the patent system will not align with the social optimum.[171] The FTC is on strong ground, then, in pointing out a number of economically indefensible practices adopted by district judges in damages proceedings. These include the economically erroneous entire-market-value rule, which invites systemic overcompensation by asking fact finders to place their frame of reference on the profitability of a larger product.[172] This aspect of patent jurisprudence has long been the subject of academic criticism.[173] A less notorious, but nevertheless potentially improper, element of damages analysis concerns the ubiquitously applied *Georgia-Pacific* factors.[174]

The agency concludes that the proper framework in which to calculate the optimal amount due a patentee is the willing-licensor/willing-licensee model. Unfortunately, the hypothetical nature of this test has led some judges to eschew proper use of that inquiry in light of the fact that the parties have, by definition, failed to reach a prior agreement.[175] Because it is difficult to construct the relevant counterfactual in a manner that comports with

168. 19 U.S.C. § 1337 (d)–(f).

169. FTC Report, *supra* note 1, at 159–76.

170. *See, e.g.*, Christopher B. Seaman, *Reconsidering the* Georgia-Pacific *Standard for Reasonable Royalty Patent Damages*, 2010 B.Y.U. L. Rev. 1661, 1679.

171. Indeed, it is widely understood in law and economics literature that excessive damages induce a variety of inefficient second-order effects. *See, e.g.*, Jesse Max Creed, Note, *Integrating Preliminary Agreements into the Interference Torts*, 110 Colum. L. Rev. 1253 (2010). It is no different with respect to patents. *See, e.g.*, Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 Harv. L. Rev. 1813, 1860 n.159 (1984).

172. *See* Alan Devlin, *Systemic Bias in Patent Law*, 61 DePaul L. Rev. (forthcoming 2012), *available at* http://ssrn.com/author=1271852 (discussing the entire-market-value rule in further detail).

173. *See, e.g.*, Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties*, 51 Wm. & Mary L. Rev. 655, 656 (2009).

174. *See* Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970); *see also* eBay, Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

175. *See* Brian J. Love, *The Misuse of Reasonable Royalty Damages as a Patent Infringement Deterrent*, 74 Mo. L. Rev. 909, 923–24 (2009).

the reality of the parties' relationship, courts sometimes implicitly abandon this form of inquiry.[176] The great virtue of the hypothetical-negotiation test, however, is that it focuses the inquiry on the economically important question: what was the economic value of the relevant product or process *ex ante*?

The seminal *Georgia-Pacific* factors, however, do not focus courts' analysis on this relevant question. The FTC correctly points out that these highly influential guidelines "do not provide a conceptual framework for calculating damages."[177] Indeed, these factors amount to little more than a laundry list of considerations that may or may not be material in a particular instance. When multiple factors are relevant to the case at hand—as will invariably be the case—the law provides no overriding principle by which to quantify and hence to weigh conflicting indicators. As Judge Easterbrook succinctly commented in a different setting, "a list of factors without a rule of decision is just a chopped salad."[178]

The Report is therefore correct to call on courts to focus on a royalty that reflects what the parties would have agreed to in a but-for world that lacked the transaction costs that precluded bargaining in the first place. To give this principle its full force, the judiciary must be willing to follow it even in counterintuitive instances. For instance, where a patentee would have refused to license at the infringing party's highest (reservation) price, then the optimal damages calculation is in fact zero where the patentee can establish no lost profits.

More generally, one might take issue with the FTC's criticism of inadequate notice with respect to functional claiming.[179] Although claiming the result achieved rather than the process by which the invention reaches that end creates overbreadth and inadequate notice problems, a ready solution is by no means apparent. If one were to significantly restrict functional claiming and require detailed disclosure of the means by which a product or process operates, patentees in certain fields would possess narrow patents that third parties could easily avoid.[180] With respect to computer software, for instance, there is invariably a multitude of ways to write code to achieve a particular end,[181] and so a patent that cannot cover a function will be of limited value.[182]

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176. FTC REPORT, *supra* note 1, at 168–70 (citing and discussing cases).

177. *Id.* at 21.

178. *In re* Synthroid Mktg. Litig., 264 F.3d 712, 719 (7th Cir. 2001).

179. FTC REPORT, *supra* note 1, at 100–01.

180. *Cf.* Stuart J.H. Graham & Ted Sichelman, *Why Do Start-Ups Patent?*, 23 BERKELEY TECH. L.J. 1063, 1086–87 (2008) (explaining that design around is often difficult because the Federal Circuit's lax application of the enablement and written description doctrines "has generally allowed patentees to claim their inventions much more broadly than the embodiments disclosed in the patent specification").

181. *See* Fonar Corp. v. Gen. Elec. Co., 107 F.3d 1543, 1549 (Fed. Cir. 1997).

182. *See, e.g.*, Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 1012–13 (2005).

Notwithstanding the FTC's well-reasoned efforts in the above areas, the FTC conspicuously avoids embracing radical solutions to the vexing issues of notice and remedies in patent law. Indeed, the Report may be most notable for two significant omissions.

1. The Problem of Disclosure

Take the serious problem of inadequate disclosure.[183] Most inventions subject to patent protection are at least somewhat self-disclosing, in that they are vulnerable to reverse engineering. For such innovations, a certain level of disclosure is coterminous with the fact of invention itself. A commonly promoted function of the patent system is its requirement that an inventor of a new, useful, and nonobvious technology explain its workings to those skilled in the art.[184] Unfortunately, the patent regime performs this disclosure role in a woefully inadequate manner. In most industries, the Federal Circuit has given the enablement and written description requirements of Section 112 such minimalist definition that the patent system has an exceedingly modest impact in facilitating the dissemination of technological know-how.[185] Indeed, in many cases, the patent regime would not seem to increase the quality of disclosure beyond what follows from the invention and subsequent commercialization of the relevant invention itself.

The culprit is the "person having ordinary skill in the art," whom the Federal Circuit typically characterizes as being sufficiently knowledgeable that a patentee need not describe the full operation of the claimed invention to enable the PHOSITA to use the invention without undue experimentation.[186] In the case of software patents, to take just one example, the law does not require a patent applicant to disclose the source code underlying the invention.[187] The lack of disclosure requirements in the field of computer software permits inventors to use general language in their claims that purports to capture a sphere of invention beyond that disclosed in the specification.[188] The more ingenious the law presupposes the PHOSITA to be in determining the operation of a claimed technology, the greater the gulf between claimed patent scope and disclosure.[189] In those fields where language is incapable of precisely demarcating the boundaries of a claimed

183. *See, e.g.*, Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007 (2005).

184. 35 U.S.C. § 112.

185. *See, e.g.*, Jeanne C. Fromer, *The Compatibility of Patent Law and the Internet*, 78 FORDHAM L. REV. 2783, 2795 (2010).

186. *See id.*

187. *See, e.g.*, Robotic Vision Sys. v. View Eng'g, 112 F.3d 1163, 1166 (Fed. Cir. 1997).

188. *See, e.g.*, Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 356–57 (2010).

189. *See, e.g.*, Dan L. Burk, *Biotechnology in the Federal Circuit: A Clockwork Lemon*, 46 ARIZ. L. REV. 441, 443–44 (2004).

invention, the divide between scope and disclosure is directly responsible for lack of notice. Thus, in such IT industries as electronic goods, semiconductors, telecommunications, and computer software, the notoriously indeterminate meaning of patents results in large part from the Federal Circuit's failure to stringently apply the requirements of Section 112.

The Report seeks to ameliorate notice conditions in the IT sphere by suggesting, among other things, that inventors designate specific dictionaries to explain claim terms. Such prescriptions, however, are apt to have only a modest impact on the problem of inadequate notice. An effective solution would treat the PHOSITA for enablement purposes as enjoying limited inferential, gap-filling, and reverse-engineering capacities. To satisfy Section 112 in light of such a presumption, the law would require patentees to disclose the full workings of their claimed inventions. If a patentee subsequently alleged infringement, the patentee would have to demonstrate that the specification underlying the patent explicitly disclosed the material features of the allegedly infringing product or process. Such an approach would largely solve the notice problem, thus facilitating efficient contractual bargaining in the form of technology transfer.

The Report, however, declines to take a position on whether patent scope should be coextensive with the written description in the specification. Given the FTC's focus on solving the dilemma of inadequate patent notice, one could argue that this is a significant shortcoming. If the law were to insist that a patent's reach be coextensive with the technology specifically revealed by the written description, it would solve the notice problem that has plagued the patent system, particularly in IT. It would also greatly simplify the confoundingly complex legal task of claim construction, by which courts strive to give precise meaning to disputed claim terms. One of the biggest impediments to accurate construction is the tension between the Federal Circuit's dueling instructions that one must read claims in light of the specification, which is "the single best guide to a disputed term" and often "dispositive," and yet refrain from importing limitations into claims from the specification.[190]

That the FTC elected to eschew such a recommendation is notable for several reasons. From one perspective, it might demonstrate an unwillingness to tackle head-on the most vexing issues facing the patent system. From another, however, it reveals a pragmatic outlook and an appropriate sense of caution. It bears emphasizing that the economic case for making the scope of patent claims and the invention revealed in the disclosure coextensive is far from bulletproof.

The major problem with limiting patent scope to the disclosure is that it threatens to under-reward some inventors by narrowing their sphere of

190. *See* Phillips v. AWH Corp., 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc).

exclusivity.[191] The problem of undercompensation may be particularly worrisome in capital-intensive research industries.[192] Such a restrictive reading of scope would result in narrow patents that competitors could easily evade by making relatively superficial changes to the claimed product or process.[193] This could facilitate an excessive level of third-party appropriation of a hard-won technology, thus discouraging inventors from engaging in costly R&D *ex ante*. To avoid such an outcome, courts might appeal to the doctrine of equivalents to expand the zone of exclusivity, though of course such a solution comes at the cost of notice because predicting the application of the doctrine to products or processes beyond the claims is not always straightforward.[194] Enhancing disclosure requirements also increases the cost of the prosecution process for applicants.[195]

"Narrow" patents may also be undesirable where a company must combine numerous complementary technologies to create a final product. By severely restricting patent scope, the law would encourage inventors to obtain a large number of narrow patents. By increasing the number of patents for which a commercializing entity needs to obtain licenses, the law would create or exacerbate anticommons effects.

These problematic features are far from academic and have in fact materialized in the biotechnology field. With respect to gene patents, the Federal Circuit has construed the PHOSITA as requiring detailed instructions to recreate the claimed gene structure. Indeed, the law now limits patentees' zone of exclusivity in this field as being coextensive with the sequence or structure actually disclosed. As Dan Burk and Mark Lemley have noted, the result is that DNA patents may be relatively easy to avoid infringing.[196]

The question whether to limit scope to disclosure is certainly vexing. Indeed, the possible gulf between invention disclosed by the specification and the claims implicates not only claim meaning, but also the permissibility of new claims obtained through continuation practice. Making patentees' exclusive rights coterminous with the specification would solve the notice problem but would raise others. From a normative perspective, of course, the fact that a change in policy would create new costs is not a legitimate objection unless there is some basis to believe that those costs would outweigh the benefits. To determine whether the net benefits of solving the notice problem in such draconian fashion are indeed positive, further study is likely required. From this perspective, one can applaud the FTC for de-

191. *See* Cindy I. Liu, *Written Description:* Gentry Gallery, Inc. v. Berkline Corp., 14 BERKELEY TECH. L.J. 123, 123 (1999); Thomas, *supra* note 61, at 234.

192. *See, e.g.*, BURK & LEMLEY, *supra* note 5, at 149–53.

193. *See, e.g.*, *id.* at 149.

194. *See* Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 613 (1950) (Black, J., dissenting).

195. *See* Fromer, *supra* note 25, at 594.

196. BURK & LEMLEY, *supra* note 5, at 149.

clining to make a recommendation that could conceivably do more harm than good.

2. Introducing an Independent-Invention Defense

There is a second notable omission in the Report. Specifically, the FTC declined to articulate a view on the propriety of an independent-invention defense. This divisive issue is distinct from the question of notice, and instead goes to the fundamental purpose of the patent system.[197]

An important distinction between physical and intellectual property is that the latter is nonrivalrous in consumption.[198] An inventor can disseminate technological knowledge at very low cost, which permits the public at large to avail itself of that information without reducing the quantity and quality of the knowledge available for others' use. This feature of intellectual property reveals that lawmakers can maximize social welfare by awarding exclusive rights only to the extent necessary to induce invention and subsequent commercialization. As a result, the exclusive right inherent in a patent carries a cost that increases in proportion with the value of the patented technology. By providing a single entity control over an idea, the law denies all interested third parties use of the technology, even though third-party use would not diminish the quality of the technology available for others. This cost is justified on economic grounds to ensure inventors receive a sufficient return to compensate them for the risk and expense of R&D and to induce them to devote the necessary capital to commercialize the relevant technology.[199]

This economic rationale for the patent system is important. The beginning of the Report observes that "by preventing copying that might otherwise drive down prices, the patent system allows innovators to recoup their investment in R&D."[200] This accurately describes the public goods theory that justifies IP law. Surprisingly, however, this is an inaccurate description of how the patent system actually works in practice. All patent cases allege infringement, of course, but few so much as allege copying.[201] The reality of current U.S. patent law is that patentees typically seek to enjoin

197. *See generally* Mauer & Scotchmer, *supra* note 56, at 535–36 (concluding that introducing an independent-invention defense would be efficient); Vermont, *supra* note 56 (arguing that independent-invention should preclude a finding of patent infringement). *But see* Roger D. Blair & Thomas F. Cotter, *Strict Liability and its Alternatives in Patent Law*, 17 Berkeley Tech. L.J. 799, 812–15 (2002) (suggesting that an independent-invention defense would be most likely to apply to those inventions that create limited deadweight loss and pointing out the difficulty of proving whether a defendant copied or independently discovered the relevant technology).

198. *See* J. Hoult Verkerke, *Notice Liability in Employment Discrimination Law*, 81 Va. L. Rev. 273, 326 n.153 (1995).

199. *See* Posner, *supra* note 51, at 40–42.

200. FTC Report, *supra* note 1, at 32.

201. *See* Cotropia & Lemley, *supra* note 46, at 1424.

third parties that manufactured infringing products and processes without relying on the asserted patents.[202] It is difficult to reconcile this phenomenon with the economic justification for the patent regime.[203]

Instead, the patent system works by creating a sphere of exclusivity that permits patentees to capture and enjoin independently discovered products and processes falling within it.[204] Although this might appear improper, it is both a defining feature of the U.S. patent system and potentially an important one. In the presence of an independent-invention defense, companies would have incentives to remain ignorant of patents in their field if they thought they could create the requisite technology in house.[205] This would of course be inimical to the supposed function of the patent system in disseminating knowledge to facilitate follow-on innovation. It could also do violence to the patent regime's most important function, which is to induce people and companies to invent. By restricting the zone of exclusivity created by a patent, an exemption for independent invention would reduce the royalty rate on which patentees and prospective licensees would rationally agree. Although this would have beneficial effects in many settings by increasing output, the positive effect would be far less clear on industries that involve capital- and risk-intensive invention and commercialization profiles, such as biotechnology. Furthermore, such a defense would increase the average cost of litigated patent cases by introducing a new (and dispositive) question as to the fact of independent invention.

Yet many economists believe that an independent-invention defense, or perhaps a sufficiently broad prior-user right,[206] is desirable.[207] In the first place, an independent-invention defense would instantly eliminate the problem of PAEs that operate as a tax on the value-creating activities of companies that market technologies.[208] Second, it would reduce the social costs of patent races, in which multiple companies expend scarce resources

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202. *See* Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709 (2012).

203. *See id.*

204. *See id.*; *see also* Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 478 (1974) (explaining that patent protection "goes not only to copying the subject matter . . . but also to independent creation"); Cotropia & Lemley, *supra* note 46, at 1424.

205. Conversely, however, such a defense would presumably spur patentees to disseminate information as to the workings of their claimed inventions, thus reducing the likelihood that a third party would subsequently engage in independent invention. On the other hand, by taking away the primary advantage of the contemporary patent system in providing functional exclusivity, an independent-invention defense would drive some inventors to opt for trade-secret protection. *See* Blair & Cotter, *supra* note 197, at 815–17.

206. *See* Carl Shapiro, *Patent Reform: Aligning Reward and Contribution* 25–29 (Nat'l Bureau of Econ. Research, Working Paper No. 13141, 2007), *available at* http://www.nber.org/papers/w13141.pdf.

207. *See, e.g.*, Maurer & Scotchmer, *supra* note 56, at 535; Vermont, *supra* note 56, at 479.

208. *See* Mark A. Lemley, *Should Patent Infringement Require Proof of Copying?*, 105 MICH. L. REV. 1525, 1527 (2007).

on duplicative research projects.[209] Absent positive spillover effects, such duplicative expenditures are wasteful and therefore inefficient. Furthermore, an independent-invention defense would encourage licensing in some circumstances.[210] Finally, although such a defense would reduce the value of a patent, some economists argue that it may not reduce incentives to innovate.[211]

There may be a strong case for an independent-invention defense if we cannot fix the patent system's broken notice function. If the principal cost of such a defense is to induce companies to ignore patents *ex ante* and to conduct the relevant R&D in house, then that price may be modest in those industries where ignorance of patents is commonplace. Companies in the IT field, especially, already ignore patents en masse, forego *ex ante* technology licensing in forging new products, and independently develop desired technology. Of course, the impact of such a defense in fields in which patents' notice function operates well, such as the pharmaceutical industry, could be more significant. This observation counsels caution.

This phenomenon of duplicative effort stems in part from the failure of today's patent system to impart adequate notice. If policymakers cannot address this failure, they are unlikely to be able to induce widespread *ex ante* technology transfer. The Report's recommendations to improve notice, though well founded, are insufficiently significant to provide a meaningful solution.

What should one make of the fact that the FTC declined to recommend or disapprove of an independent-invention defense? This feature of the Report is emblematic of its restrained approach. There is no doubt that introducing such a defense would be a radical change, as it would eliminate a unique and central feature of the U.S. patent system. Although such a fundamental change may have desirable effects, especially in IT industries, policymakers must be sensitive to the possible negative effects of such a rule on incentives in other settings. The law would have to cabin an independent-invention defense in a number of ways to hedge against the danger of unforeseen and undesirable consequences.

There may be a more responsible way to achieve the benefits of an independent-invention defense without running the risk of harming innovation in certain industries. Although the Report did not address the possibility, courts, the PTO, lawmakers, and academics should begin to take seriously the idea that simultaneous, or close-in-time, innovation constitutes a strong indicator of inevitability. Absent large capital expenditures, rapid instances

209. It should be noted, however, that patent races may have offsetting benefits in the form of positive spillover effects. In this respect, a losing company's investment in R&D may produce insights and technology that prove useful for other projects.

210. *See* John S. Leibovitz, Note, *Inventing a Nonexclusive Patent System*, 111 YALE L.J. 2251, 2272 (2002).

211. *See* Lemley, *supra* note 208, at 1527.

of independent discovery counsel a finding of obviousness. The PTO and courts should generally find a claimed product or process to be obvious in light of evidence that the claimed technology is but the first instance of numerous and close-in-time acts of independent invention.

By properly tailoring the obviousness inquiry, the law can ensure that only inventors of technologies that were not inevitable in the short run can obtain a twenty-year exclusive right.[212] In doing so, however, courts must avoid fashioning a dogmatic rule that would deny patents in the event of rapid instances of separate invention. The prospect of an exclusive award may entice several competing firms to engage in costly R&D toward the same goal, thus leading each to invent the same or comparable technology. Such instances of independent invention result from a patent race and do not in themselves warrant a finding of obviousness.[213] Absent the prospect of a monopoly return, inventors may be unwilling to devote the scarce capital necessary to invent the relevant technology, such that an excessively high obviousness bar may transform a situation of simultaneous invention into one of no, or significantly delayed, invention.[214] Consistent with the structure of the Patent Act itself, the law should decline to draw a formal and conclusive equation between independent invention and obviousness.[215]

Nevertheless, the judiciary and the PTO should treat contemporaneous discovery of the same technology as prima facie evidence of obviousness, which patentees could rebut in a manner consistent with the principles discussed above. Such a change in practice would allow the patent system to experience some of the benefits of a formal independent-invention defense without risking a potentially serious upset in incentives in certain industry segments. It would also bypass a further cost of introducing such a defense, which would be the difficulty and hence cost of determining whether copying had in fact occurred.

3. A Restrained Approach

In summary, the FTC's recommendations are noteworthy for not addressing two major issues that some might argue constitute the proverbial elephant in the room. The questions of whether courts should limit patent scope to the invention actually disclosed in the specification and whether Congress should introduce an independent-invention defense are of the ut-

212. This reading of obviousness comports with the Supreme Court's view that the purpose of the nonobviousness doctrine is to weed out "those inventions which would not be disclosed or devised but for the inducement of a patent." Graham v. John Deere Co., 383 U.S. 1, 11 (1966).

213. Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1677 (2011).

214. *See, e.g.*, *id.* at 1663.

215. *See* Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH, 139 F.3d 877, 883 (Fed. Cir. 1998) ("Because Title 35 provides for interference proceedings, it implicitly recognizes that contemporaneous independent invention may not alone show obviousness.").

most importance, for they have the potential to solve some of the most pressing issues that currently fuel the patent crisis. Nevertheless, it does not follow that these omissions constitute flaws, serious or otherwise, in the Report. Had the FTC recommended that Congress enact broad prior-user rights, introduce an independent-invention defense, or require that courts read claims as being no broader than the disclosure contained in the relevant specification, it would have ignited a firestorm of controversy. The case for such dramatic changes is not ironclad, as each could have potentially significant negative repercussions on the innovation incentives of some important inventors.

Although there may be reason to think that the benefits of such a fundamental rewriting of patent law would exceed the costs, as a practical matter one would have to present a compelling case to achieve such reform. The U.S. patent system has served the country well for generations. Lawmakers would understandably be hesitant to overhaul it in a radical fashion. For that reason, the restrained nature of the Report is likely a positive feature. By limiting its recommendations to those that are not vulnerable to serious counterargument, the FTC simply made it more likely that courts and the PTO will adopt their policy suggestions. One might also applaud the agency's caution by appealing to the cardinal rule of medicine: "First, do no harm."[216] In the terminology of decision theory, the error cost of mistakenly undercutting incentives to invent would be severe. A 2010 report by the Department of Commerce tied three quarters of post-World War II growth in the U.S. economy to innovation.[217]

B. *Questioning Certain Aspects of the Report*

Although the FTC's policy recommendations are generally well founded, certain ancillary features of the Report are either misplaced or in need of clarification. This section critically analyses these aspects of the Report and suggests a number of qualifications to the FTC's recommendations. It begins with one of the FTC's sensible recommendations, which nevertheless stands to benefit from some elaboration.

1. Financing the Prosecution Process

Let us begin with the ostensibly straightforward subject of funding the PTO. That office has the unenviable task of sifting through purported inventions that cover a vast array of intricately complex technologies to determine whether they meet the statutory requirements of novelty, nonobviousness,

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216. *See, e.g.*, Tiana Leia Russell, *Unlocking the Genome: The Legal Case Against Genetic Diagnostic Patents*, 16 MARQ. INTELL. PROP. L. REV. 81, 117 (2012).

217. U.S. DEP'T OF COMMERCE, PATENT REFORM: UNLEASHING INNOVATION, PROMOTING ECONOMIC GROWTH & PRODUCING HIGH-PAYING JOBS 2 (2010), *available at* http://www.commerce.gov/sites/default/files/documents/migrated/Patent_Reform-paper.pdf.

utility, and disclosure. Unfortunately, the PTO has been overwhelmed by the slightly over three-quarters-of-a-million applications presently pending before it,[218] and so it may be unsurprising that its performance has suffered. There is abundant evidence that the office routinely approves applications it should not. Empirical evidence of patent validity determinations at trial is illuminating: courts invalidate between 42% and 46% of patents that parties litigate to judgment. This high error rate, which arises notwithstanding the high evidentiary burden that plaintiffs must currently meet to invalidate a patent, would not startle anyone who is familiar with the workings of the PTO. The average time from submission of a patent application to final action is now in excess of three years, and yet during that time an examiner spends an average of only eighteen hours on each application.[219] The *ex parte* nature of the proceeding, what some consider to be a culture of permissibility at the PTO,[220] and the lack of an affirmative obligation on applicants to search the prior art for anticipatory references, further undermine the quality of examiners' final determinations.[221] In addition, abuse of continuation practice has led some to suspect that examiners approve applications more often than they should.[222]

In light of these problems, and the axiomatic importance of the prosecution process, improving the PTO's performance is surely an important component of fixing the patent crisis. It naturally follows from this observation that government funding of the PTO must increase. Consistent with that view, the Report recommends that the government provide the office with greater resources to work through the current backlog and to improve the quality of its determinations.[223]

It is questionable, however, that the PTO will receive sufficient funding to shorten pendency times significantly and to improve the quality of the prosecution process. In April 2011 the PTO lost approximately $100 million from its budget, which represents a ten percent cut. The AIA improved the situation by granting the PTO fee-setting authority and providing for a fund for the agency. The act, however, also limits the use of this fund "[t]o the

218. *See* U.S. Patent & Trademark Office, Performance and Accountability Report Fiscal Year 2010 18 (2010), *available at* http://www.uspto.gov/about/stratplan/ar/2010/USPTOFY2010PAR.pdf.

219. Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495, 1500 (2001).

220. *See* Matthew Sag & Kurt Rohde, *Patent Reform and Differential Impact*, 8 Minn. J.L. Sci. & Tech. 1, 21 (2007).

221. *See, e.g.*, *All About Patents*, U.S. Pat. & Trademark Off., http://www.uspto.gov/smallbusiness/patents/filing.html (last visited Mar. 15, 2012) (noting that "a search of the prior art before the filing of an application is not required").

222. *See* Mark A. Lemley & Kimberley A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. Rev. 63, 64, 71–83 (2004).

223. FTC Report, *supra* note 1, at 117.

extent and in the amounts provided in appropriations Acts," which bodes ill for the PTO's ability to access these resources in their entirety.[224]

This Essay broadly agrees with the Report's recommendation that Congress give the PTO the resources it needs to do its job properly. Nevertheless, there may be limits to the amount that society would efficiently expend on improving the prosecution process. In a somewhat controversial but nevertheless influential essay, Mark Lemley explained that it might be desirable for the PTO to maintain a level of "rational ignorance" in its determinations.[225] This view emanates from the fact that the vast majority of patents that the PTO issues are, and remain, commercially worthless, such that money spent ensuring their consistency with the technical prerequisites of patentability is wasted. It is better, Lemley argues, to allow courts to give an exhaustive *ex post* review to the relatively few patents that turn out to be commercially valuable. Given the numerous advantages enjoyed by the courts—in terms of resources, time, and most of all access to information due to the *inter partes* nature of the litigation process—it may be desirable to subject applications at the prosecution stage to a form of clear-incompatibility review and to postpone truly scrutinizing analysis to the *ex post* stage. However, efficiency would require the PTO to give applications in certain fields greater scrutiny than others. This is particularly so in industries such as biotechnology and pharmaceuticals, where a single patent grant can accompany an extraordinarily large capital investment.

These considerations warrant qualifying the FTC's recommendation as to funding the PTO. While providing the office with much-needed resources is surely an important step toward addressing the patent crisis, the government may experience decreasing returns as they augment the level of funding. It may be better to introduce a two-tier track of review that would allow inventors of what are likely to be valuable technologies to self select into a form of examination with elevated scrutiny, and in return receive a more powerful patent.[226]

2. The "Incentive to Disclose" Fallacy

The Report's first significant error involves the oft-repeated fallacy that the patent system creates an incentive to disclose. The FTC specifically opines that the patent system "encourages . . . disclosure" and submits that "patents encourage inventors to make public what they might otherwise keep secret."[227]

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224. 35 U.S.C. § 42(c)(1) (2011); Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284-341 (2011).

225. Lemley, *supra* note 219, at 1496.

226. *See* Alan Devlin, *Revisiting the Presumption of Patent Validity*, 37 Sw. U. L. Rev. 323 (2008); Lichtman & Lemley, *supra* note 32.

227. FTC Report, *supra* note 1, at 40–42.

This is a common mistake. In fact, economic analysis reveals that the patent system operates in precisely the opposite manner, by creating a *disincentive* to disclose.[228] It does so by increasing the price that an inventor must pay to obtain a patent. By fulfilling the Section 112 requirements, an inventor reduces the cost to its competitors of recreating the claimed technology. By facilitating more effective reverse engineering and design around, the enablement and written-description requirements of the Patent Act reduce the allure of a patent to inventors of valuable technologies for which the workings are not immediately apparent.

To appreciate the flaw in the FTC's analysis, consider three broad categories of invention. First, there are technologies that are immediately self-disclosing to the PHOSITA, who can tell either upon casual inspection or at minimum expense how the claimed discovery operates. Second, there are inventions that are susceptible to reverse engineering if third parties expend significant capital. Third, there are inventions (or, more commonly, internally utilized processes) that are not vulnerable to reverse engineering. These are non-self-disclosing inventions.

Which inventions will an inventor rationally patent? She will certainly seek to patent the first category because a rival could otherwise readily copy it. Such an invention is the classic public good on which an economic conception of the patent system rests. In this instance, the principal and overriding function of the patent regime is to cabin third-party appropriation, thus creating an incentive to invent. Importantly, the value of disclosure under Section 112 in this instance is exceedingly modest. This is because the relevant technology was self-revealing, such that effective disclosure is essentially synonymous with the fact of invention and commercialization.

Now consider the third category of invention, which is non-self-disclosing. It should be clear that inventors of such technologies will not rationally seek patent protection because they could obtain perpetual protection through trade secret. If the patent system had no disclosure requirements, such inventors might seek patents so as to enjoin competitors in the event that they engage in independent invention. As trade-secret laws allow significant appropriation, however, thus generating powerful incentives to invent non-self-disclosing technologies, it is open to question whether patent availability would promote social welfare. The important point, however, is that the cost of disclosure ensures that few inventors will patent their discoveries. Ironically, of course, this is when the value of disclosure is greatest to society. In this manner, one can appreciate how Section 112 actually creates a disincentive to disclose.

Finally, consider the more important middle case, in which rivals can probably reverse engineer technologies, but only at considerable expense and over time. These inventions are candidates for patent protection, but

228. *See* Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401 (2010).

Section 112 increases the costs of patenting, which drives at least some inventors to trade secret. Thus, and counter to the Report's characterization, patents actually encourage inventors to keep their inventions secret.

It bears emphasizing, however, that the preceding discussion does not denigrate the value of disclosure to society. It is only to point out that insisting on such disclosure increases the cost of patent protection to the inventors of products and processes for which the operation is not immediately apparent. All things being equal, greater disclosure is beneficial because it facilitates the dissemination of relevant technology, thus promoting cumulative innovation as well as monopoly-reducing design around.[229] Nevertheless, the contours of optimal disclosure are rarely obvious because the benefits of requiring inventors to reveal the workings of their discoveries may come at a cost to the incentive to invent. This last incentive is, of course, the most important.

3. Draconian Penalties Do Not Necessarily Spur *Ex Post* Transactions

The FTC makes an interesting observation in Chapter 2 of the Report when it notes that excessive patent remedies and permanent injunctions encourage *ex post* transactions.[230] The agency makes these comments in the context of the hold up problem in the patent-licensing realm. *Ex post* proceedings are undesirable because they take place in the context of sunk capital investment and lock in. Substitute technologies that were available *ex ante* no longer act as effectively in constraining the royalty rate for the asserted patent, which allows patentees to extract inflated rents *ex post*. Given the inefficiencies of such after-the-fact licensing, the FTC is correct to focus on possible steps that policymakers might implement to spur *ex ante* negotiations.

Nevertheless, there is reason to doubt the accuracy of the FTC's specific suggestion that the fact of supraoptimal rewards for infringement spurs *ex post* licensing. The prospect of a windfall return *ex post* certainly encourages patentees not to search out licensees *ex ante*. Yet, patentees' windfall is licensors' loss, and so inflated remedies in court create strong incentives for potential infringers to bargain *ex ante*. This might seem to have a neutral effect, such that patentees' reduced incentive to negotiate *ex ante* offsets the concomitant desire for potential infringers to do just the opposite. There is good reason, however, to believe that society should be more concerned with spurring prospective licensees to seek out holders of the relevant patent rights *ex ante*.

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229. This last feature, however, is not necessarily beneficial. Whether an increased incidence of design around is beneficial depends on the relative importance of initial to follow-on invention. If design around is too easily available, the law may deny inventors of breakthrough technologies an optimal reward.

230. FTC REPORT, *supra* note 1, at 51–58.

Despite the preceding qualification of the FTC's observation, it does not follow that artificially enhanced remedies *ex post* are desirable. The crucial point echoes the discussion in Part II, which emphasized the primacy of notice. If transaction costs are too high to facilitate *ex ante* bargaining, then excessive rewards will compound the problem. By increasing the price of infringement to third parties in circumstances where *ex ante* licensing is not feasible, greater-than-optimal damages will simply discourage third parties from engaging in commercialization in the first place. Excessive remedies, in addition to having this undesirable effect, will further encourage strategic hold out by patentees.

The point, consistent with law-and-economics theory, is that courts should deny injunctive relief in high-transaction-cost settings where *ex ante* bargaining was not feasible. Similarly, courts must strive to avoid providing excessive damages, which undo the benefits of a liability-rule approach.

4. Treble Damages for Willful Infringement Serve a Purpose Beyond Punishing the Infringer

In discussing the economic function of damages in patent cases, the FTC articulates a number of insightful principles as to how different remedies play complementary and partially distinct roles.[231] The agency correctly explains how properly tailored remedies perform a vital function in maintaining optimal incentives in the marketplace. One cannot spur desirable *ex ante* technology licensing if courts are apt to award subpar damages *ex post*. Although systemic levels of inadequate damages in court will not eliminate the incentive for prospective licensors and licensees to reach an agreement before the fact, it will depress the royalty upon which those entities will rationally agree. Only if patentees can credibly threaten to obtain damages *ex post* that correspond to the true economic value of their technologies can they bargain for royalties *ex ante* that equate to that optimal level. The FTC, therefore, is correct to emphasize that the law must align patentees' compensation with their inventions' economic value.

In discussing the various forms of remedies, however, the Report makes the interesting observation that "[e]nhanced damages are unique . . . because they are meant to punish the infringer."[232] This is not entirely true, as punitive damages in the event of willful infringement serve an important consequentialist goal consistent with the utilitarian underpinnings of the patent system. It is a little-discussed fact of the contemporary patent regime that the cost of enforcing one's exclusive patent rights in court is so great that a significant level of nonenforcement takes place. As litigating a patent-infringement dispute to trial typically costs in the realm of three to five million dollars, the owners of many infringed patents never bring suit, thus

231. *Id.* at 138–48.
232. *Id.* at 141.

creating a broad quasi-fair-use right. Consistent with this phenomenon, the practice of many IT companies is simply to ignore the relatively costless cease-and-desist letters that patentees regularly send them, knowing full well that few of those patent holders are likely to initiate expensive judicial proceedings.

This environment of underenforcement may not be entirely undesirable, however, for it facilitates potentially innovation-enhancing activities such as experimental use aimed at cumulative invention and invent around. This de facto fair-use right justifies the currently restrictive law governing experimental use, which operates to ensure that inventors of especially valuable patents can enjoin efforts by their competitors to practice the claimed invention without permission.[233]

Chronic levels of underenforcement, though, threaten to produce nefarious results. If third parties can routinely appropriate the value of others' inventions free of reprisals due to the cost of asserting a patent in court, an environment may develop that systemically undercompensates inventors of breakthrough technologies. It is with respect to this danger that the law governing willful infringement plays an especially important role in maintaining optimal incentives. If a competitor knows of another's patent but purposefully proceeds to market an infringing product, it presumably does so knowing that there is a significant likelihood that the patentee will not bring a lawsuit that proceeds to trial. If the infringer deems the probability of detection and successful enforcement by the patentee to be less than certain, which is surely the case, then the law's only awarding damages in an amount equal to the value of the patented technology creates a direct incentive to eschew licensing negotiations and instead to pay damage in the event of a successful lawsuit. Depending on the likelihood of detection and successful infringement proceedings, such a legal environment would seriously undercompensate inventors.

Viewed in this light, one can appreciate that treble damages may play important roles in ensuring adequate returns to patentees and in maintaining incentives for potential infringers to bargain for permission *ex ante*. It is therefore not the case that enhanced damages serve only to punish infringers.

5. The Limited Efficacy of RAND Licensing Agreements

A central tenet of the Report is that courts should be loath to award injunctive relief in the event of *ex post* hold out. Nowhere is the phenomenon of hold out more acute than in the standard-setting context in which patentees conceal their IP rights only to assert them after the industry locks in on an adopted standard that infringes their claimed technology. A

233. *See* Alan Devlin, *Restricting Experimental Use*, 32 HARV. J.L. & PUB. POL'Y 599, 615 (2009).

less-egregious but nonetheless problematic example also emanates from the standards arena. This occurs where patentees engaged in the standard-setting process agree to license their technologies on "reasonable and nondiscriminatory terms" ("RAND"), but later refuse to make them available at what prospective licensees consider an appropriate price.[234]

The economic harm of hold out is clear. By ambushing companies that seek to manufacture products incorporating the patented-technology-bearing standard, patentees can extract greater royalties after the industry locks into a standard. Although technological substitutes may have existed while the standard-setting organization ("SSO") conducted negotiations as to the proper standard, the fact of *ex post* investment in a chosen standard effectively eliminates those substitutes as a price constraint on the chosen technology. Some patentees have nefariously sought to capitalize on this opportunity, invoking the ire of antitrust-enforcement agencies.

Given the FTC's overarching and well-founded prescription that property rules are inappropriate in situations of hold out, it might come as little surprise that the agency urges courts not to award injunctions to patentees that previously agreed to make their rights available on RAND terms.[235] Further examination, however, reveals that this particular recommendation is deeply incongruous.

As explored above, the Report's general—albeit implied—prescription is that courts should award injunctive relief in low-transaction-cost settings in which the parties could have reached agreement at low cost *ex ante,* but did not. This recommendation fits comfortably with traditional economic theory, as discussed in Part II. The purpose of awarding an injunction *ex post* is to spur potential infringers to use market mechanisms *ex ante* by bargaining for access to the relevant technology. Private bargaining is desirable because it relies on the superior information enjoyed by the parties themselves, creates legal certainty as to each party's ongoing legal obligations and entitlements, and—assuming competence, rationality, and sufficient access to information—ensures Pareto-superior outcomes as between the contracting entities. As a general matter, courts should employ liability rules only where the cost of reaching agreement exceeds the benefits associated with private bargaining. In such circumstances, setting mandatory-access parameters upon payment of an access fee efficiently incentivizes parties to forego expensive negotiations and instead to rely on after-the-fact judicial proceedings.

The FTC's recommendations generally track this policy-based distinction. For instance, the agency takes aim at the PAE phenomenon, and urges courts and the ITC to deny injunctive relief and exclusion orders in cases

234. *See, e.g.*, U.S. Dep't of Justice & Fed. Trade Comm'n, Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition, 45–48 (2007), *available at* http://www.usdoj.gov/atr/public/hearings/ip/222655.pdf.

235. FTC Report, *supra* note 1, at 28.

where PAEs bring suit after the defendant has commercialized a technology. Given the nature of the IT industries in which PAEs are especially active, it is not always—or even usually—possible for manufacturing companies to conduct a cost-effective search of the prior art and to bargain for licenses *ex ante*. In the presence of preclusive transaction costs, damages are the preferred remedy, and so the Report is correct to urge courts to decline injunctive relief in lawsuits brought by PAEs. Furthermore, in calculating an appropriate measure of damages, the FTC fittingly recommends that courts focus on the *ex ante* value of the infringed technology underlying the asserted patent.

Now consider the SSO setting. The process by which industry participants meet to hammer out a common technological platform for manufacturing and marketing interoperable goods does not necessarily involve preclusive transaction costs. By definition, the parties have identified one another and in fact routinely reach agreement on technologically complex issues. One impediment to bargaining might be asymmetric access to information, especially as to the contents of the various parties' IP portfolios, though the law can encourage disclosure by denying injunctive relief and curtailing damages in the event of an SSO member's strategically withholding patents and subsequently enforcing the same following lock in. If transaction costs in the standards arena are indeed modest, SSOs could readily require IP-holding participants to announce the most restrictive terms upon which they would demand to license, thus creating a royalty ceiling. Alternatively, though it would modestly delay the onset of negotiations as to the technically optimal standard, SSOs could bargain with each patentee to determine specific royalty terms that would apply in the event that the SSO incorporates that patentee's technology in the chosen standard.

The benefits of such agreements are self-evident. SSOs, armed with knowledge not only as to the technical attributes of substitute technologies, but also as to either the precise or maximum royalties at which they will be available, could make more informed decisions as to the make up of the best possible standard. Simultaneously, patentees would agree to license at a price that reflects competition between rival technologies. The net result would be an efficient standardization process.

Oddly, this has not occurred. Instead, SSOs have eschewed formal negotiations over price in advance of selecting a standard. They instead rely on nebulous, and ultimately ineffective, RAND guarantees as a prophylactic device against *ex post* hold up.

Competition laws are partially to blame. SSOs and their members often fear the legal ramifications of discussing price.[236] I have argued elsewhere that antitrust-enforcement agencies should affirmatively relax oversight of

236. *See* Michael G. Cowie & Joseph P. Lavelle, *Patents Covering Industry Standards: The Risk to Enforceability Due to Conduct Before Standard-Setting Organizations*, 30 AIPLA Q.J. 95, 102 (2002).

these activities.[237] Another probable reason is that engineers, rather than lawyers or executives, dominate the standard-setting process, and they may have more interest in figuring out a technological solution than concerning themselves with such after-the-fact business details as price. Ultimately, it appears that SSOs and their constituent members have little interest in carrying out royalty negotiations *ex ante*. No doubt, the perception that an easy-to-agree-on assurance of RAND licensing is an effective provisional solution drives this attitude.

Let us return to some basic economic theory. If parties spurn *ex ante* negotiations in favor of potential *ex post* proceedings, despite the presence of low transaction costs, it is presumably because one or both of the parties believes that it can obtain a better deal *ex post*. This is by definition undesirable because inflated or deflated access prices both have negative effects. In the innovation context, inadequate remedies may deflate incentives to invent,[238] while windfall profits for patentees may attract inefficiently high levels of investment in the relevant technology.[239] It is unclear whether damages calculated in the presence of RAND assurances are more likely to over- or under-compensate patentees. One can be confident, however, that SSOs and prospective licensors would agree on more socially desirable royalty rates through *ex ante* negotiations. How could the law spur these entities to enter into such arrangements before selecting and locking into a standard? As a matter of economic theory, the solution is to impose a property rule, thus permitting the owners of infringed technologies to enjoin others' use if the prospective licensor and the licensee are unable to reach an agreement *ex post*.

Many, presumably including the FTC, would rejoin that awarding injunctive relief in this manner would facilitate hold out. Even though the use of a property rule would indeed allow some patentees to extract royalties that exceed the *ex ante* economic value of their inventions, critics of a property rule would be wrong to treat this as a hold-out situation. By putting SSOs and those adopting their chosen standards on notice that injunctive relief will accompany demonstrated infringement, the law would create a powerful incentive for those entities to bargain as to specific licensing details *ex ante*. The situation is at least somewhat comparable to instances of marginal encroachment over physical land in which the owner of the invad-

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237. *See* Alan Devlin, *Standard-Setting and the Failure of Price Competition*, 65 N.Y.U. ANN. SURV. AM. L. 217, 262–63 (2009).

238. *See, e.g.*, Benjamin H. Diessel, Comment, *Trolling for Trolls: The Pitfalls of the Emerging Market Competition Requirement for Permanent Injunctions in Patent Cases Post*-eBay, 106 MICH. L. REV. 305, 335 n.196, 342 n.239 (2007) (observing that "judicially determined damages [may] be inadequate to protect innovation incentives").

239. *See generally* Michael Dorff, *Attaching Tort Claims to Contract Actions: An Economic Analysis of Contort*, 28 SETON HALL L. REV. 390, 405 (1997) (observing that "supercompensatory damages would encourage parties to overinvest . . . in the hopes of acquiring a windfall").

ed land could obtain an injunction even if the owner's real damages were small and the encroaching neighbor's harm great. The result in such cases is an ostensible windfall in favor of the landowner and an apparently draconian result for the encroacher, but the consequential—and efficient—result is that future encroachers have a strong incentive to bargain for permission before the fact.

The distinguishing feature between the encroachment example and the standard-setting case, of course, is that prospective licensees have received *ex ante* RAND assurances in the latter setting. The operative question, therefore, is how should the law treat RAND licensing agreements? One answer is to adopt the FTC's view, which would entail giving those agreements the greatest possible force under the law. In practice, the most one can do to bolster the concept of RAND is to treat the assurance as a voluntary abandonment of the right to pursue injunctive relief should a dispute arise *ex post* as to the meaning of a "reasonable royalty."

There is a cost to this approach, however, which the FTC's Report does not address. By formally treating a RAND licensing agreement as precluding the judicial use of a property rule, the law would create a strong incentive for SSOs to keep doing what they are doing—essentially, to agree to agree at a future time. By using a liability rule, the law would incentivize SSOs and their members to reject efficient use of market mechanisms *ex ante*.

This might not be so bad if the idea of a "reasonable and nondiscriminatory" royalty were at least somewhat determinate, such that courts would be likely to craft damages awards that accurately mirror the patented technology's marginal contribution in value to the end product. Unfortunately, RAND is a vacuous concept. To the extent that "reasonable" lacks a theoretical foundation, the FTC is correct to point out that the term should be synonymous with the *ex ante* value of the relevant technology.[240] Yet, this is only the start of the battle, for courts face the vexing task of calculating a reasonable royalty given the specific facts before them. This is unavoidable in settings where high transaction costs preclude agreement *ex ante*, but is a very real cost in situations such as those involving SSOs where the parties could readily have reached agreement *ex ante*. Different parties' views of "reasonableness" are apt to vary, such that potential licensors and licensees can maintain good-faith positions that are leagues apart.[241] Resolving those

240. *Id.*

241. As an illustration, consider the European Commission's action in February 2008 in fining Microsoft $1.3 billion (then a record in the antitrust world) for charging "unreasonable prices" for interface information necessary to achieve interoperability with work-group servers. The offending royalty rate was 3.87% of licensees' product revenues. *See* Press Release, European Commission, Antitrust: Commission Imposes €899 Million Penalty on Microsoft for Non-Compliance with March 2004 Decision (Feb. 28, 2008), *available at* http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/318.

differences is not only wholly unpredictable, but also expensive and unlikely to yield accurate results.

This inaccuracy stems, in part, from the distinct context in which SSO disputes are likely to arise. Factual findings as to what constitutes a reasonable royalty can be straightforward when a market already exists for the subject matter in dispute. In those cases, courts can simply look to comparable licenses and use the accompanying royalties as an effective baseline.[242] In the SSO setting, however, new technologies are typically at issue, which forecloses judicial appeal to other benchmark licenses for the patented product or process.

The FTC's recommendation as to RAND, though well intentioned and indeed desirable if the law could not realistically alter SSO behavior, is misplaced. Treating RAND assurances as necessitating judicial use of a liability rule only will simply perpetuate an inefficient—and wholly unnecessary—status quo. The Report should instead have looked to the law-and-economics theory that underlies many of its other recommendations and noted that the use of a property rule in the SSO setting in the presence of RAND agreements would have two consequential benefits. First, it would induce SSOs to discard inefficient RAND licensing agreements, which create uncertainty, impose significant *ex post* negotiation and litigation costs, and bear the potential to undercompensate patentees. Second, it would spur these entities either to reach specific agreement as to the terms under which each potential licensor will make its technology available or, less desirably though perhaps more realistically, incentivize SSOs to require their IP-holding members to announce their most restrictive terms *ex ante*.

In conclusion, it bears emphasizing that there is a crucial difference between patentees that conceal their IP rights only to assert them *ex post*, and those that reveal their claimed technologies *ex ante*. One can meaningfully speak of hold out only in the former case. In such settings, it ought to be axiomatic that courts should deny injunctive relief.

6. Claim Amendment Through the Continuation Process to Capture a Rival's Product Need Not Be Improper

The FTC takes issue with a staple of the modern prosecution process that allows an applicant to amend her claims through the continuation process to capture a rival's product that she observes in the marketplace.[243] The

242. In practice, difficulties can emerge even in these instances because royalty-implicating nuances often accompany different license agreements. For instance, the licensed technology that courts may look to as a baseline may be one of many licenses in a portfolio and thus difficult to isolate. Alternatively, licensing agreements between the patentee and a third party may reflect specific tenets of those parties' relationship, which affect the agreed-upon royalty. Nevertheless, where a market exists for the infringed technology, courts have a strong reference point for determining "reasonable" damages that approximate the *ex ante* value of the claimed product or process.

243. FTC REPORT, *supra* note 1, at 124–25.

FTC is correct to scrutinize the prosecution process—and continuation practice in particular—because these practices play an important, if unfortunate, role in the chronic lack of notice generated by the patent system. Continuations enable applicants to extend the prosecution process, adding new claims as long as the original application's specification adequately supports them. The longer the prosecution process lasts and the more flexibility inventors have to alter the nature of their claims, the more likely it is than a third party will independently invent and market a technology, oblivious to the fact and nature of the pending patent application.

Perceived abuses of the continuation process have not escaped academic scrutiny.[244] It might seem odd that the PTO should allow applicants to repeatedly change the technology that they claim to have invented, but continuations can play an important and legitimate role. This is particularly so in fields involving complex technologies in which a dialog with an examiner may be necessary to arrive at an appropriate level of mutual understanding. Furthermore, continuations may enable inventors to perfect the language that best encapsulates the substance of their actual inventions. For these reasons, simply eliminating the continuation practice is not a feasible solution. Indeed, the PTO's efforts to impose certain limitations aimed at stamping out some of the worst abuses met an ignominious end when a federal district court enjoined the PTO's attempted changes.[245]

The Report objects in particular to the practice of using continuations strategically to broaden "claim language to cover rivals' subsequent development of products that the applicant never envisioned when filing the initial application."[246] The FTC suggests that this phenomenon is categorically improper, which is a characterization that this Essay agrees with given the current makeup of patent law. Nevertheless, it need not always be undesirable that an inventor should be able to amend claims through continuation to capture a rival's product that already exists in the market. It is notoriously difficult in certain fields for inventors to employ language to accurately encapsulate the nature of the invented product or process. Indeed, the doctrine of equivalents implicitly recognizes this difficulty by specifying that a third party cannot avoid infringement by designing a product in such a way as to technically avoid the specific claims of a patent that covers substantially the same technology.[247] There may indeed be situations in which inventors struggle to find appropriate language to describe technologies that they created following a protracted and expensive R&D process. If such inventors discover that a rival company has subsequently invented the same technology

244. *See, e.g.*, Lemley & Moore, *supra* note 222.

245. *See* Tafas v. Doll, 541 F. Supp. 2d 805 (E.D. Va. 2008*), aff'd in part, rev'd in part*, 559 F.3d 1345 (Fed. Cir. 2009).

246. FTC REPORT, *supra* note 1, at 124.

247. *See* Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 733 (2002).

but has commercialized it in a way that technically evades the literal claims pending in front of the PTO, the continuation practice may efficiently enable the inventor to procure the return envisioned by the patent bargain.

In determining the propriety of amending claims in light of marketed products, the focus should properly be on the specification. It is that portion of the application that provides or fails to convey the details of the claimed invention sufficiently to put third parties on notice.

Unfortunately, and as the Report explains in detail, specifications typically do not provide the requisite notice to ensure that amended claims through continuations take place in unobjectionable fashion. The FTC makes the sensible suggestion that the PTO shift its test from whether the application provides "adequate support" for the relevant claim to whether, starting from the specification, a PHOSITA would predict the claim that later emerges. It is open to question, however, whether such a modest change will have a sufficient impact to remedy this form of "submarine" patenting. It may not be sufficient to consistently prevent applicants from ambushing companies that independently invent and market products that arguably fall within the ambit of the specification.

The FTC's prescription as to prior-user rights is somewhat more controversial. The agency recommends providing protection to those companies that (1) infringed patents only due to claim amendment following a continuation and (2) developed the relevant product or process before the amended claim was published.[248] To the extent that the PTO's processes do not sufficiently apprise third parties of the scope of pending patent applications, such prior-user rights may be desirable to ensure commercialization of technology. Should the PTO subsequently insist that specifications more strongly support amended claims, however, prior-user rights may prove to be unnecessary. Indeed, there may be instances in which applicants should legitimately be able to alter the language of their claims to capture products that their rivals have introduced in the market. Fixing the notice deficiency inherent in the specification may be the first-best fix.

CONCLUSION

The FTC's 2011 Report on patent notice and remedies provides an authoritative treatment on some of the most pressing issues faced by the U.S. patent regime. The agency's well-founded recommendations promise to deliver a series of appreciable improvements in contemporary U.S. innovation policy. Indeed, such is the importance of this work that it ought to be mandatory reading for judges, IP academics, examiners, lawmakers, and those who operate in patent-heavy industries.

248. FTC REPORT, *supra* note 1, at 125.

The FTC's normative conclusions come at an important time, for the patent system's shortcomings have become increasingly apparent. Economists generally agree that patents exist to spur the invention and commercialization of technology that would otherwise be vulnerable to excessive levels of free riding.[249] Exclusive rights over the fruits of one's R&D provide a defensible solution to the free rider problem.

To achieve optimal levels of innovation, however, one must do more than spur isolated instances of private invention. Instead, the law should create an infrastructure that fluidly disseminates technology to its highest-value uses, allowing both those who are best placed to market inventions to consumers and those who enjoy superior opportunities to improve technology to do so. Low-cost and effective alienation is an indispensable prerequisite of such a dynamic platform of interconnected innovation. Private rights over products and processes promise in theory to produce such desirable results in much the same way that traditional property law creates an efficient system of self-regulation in which owners control the use of real and personal property. Unfortunately, this theory does not translate well into practice on account of a critical shortcoming of the contemporary patent system—namely, notice.

Lacking the ability to determine the contours of claimed technology, overwhelmed by the sheer number of discrete patent-eligible products and processes in certain fields, and frustrated by overlapping claims to the same invention, many of today's companies cannot use *ex ante* technology transfer to license necessary patented inventions. For such entities, the prospect of a patent-driven, efficient market for the dissemination of technology gives way to a system that operates as a tax on commercialization. Instead of operating within a patent system that permits companies to identify and pay royalties for useful technology, many of today's inventors must resort to in-house R&D. Meanwhile, PAEs acquire patents when the owners have not developed the claimed technologies to a commercially viable level. In lieu of advancing these claimed products and processes beyond the threshold level required for patentability, these PAEs enforce them against companies that market goods to consumers. This phenomenon creates a patent bubble that induces many inventors, especially in the IT field, to produce patents that few will ever read or rely on, and that rarely lead to marketable products.

The Report does an expert job of exploring the many reasons why patents do not provide appropriate levels of notice and explaining how remedies play a crucial, complementary role in producing appropriate incentives. The FTC's recommendations are generally laudable and should form a focal point for ongoing debate and analysis.

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249. *See, e.g.*, Bruno Salama & Daniel Benoliel, *Pharmaceutical Patent Bargains: The Brazilian Experience*, 18 CARDOZO J. INT'L & COMP. L. 633, 685 n.248 (2010).

In evaluating the Report, however, the principal observation must be that its ultimate impact on the patent crisis, especially in the IT industry, is likely to be modest. If courts, the PTO, and Congress were to adopt all of the FTC's recommendations, the likely result would be only a mild amelioration of the problems that plague the system.

Notice and *ex ante* technology transfer will continue to challenge the IT field so long as myriad discrete technologies underlie IT products. Where a large number of fragmented ownership rights exist over complementary technologies, *ex ante* bargaining will be elusive. The FTC's recommendations cannot change the nature of technology in these industries. Nor is the Report likely to have a significant effect on the problem of indeterminate claims. Absent rules limiting a patent's sphere of exclusivity to that disclosed in the specification, IT patent claims will remain too vague to make *ex ante* bargaining the norm. Unless there is an unforeseen improvement in the dynamics of patent law in IT industries, it seems probable that more drastic action will be necessary in the future. In the meantime, policymakers would benefit greatly from studies devoted to identifying more significant fixes.

As explored above, property law traditionally responded to high-transaction-cost environments by employing liability rules that shift conflicting claims to a resource to an *ex post* proceeding in which courts set appropriate access prices. This suggests the propriety of a liability-rule approach to patent damages in cases in which *ex ante* bargaining was not economically feasible. The Report correctly identifies the desirability of denying injunctive relief in such circumstances, and reminds the courts to focus on fundamental economic principles in awarding damages so as not to systemically under- or over-reward patentees.

The 2011 Report sets policymakers in the correct direction. Given the cabined reach of its recommendations, however, the FTC's most recent views on the patent system are likely to constitute just one step toward the ultimate goal of creating a value-maximizing infrastructure in which innovation flourishes.