

AN INCREMENTALIST APPROACH TO PATENT REFORM POLICY

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INTRODUCTION

It is a common notion that systems to promote innovation are particularly effective when they employ economic incentives. A reward that makes research and development efforts worthwhile is logically presumed to be a strong motivator. However, conceiving an appropriate reward is necessarily a complex endeavor, as the diversity of invention necessitates a reward that is aligned to the output of persons in a variety of fields. Patent systems attempt to create just such an encompassing and flexible incentive by providing government grants of limited property rights over an invention, allowing the owner to reap profits limited only by market demands. But are current patent systems actually effective in inducing innovative behavior, and if so, are the benefits worth the costs? If problems exist, how should reform be directed? Given the current political climate, the answers to such questions are critical.

Efforts to determine the optimal characteristics of a national patent system have been the frequent subject of legal and economic research. In just the last two years, broad reviews of the U.S. patent system were produced by such prominent sources as the Federal Trade Commission (FTC),¹ the National Academy of Sciences (NAS),² and, most recently, the National Academy of Public Administration (NAPA).³ Despite the scope of these recent efforts and the great number of smaller theoretical and empirical works in the economic and legal literature,⁴ the degree to which current patent systems promote innovative behavior remains surprisingly unclear.⁵ The NAS con-

1. FED. TRADE COMM'N, *TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY* (2003) [hereinafter *FTC REPORT*]. This report is particularly interesting in that it reviews the statements of participants in a lengthy information gathering project, but states few conclusions.

2. NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *A PATENT SYSTEM FOR THE 21ST CENTURY* (Stephen A. Merrill et al. eds., 2004) [hereinafter *NAS REPORT*].

3. NAT'L ACAD. OF PUB. ADMIN., *U.S. PATENT AND TRADEMARK OFFICE: TRANSFORMING TO MEET THE CHALLENGES OF THE 21ST CENTURY* (2005) [hereinafter *NAPA REPORT*].

4. For example, noted economists Adam Jaffe and Josh Lerner, both of whom have published extensively on various aspects of patent incentives, also recently delivered a detailed analysis of the problems in the U.S. system. See generally, ADAM B. JAFFE & JOSH LERNER, *INNOVATION AND ITS DISCONTENTS* (2004).

5. See, e.g., George L. Priest, *What Economists Can Tell Lawyers About Intellectual Property*, 8 RES. L. & ECON. 19, 21 (1986) (“[E]conomists know almost nothing about the effect on social welfare of the patent system or of other systems of intellectual property.”); Roberto Mazzoleni & Richard R. Nelson, *Economic Theories About the Benefits and Costs of Patents*, 32 J. ECON. ISSUES 1031, 1031–32 (1998) (“In this paper, we discover that the answer [as to the social benefits and costs of patents] certainly is not simple and currently not well settled.”); Adam B. Jaffe, *The U.S.*

cluded in its report that, outside of a handful of industries such as pharmaceuticals, “[o]ne may legitimately question whether the impact of patenting on innovation and its consequences for social welfare are, on balance, positive.”⁶ While admittedly lacking the grounding to establish comprehensive criteria for innovation, the NAS and FTC reports nevertheless offer suggestions—many quite similar—on how the U.S. system must be reformed.⁷ Based in part on the recommendations of these reports, significant legislative efforts in 2005 and 2006 focused on substantially changing U.S. patent rules.⁸ Unfortunately, the uncertainty underlying the essential questions about how patents contribute to innovation casts a shadow of doubt over such reforms

Patent System in Transition: Policy Innovation and the Innovation Process, 29 RES. POL’Y 531 (2000). Economist Robert Hahn makes one of the more blunt comments on the lack of consensus on patents and innovation in a recent review of the economic literature: “As a newcomer to the field I thus assumed that basic policy questions, such as whether strengthening patent protection spurs innovation, would have more or less been answered. I was wrong.” Robert W. Hahn, *The Economics of Patent Protection: Policy Implications from the Literature* 1 (2003), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=467489.

6. NAS REPORT, *supra* note 2, at 41.

7. *Id.* at 81–83 (making seven recommendations for reform, including a post-grant opposition procedure); FTC REPORT, *supra* note 1, Executive Summary, at 4–17 (making ten recommendations for reform, including a post-grant opposition procedure). See generally AM. INTELLECTUAL PROP. LAW ASS’N (AIPLA), AIPLA RESPONSE TO THE NATIONAL ACADEMIES REPORT ENTITLED “A PATENT SYSTEM FOR THE 21ST CENTURY” (2004), available at http://www.aipla.org/Content/ContentGroups/Issues_and_Advocacy/Comments2/Patent_and_Trademark_Office/2004/NAS092304.pdf [hereinafter AIPLA RESPONSE]. Some of the recommendations are even contradictory. For example, the NAS Report calls for a unitary patent system but subsequently suggests that different obviousness standards should apply to different technologies. NAS REPORT, *supra* note 2, at 85 (“The committee realizes that there may appear to be some contradiction between [our unitary system] position and our belief in the importance of exploiting the mechanisms and doctrines that reflect differences among technologies or allow for some deliberate discrimination among them by the USPTO, by the courts, and by patent holders themselves.”).

8. For example, a series of hearings on patent reform were held by the Senate Judiciary Committee in 2005, the first of which included a summary of the NAS Report’s major proposals for legislative reform. *A Perspective on Patents: Hearing before the S. Comm. on the Judiciary*, 109th Cong. (2005) (statement of Drs. Richard C. Levin & Mark B. Myers, Co-Chairs, Comm. on Intellectual Prop. Rights in the Knowledge-Based Economy, Nat’l Research Council), available at http://judiciary.senate.gov/testimony.cfm?id=1475&wit_id=4217. Additionally, Representative Lamar Smith has introduced into the House a bill that contains many of the NAS and FTC proposals for reform. See generally Patent Reform Act of 2005, H.R. 2795, 109th Cong. (2005). A second, somewhat narrower bill was introduced in April 2006 by Representatives Howard Berman and Rick Boucher. See generally Patents Depend on Quality Act of 2006, H.R. 5096, 109th Cong. (2006).

and poses a persistent obstacle to meaningful change.⁹ Moreover, there is danger in blind reform; ill-founded revisions may actually lead to greater crises down the road.

The basis of the problem seems to be the inherent and overwhelming complexity of patent property systems. When it comes to designing the rules of the game, the questions are often as unclear as the answers. Of primary importance is the general failure to narrow the relevant goals by first addressing the fundamental question of output metrics—*i.e.*, exactly what it is we expect a patent system to do.¹⁰ This failure is fueled in part by the literature's use of varied and often inconsistent economic and social measures of patent system success. Additionally, even if some basic goals are identified, the complex nature of relevant incentives is widely underappreciated. Patents are often treated as a one-dimensional power that is either "strong" or "weak," depending on its legal attributes. This results in an inability to account for the full extent and interrelationship of factors that contribute to the power of a patent right to act as a motivator for important innovation. Without this detailed background, traditional patent system analysis can actually obscure the most important reasons that individuals and companies either respond to or ignore patent incentives. Reform under such circumstances may be a wasted endeavor.

The prognosis for intelligent reform appears grim. Does the endemic confusion eliminate any chance to intelligently improve the efficiency of patent systems? Are we destined to cast about aimlessly in the dark? This article suggests that such policy failure can be partially remedied by an alternative approach to radical and systemic patent reform: incrementalism. As first articulated by economist Charles Lindblom,¹¹ incrementalism (or more specifically, "disjointed incrementalism") is a form of strategic analysis that permits the intelligent administration of complex systems. Its general steps include:

- (a) limitation of analysis to a few somewhat familiar policy alternatives;

9. See Mazzoleni & Nelson, *supra* note 5, at 1051 ("Our lack of knowledge here clearly limits our ability to analyze intelligently the current pressing issues of patent reform.").

10. See Edmund W. Kitch, *Elementary and Persistent Errors in the Economic Analysis of Intellectual Property Law*, 53 *VAND. L. REV.* 1727, 1740–41 (2000) ("Some literature on intellectual property rights has tended to treat the policy question as one of whether to have or not to have the intellectual property right, without considering the full range of features that can be varied by the law in order to affect the operation of the right.").

11. See Charles E. Lindblom, *The Science of "Muddling Through,"* 19 *PUB. ADMIN. REV.* 79 (1959).

- (b) an intertwining of analysis of policy goals and other values with the empirical aspects of the problem;
- (c) a greater analytical preoccupation with ills to be remedied than positive goals to be sought;
- (d) a sequence of trials, errors, and revised trials;
- (e) analysis that explores only some, not all, of the important possible consequences of a considered alternative; and
- (f) fragmentation of analytical work to many (partisan) participants in policy making.¹²

The process assumes imperfection of analysis and the need for the input of many voices to make acceptable decisions. Rather than maximizing the pursuit of overarching ends, incrementalism assumes that other considerations will be entertained in searching for policy alternatives.¹³ Consensus is elevated over theory. Through the use of narrowly defined, small and frequent revisions, patent law can be edged toward a better functioning and more socially desirable end without the risk of destroying existing incentives.

To place the issues in context, the article begins in Part I with a discussion of the primary goals of a patent system, and reviews evidence that existing systems are meeting these goals. Then, in Part II, the article details the great complexity of an invention incentive system with a novel articulation of the full scope of independent variables that impact prospective innovators. These variables can be broadly categorized as (1) legal factors and (2) cultural/institutional factors. In Part III, the article explains that, in view of the inherent complexity and the lack of empirical evidence, an incrementalist strategy is warranted with respect to patent reform in the immediate future. It applies this perspective to assess the likely impact of a variety of proposed revisions to current patent system rules. Forward movement on something as important as innovation policy, the article concludes, is best achieved step-by-step.

12. See Andrew Weiss & Edward Woodhouse, *Reframing Incrementalism: A Constructive Response to the Critics*, 25 POL'Y SCI. 255, 256 (1992) (restating the steps of disjointed incrementalism). The formal articulation of disjointed incrementalism, from which the six commonly noted steps are derived, was published as a chapter in a 1963 text by Braybrooke and Lindblom. DAVID BRAYBROOKE & CHARLES E. LINDBLOM, *A STRATEGY OF DECISION* 83–106 (1963).

13. See BRAYBROOKE & LINDBLOM, *supra* note 12, at 93–98.

I.
PATENTS, INNOVATION, AND THE FAILURE OF
SYNOPTIC DESIGN

Managing innovation has long been considered an important government purpose.¹⁴ But it has dramatically increased in prominence since the Renaissance (particularly post-industrial revolution), after which civilizations began to openly measure themselves against their neighbors by their degree of technical achievement, rather than simply by military might or land ownership.¹⁵ Societies have sought ways to improve productivity in this regard, and intellectual property rights have been an important part of the equation.

Since their inception, intellectual property regimes have embraced forward looking goals over the natural desire of immediate gratification. They incorporate some temporary societal negative (*e.g.*, lack of competition in an idea, secrecy, etc.) in exchange for a greater overall gain in the future (*e.g.*, more technical information ultimately available).¹⁶ The hubris in this endeavor is the belief that the existing environment for information creation is sufficiently understood to effectively craft incentives for improvement. It is implicit that the most important factors in such systems are knowable and simple enough to rearrange through legal rules. This type of rational and comprehensive policy design is often referred to in decision theory as the “synoptic” or “comprehensive-rational” ideal,¹⁷ and it appears to have had a strong influence on Western government administrative policy in particular.¹⁸

14. See, *e.g.*, SUZANNE SCOTCHMER, *INNOVATION AND INCENTIVES* 4–5 (2004) (introduction co-authored with Stephen Maurer describing government manipulation of innovation among the ancient Greeks).

15. See *id.* at 8–11 (noting that the growing realization among European governments that “innovation could lead to prosperity” persuaded them to “make unprecedented efforts to promote it”).

16. See ROBERT P. MERGES ET AL., *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 15 (2d ed. 2000) (“[I]ntellectual property laws can be justified by the public goods argument only to the extent that they do on balance encourage enough creation and dissemination of new works to offset [the social] costs.”).

17. See Colin S. Diver, *Policymaking Paradigms in Administrative Law*, 95 HARV. L. REV. 393, 396–99 (1981). Diver explains the steps involved in comprehensive-rational decision making: (1) “specify the goal” to be attained; (2) “identify all possible methods” of reaching that goal; (3) evaluate each method based on how each one will achieve the goal; and (4) select the best method. *Id.* at 396. Diver notes how rigorous this analysis is, noting that one would have to be “superhuman” to “adhere to the ideal of comprehensive rationality.” *Id.*

18. *Id.* at 409–13 (arguing that a more limited comprehensive-rational administrative policy reigned supreme in the United States during the 1960s and 70s).

In many respects, relying on the synoptic ideal in intellectual property system design seems reasonable. Crafting an incentive system to directly inspire innovation and creativity appears straightforward in comparison to other government endeavors like preventing crime or eliminating hunger. Indeed, the basic economic premise of existing patent systems—compensation for invention—is strikingly simple.¹⁹ However, cracks in the façade of rational-comprehensive designs begin to appear when one delves deeper into the measures of system success and results.

A. *Economic Supplements to Encourage Information Creation*

How does one induce innovation in a free market economy? The nature of decentralized control elevates the role of private industry in the innovation equation. There is a dependence on privately funded research and development to produce a large share of pioneering products and services for the public; in many cases, the private sector outspends government-related entities.²⁰ Thus, the way in which the private sector allocates its resources and marshals its forces determines the direction of a substantial portion of innovation. Economic incentives drive research inputs, and pure market forces promote substantial research and development spending by firms to achieve a competitive advantage.²¹ However, in cases where advancement can be appropriated by competitors before the investment is recouped—such as when the innovation is non-rivalrous,²² non-excludable

19. See Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 266 (1977) (restating the basic notion historically agreed upon by economists: “The patent is a reward that enables the inventor to capture the returns from his investment in the invention, returns that would otherwise (absent secrecy) be subject to appropriation by others.”).

20. For example, in the United States, private funding accounts for most research and development spending. NAT’L SCI. BD., SCIENCE AND ENGINEERING INDICATORS 2004, at 4–9 (2004), available at <http://www.nsf.gov/statistics/seind04/pdf/c04.pdf> [hereinafter NSB REPORT] (“Industry performs most of the nation’s R&D and accounted for 70.4 percent of total R&D performance in 2002.”). This is true even in areas of substantial public interest, such as health care. See Peter J. Neumann & Eileen A. Sandberg, *Trends in Health Care R&D and Technology Innovation*, 17 HEALTH AFF. 111, 115 (1998) (noting that data from the U.S. “reveal an ongoing and marked shift in the relative amount of R&D conducted in the private sector”).

21. See, e.g., FTC REPORT, *supra* note 1, ch. 2, at 8–16 (reviewing evidence and testimony in support of the notion that competition drives innovation, particularly through races to innovate).

22. Tangible property is subject to “rivalrous consumption,” as one person’s use precludes another’s. See ROBERT COOTER & THOMAS ULEN, *LAW & ECONOMICS* 107–08 (4th ed. 2004).

knowledge requiring more than trivial outlay²³—additional mechanisms may be required to encourage investment.²⁴ The most prominently employed supplemental mechanism to encourage private research and development spending is the award of a limited property right in the form of a patent for the discovery of truly innovative methods or materials.²⁵ This incentive mechanism has become central to cutting-edge product development in so many industries that it is fair to say that the health of the overall innovation environment is based in part on the alignment (or lack of alignment) of patent incentives with private industry behavior. Conversely, sub-optimally aligned incentives can exact more in terms of social costs than benefits from productive industry behavior. These are basic economic concepts and most commentators are in agreement on these points.²⁶

The concept of granting an exclusive patent right to practice an invention in order to encourage innovation has a long, global history, particularly in the Western world, which played a strong role in informing the current system.²⁷ As to why so many nations settled on

23. See *id.* at 120–22 (explaining the nature of information economics and the difficulty of appropriating a return on investment without government intervention).

24. *Id.*; Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 993–96 (1997).

25. Many other options are possible and have, in fact, been used throughout history. See SCOTCHMER, *supra* note 14, at 8–11 (describing the historical use of prizes and patronage to encourage innovation); MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW 14–16 (1998) (describing the use of “colonial privileges” in early U.S. history).

26. See, e.g., NAS REPORT, *supra* note 2, at 35 (reviewing the literature assessing a patent’s ability to act as an innovation incentive or barrier).

27. Evidence of rudimentary patent systems extends back at least as far as Venice in the 1400s, where the government extended “patents of monopoly” to members of the glassblowing guilds to protect their innovative techniques. See Edward C. Walterscheid, *The Early Evolution of the United States Patent Law: Antecedents (Part I)*, 76 J. PAT. & TRADEMARK OFF. SOC’Y 697, 705–09 (1994). The Tyroleans apparently granted similar rights for the superior manufacture of mining equipment, and there may be some connection with the Venetians. JAFFE & LERNER, *supra* note 4, at 7; Harold C. Wegner, *TRIPS Boomerang—Obligations for Domestic Reform*, 29 VAND. J. TRANSNAT’L L. 535, 537 n.8, 538 n.9 (1996). The practice of conveying exclusive rights later spread across the European continent. See Frank D. Prager, *A History of Intellectual Property from 1545 to 1787*, 26 J. PAT. OFF. SOC’Y 711, 715 (1944); ADELMAN ET AL., *supra* note 25, at 11–13 (describing the evolution of the French and English systems as the two major categories of offshoots from the Venetian system). By giving prospective grantees the incentive to seek out ideas that literally would have been otherwise unavailable, development of home industries was thus encouraged. Adam Mossoff, *Rethinking the Development of Patents: An Intellectual History, 1550–1800*, 52 HASTINGS L.J. 1255, 1260–61 (2001). It became particularly well established in English law, the source most influential on the United States, in the form of the Statute of Monopolies. Frank D. Prager, *Historic Background and Foundation of American Patent Law*, 5 AM. J. LEGAL HIST. 309, 314 (1961); Edward C.

the patent right as the method of, to use U.S. terminology, “promot[ing] the Progress of . . . the useful Arts,”²⁸ the answer may boil down to simple economics: Granting exclusive rights is free.²⁹ In other words, excepting the social costs, patents may be the only mechanism for encouraging industrial growth that a new government could employ without spending a penny. This decision is phenomenally important because it transfers the cost of financing innovation to the private sector.³⁰ The system chosen by the United States’ Continental Congress and others evidences two important principles: (1) Industrial progress is facilitated by recognizing new and innovative technologies as opposed to protecting existing businesses,³¹ and (2) a reliable payment or exchange is necessary to motivate an individual to produce these ideas.³²

Unfortunately, a successful rational-comprehensive design does not automatically flow from the above economic precepts. Importantly, one can reasonably disagree on what ends such a system should ultimately achieve. Is it simply an increased number of inventions, or are broader returns required?³³ The distinction is important in terms

Walterscheid, *To Promote the Progress of Science and Useful Arts: The Background and Origin of the Intellectual Property Clause of the United States Constitution*, 2 J. INTELL. PROP. L. 1, 10–12 (1994).

28. U.S. CONST. art. I, § 8, cl. 8.

29. Granting exclusive rights is “free” in the sense that there is no need for public financing. Another way of stating this is that it forces individuals to internalize the costs of innovation. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 294 (2003) (“The standard rationale of patent law is that it is an efficient method of enabling the benefits of research and development to be internalized, thus promoting innovation and technological progress.”).

30. See MERGES ET AL., *supra* note 16, at 130 (“[B]ecause intellectual property legislation has no direct, immediate cost to the government, it seems to many to be a relatively cheap aid to industry.”).

31. JAFFE & LERNER, *supra* note 4, at 8; *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 146–48 (1989) (“In addition to novelty, the 1790 Act required that the invention be ‘sufficiently useful and important’ to merit the 14-year right of exclusion.”).

32. See Edward C. Walterscheid, *Charting a Novel Course: The Creation of the Patent Act of 1790*, 25 AIPLA Q.J. 445, 454 (1997) (noting that the lack of a dependable federal patent right immediately after the ratification of the Constitution was viewed as a defect that negatively impacted innovation). The underlying basis of this exchange is that there will be an underinvestment in risky undertakings without the patent guarantee. See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in *THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS* 609, 610–14 (1962).

33. See, e.g., LANDES & POSNER, *supra* note 29, at 310 (“The most important economic question about the patent system is whether on balance . . . it increases or reduces economic welfare.”). For an excellent review of the most significant findings on the innovation effect in the relevant literature, consider Bronwyn Hall’s recent

of directing patent reform. Before one can revise the current patent regime to foster additional innovation, there must be some agreement on exactly what outcomes are desired. Certainly, the historical underpinnings of the current system provide a starting point, but the continued viability of these goals must be considered in the context of the modern global economy.

B. *Modern Patent System Goals and the Measurement of Success*

The ability to exclude others from making, using, and selling are the fundamental rights reflected in most international patent regimes.³⁴ It is through the use of these rights of exclusion that the patentee can obtain the monopoly profits that create the incentive to invest in innovation,³⁵ a primary goal of the patent system. The right is *ex ante* in nature; it induces behavior before the success of the investment can be determined.³⁶ Perhaps the most important facet of patents as a motivator of inventive activity is the fact that they are treated as a property right under national laws.³⁷ In addition to creating incentives for

work. Bronwyn H. Hall, *Business Method Patents, Innovation, and Policy* 6–11 (Competition Pol’y Ctr., Univ. of Cal., Berkeley, Working Paper No. CPC03-39, 2003) (reviewing both theoretical and empirical literature on the effect of patents on innovation and concluding that it is an exceedingly difficult question to answer).

34. See WORLD INTELLECTUAL PROP. ORG., WIPO INTELLECTUAL PROPERTY HANDBOOK: POLICY, LAW AND USE 17 (2d ed. 2004), available at <http://www.wipo.int/about-ip/en/iprm/pdf/ch2.pdf> [hereinafter WIPO HANDBOOK] (“[The patent owner] is given a statutory right to prevent others from commercially exploiting his invention, which is frequently referred to as a right to exclude others from making, using or selling the invention.”).

35. See, e.g., WILLIAM D. NORDHAUS, INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE 70 (1969) (stating patents create incentives by conferring monopoly power for a limited period of time).

36. See Mark A. Lemley, *Ex Ante versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 148–49 (2004) (arguing that many economic theorists improperly focus on patent rules as a means of controlling already-created innovation, rather than on incentives to produce the innovation).

37. See, e.g., 35 U.S.C. § 261; General Agreement on Tariffs and Trade—Multilateral Trade Negotiations (The Uruguay Round): Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods, Preamble, Dec. 15, 1993, 33 I.L.M. 81, 84 (1994) [hereinafter TRIPs] (stating “intellectual property rights are private rights”). But see generally Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031 (2005) (arguing that, although intellectual property is generally treated as equivalent to tangible property, fundamental differences in the nature of intellectual property suggest that it should not receive such treatment). They can be created, owned, and sold much like tangible items. See 8 DONALD S. CHISUM, CHISUM ON PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY AND INFRINGEMENT § 22.01 (2005) (“Patents are subject to general legal rules on the ownership and transfer of property.”). There is a degree of certainty in patent rights that provides confidence in the investment. COOTER & ULEN, *supra* note 22, at 107–08 (commenting on the nature of private and public goods and why

investment by a prospective inventor, it has been long recognized that the award of government property rights can serve as an innovation support mechanism by bringing information to the public.³⁸ As a result, patent systems have generally adopted rapid and detailed disclosure as a “quid pro quo” for the property grant to enable follow-on inventors to build on the patented invention.³⁹ The original investment is essentially subsidizing future innovation. Importantly, this “grant-back” of information to the public arguably reduces the value of the patent right to an innovator.⁴⁰ Thus, patent rights must be structured to ensure that limited exclusive use can, at least in some instances, outweigh the disincentives of disclosure.

Since the development of modern patent systems, the patent rules in the United States and other nations have continued to evolve to become even more directed as to the specific kind of innovation sought. The most prominent change in this regard is the incorporation of a standard that prohibits the patenting of inventions that, even if novel, are obvious in view of existing knowledge.⁴¹ The reward has also increased over the years in terms of the length of the right of exclusion⁴² and its scope.⁴³ A pattern can be discerned. Such changes

protecting private goods with private property rights encourages efficiency); RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 36–39 (5th ed. 1998) (“The creation of individual (as distinct from collective) ownership rights is a necessary rather than a sufficient condition for the efficient use of resources.”).

38. See, e.g., *Seymour v. Osborne*, 78 U.S. 516, 533 (1870) (“Letters patent are . . . public franchises . . . tending to promote the progress of science and the useful arts, and as matter of compensation to the inventors for their labor, toil, and expense in making the inventions, and reducing the same to practice for the public benefit . . .”).

39. See FTC REPORT, *supra* note 1, ch. 2, at 6–7. This is a common notion in the patent jurisprudence of the Supreme Court. See, e.g., *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 151 (1989) (“In consideration of its disclosure and the consequent benefit to the community, the patent is granted.”).

40. In the context of the requirement to disclose enabling information to obtain a patent, the rule actually functions like an incomplete grant of monopoly over the claimed invention. See LANDES & POSNER, *supra* note 29, at 299 (“The requirement of public disclosure creates a situation of *incomplete appropriability* by the patent holder . . .”).

41. See *Graham v. John Deere Co.*, 383 U.S. 1, 12–17 (1966). In other countries, this concept is known as “inventive step.” Convention on the Grant of European Patents art. 56, Oct. 5, 1973, 1065 U.N.T.S. 254, 273 [hereinafter EPC] (“An invention shall be considered as involving an inventive step if . . . it is not obvious to a person skilled in the art.”); TRIPS, *supra* note 37, at art. 27(1).

42. Since 1995, U.S. law has been in conformity with the international standard patent term of twenty years from the date an application is filed. 35 U.S.C. § 154(a)(2) (2000). The amendments to the Patent Act changed the method of calculating the patent term from seventeen years from issuance of the patent to twenty years from filing of the patent application. *Merck & Co. v. Kessler*, 80 F.3d 1543, 1546 (Fed. Cir. 1996).

represent a systematic push toward the encouragement of a specific type of private sector “invention.”⁴⁴ We seek to reward that which is so groundbreaking, resource-intensive, and fortuitous that only a powerful incentive will bring it into being. In other words, we are looking for inventions that are truly the *result* of the patent system, instead of merely developed alongside of it.⁴⁵ One can refer to this subclass as incentive-aligned inventions (IAI).⁴⁶ Viewed from the converse, one can derive a key measure of patent system success: Does the patent system encourage the creation and dissemination of IAIs—inventions by the private sector that would not have been made in the absence of a property incentive?⁴⁷ The tautological explanation as to why the

43. The firm acceptance of the “doctrine of equivalents”—the rule permitting capture of subject matter broader than the actual claim language—is the primary example. *See, e.g.*, *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 731 (2002) (reaffirming doctrine in U.S. law, stating, “The language in the patent claims may not capture every nuance of the invention or describe with complete precision the range of its novelty.”); EPC, *supra* note 41, at art. 69(1) (“The extent of the protection conferred by a European patent or a European patent application shall be determined by the terms of the claims. Nevertheless, the description and drawings shall be used to interpret the claims.”); *Tsubakimoto Seiko Co. v. THK K.K.*, 52 Minshû 113 (Sup. Ct. Feb. 24, 1998) (affirming the application of the doctrine of equivalents in Japanese patent law). *See also* John R. Thomas, *Litigation Beyond the Technological Frontier: Comparative Approaches to Multinational Patent Enforcement*, 27 L. & POL’Y INT’L BUS. 277, 286–88 (1996).

44. Not all commentators distinguish between invention and innovation, particularly if there is no separate impact on the analysis. *See* Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 107 n.112 (2004) (noting that both are accounted for by the assessment of patent return and trade secret return).

45. Obviously, this is not to say that the requirements of the patent system encourage such innovations exclusively. Even non-obvious inventions could be created in the absence of a property right. *See* JAFFE & LERNER, *supra* note 4, at 8 (stating that the economic logic of patent law is that fewer innovations would be developed without it, but not necessarily no innovations).

46. Although a basic economic concept, incentive alignment in the legal literature is more commonly associated with executive compensation systems or contracting. *See* Christopher R. Drahozal & Keith N. Hylton, *The Economics of Litigation and Arbitration: An Application to Franchise Contracts*, 32 J. LEGAL STUD. 549, 556–57 (2003) (describing incentive alignment devices in franchise contracts). Such systems are *ex ante* in nature, structured to induce beneficial behavior before the outcome is known. The idea is essentially the same in the context of patents, except that inventors are the parties incentivized and society is the beneficiary.

47. *See* FTC REPORT, *supra* note 1, ch. 1, at 9–12 (“[O]ne could ask whether the claimed invention would have emerged in roughly the same time frame ‘but for’ the prospect of a patent.”). Noted judge and scholar Richard Posner has suggested that this question can be merged with the obviousness inquiry: “[I]f a court thinks an invention for which a patent is being sought would have been made as soon or almost as soon as it was made even if there were no patent laws, then it must pronounce the invention obvious and the patent invalid.” *Roberts v. Sears, Roebuck & Co.*, 723 F.2d 1324, 1346 (7th Cir. 1983) (Posner, J., dissenting). To fill out the measure of success,

patent reward should be the impetus behind patent-protected intellectual progress is simple: there is no reason to employ an incentive to induce behavior that would occur in its absence.

Additional support for incentive-aligned goals is derived from the impact of intellectual property costs and benefits. A patent allows its owner to extract monopoly rents for the period of exclusivity.⁴⁸ Although this is not to say that a patent owner necessarily has “monopoly power”—that depends on the market in which the invention competes⁴⁹—he or she does have the ability to exert almost complete control over the availability of that innovation during the patent term.⁵⁰ The public has knowledge of the innovation but cannot make use of it except by permission of the patent owner,⁵¹ who can decide

it is important to consider the fact that there is an alternative to patents that does allow inventors to recoup some investment above competitive levels. Trade secrets can be integrated into the definition of patent system optimality as a baseline; such a system must create incentives for IAs not already induced by trade secret regimes, and to the extent possible, avoid overlap. See LANDES & POSNER, *supra* note 29, at 326–29 (describing three economic justifications for the patent system based on inventor incentives and alternate behavior if only trade secret protections existed); Vincenzo Denicolò & Luigi Alberto Franzoni, *The Contract Theory of Patents*, 23 INT’L REV. L. & ECON. 365 (2004) (analyzing patent economics by considering trade secrets as the alternative).

48. See COOTER & ULEN, *supra* note 22, at 122–23 (“[A] patent enables the inventor of something valuable to earn profits that exceed the ordinary rate of return on investment.”). The concept that monopolies can be more conducive to innovation than competition is often referred to as “Schumpeterian theory,” in reference to the work of Joseph Schumpeter. See Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1038–40 (1989).

49. See Kitch, *supra* note 10, at 1730; COOTER & ULEN, *supra* note 22, at 122; ROBERT L. HARMON, PATENTS AND THE FEDERAL CIRCUIT § 1.4(b), at 21 (4th ed. 1998); *Illinois Tool Works Inc. v. Indep. Ink, Inc.*, 126 S. Ct. 1281, 1293 (2006) (reversing years of Supreme Court precedent in holding that “a patent does not necessarily confer market power upon the patentee.”).

50. For the most part, patents do not have robust fair use provisions (like copyrights) that would allow others to engage in unauthorized use of the patent for non-commercial purposes. See Daniel R. Cahoy, *Oasis or Mirage? Efficient Breach as a Relief to the Burden of Contractual Recapture of Patent or Copyright Limitations*, 17 HARV. J.L. & TECH. 135, 148–49 (2003).

51. In most countries, patent applications must be published eighteen months after filing. See, e.g., Charles R. McManis, *Intellectual Property, Genetic Resources and Traditional Knowledge Protection: Thinking Globally, Acting Locally*, 11 CARDOZO J. INT’L & COMP. L. 547, 565 n.85 (2003). While the U.S. allows applicants to “opt out” of the eighteen-month publication rule under certain limited conditions, see 35 U.S.C. § 122(b)(2) (2000); 37 C.F.R. § 1.138 (2004), only a minority of applicants take advantage of the option. See Robert A. Clarke, *U.S. Continuity Law and its Impact on the Comparative Patenting Rates of the U.S., Japan and the European Patent Office*, 85 J. PAT. & TRADEMARK OFF. SOC’Y 335, 337 (2003) (stating that 73.93%–74.76% of original applications become U.S. patents, as opposed to being abandoned).

in what way it is used or even if it is used.⁵²

The power of a patent owner to control access is acceptable if one can demonstrate the existence of an IAI by arguing that the innovation would not exist but for the efforts the patentee made in anticipation of the property right. In this case, nothing is being removed from the public domain. Such an invention can hardly be inappropriately “held up” if there is no alternative context in which it is more freely available.⁵³ The benefits gained by eventually having such an invention in the public domain offset the costs of temporary monopoly.⁵⁴ This rationale also applies to those innovations that would eventually exist, but are created much sooner due to the property right. Even limited availability during a particular time period is better than none at all.⁵⁵

52. See generally Kurt M. Saunders, *Patent Nonuse and the Role of Public Interest as a Deterrent to Technology Suppression*, 15 HARV. J.L. & TECH. 389 (2002). While this is constraint enough for the specific subject matter of the patent, various commentators have noted that the patent monopoly may have an even stronger effect on follow-on innovation, which requires access to the pioneering invention. See, e.g., Oren Bar-Gill & Gideon Parchomovsky, *A Marketplace for Ideas?*, 84 TEX. L. REV. 395, 409–10 & n.46 (2005) (describing the hold-up problem inherent in granting a patent right in innovation and citing several articles that reflect a similar concern for health of follow-on innovation). The restrictive effects of patenting on follow-on innovation may be partially offset by a patentee’s mandatory disclosure. Even though the invention is locked up for a period of time, the information is available for follow-on innovation. See Suzanne Scotchmer & Jerry Green, *Novelty and Disclosure in Patent Law*, 21 RAND J. ECON. 131, 134–35 (1990) (explaining the social value of disclosure for follow-on innovation). Progress in industries whose products depend on intellectual property from multiple sources may be even more restrained. See James Bessen & Eric Maskin, *Sequential Innovation, Patents, and Imitation* 3 (MIT Dep’t of Econ., Working Paper No. 00-01, 2000) (describing how patents may decrease innovation in industries where innovation is both sequential and complementary), *available at* <http://ssrn.com/abstract=206189>.

53. Another’s innovation cannot reasonably be said to “require” access to a truly innovative technology—*i.e.*, it would not have been created but for the patent incentive—because the fact that it exists at all is a consequence of the patent. On the other hand, incremental innovation that is overproduced and overlapping could lead to a holdup of that technology that results in a “tragedy of the anticommons.” See Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 699 (1998).

54. See Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEGAL STUD. 247, 250–51 (1994) (describing the concept of economic rents and how the contributions of patent-induced R&D can justify them). Of course, there are broader antitrust implications for the way in which a patentee uses his or her patent grant, as there are with any other type of property. Determining the appropriate degree of antitrust scrutiny is no easy task. See Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1821–23 (1984).

55. Here, one could argue that an innovation created earlier, but locked up by the patentee for a time period beyond that which would have allowed the eventual discovery by competitors, is not beneficial.

On the other hand, if a given innovation would have been produced at the same time in the course of normal business operations, the public “deadweight” economic losses may very well exceed the gains.⁵⁶ Despite the fact that the patent owner may personally benefit from the period of exclusivity to develop and market products incorporating the invention, the public suffers from the exploitation in the context of a protected environment that is less efficient than a fully competitive marketplace. A patent owner free from competition may under-invest or over-invest in an invention with respect to its true value in the marketplace.⁵⁷ On the other hand, in an unrestricted environment, other businesses may be able to utilize and further develop the invention⁵⁸ while driving down prices through competition. Without the preference of incentive-aligned behavior, the patent right is more likely to act as a net societal burden.

If the pursuit of IAIs was the only goal of a patent system, accounting for all of the relevant incentive factors would be difficult,⁵⁹ but definable. However, it has been recognized that patent systems provide many other important societal benefits, and some may rival or exceed the attractiveness of IAI creation in certain industries. For example, innovative activity itself may produce several positive spillover effects.⁶⁰ Moreover, it has been noted that patent rights can serve val-

56. See FTC REPORT, *supra* note 1, ch. 2, at 7–8 (“If the promise of patent protection is not necessary [to stimulate invention, disclosure or investment], then the costs—which may include higher prices or retarded follow-on innovation—may cause unjustified injury to consumers.”); Dam, *supra* note 54, at 251 (“[I]f we assume that the innovation were open to all, then all producers would gain the same cost advantage and the economic rent would be competed away; production would rise as cost fell, and in that sense one could say that the patent restricts production and causes a deadweight loss.”).

57. See Arrow, *supra* note 32, at 619 (arguing that there is a reduced incentive to invent under monopolistic conditions as compared to competitive conditions).

58. See FTC REPORT, *supra* note 1, ch. 2, at 9–12 (describing cannibalization and races to innovate as ways in which competition can spur innovation). See also Thomas M. Jorde & David J. Teece, *Innovation and Cooperation: Implications for Competition and Antitrust*, 4 J. ECON. PERSP. 75, 81 (1990).

59. See Part II, *infra*.

60. Robert Hahn summarizes the empirical research on five different questions regarding the effect of patents: (1) innovation, (2) information disclosure, (3) technology transfer, (4) commercial development, and (5) economic growth. Hahn, *supra* note 5, at 14–37. The NAS Report is particularly striking in this regard, listing such diverse possible patent system goals as promoting economic growth, creating jobs, and promoting health. NAS REPORT, *supra* note 2, at 39 (“Ultimately, the test of a patent system is whether it enhances social welfare . . .”). See also Bronwyn H. Hall, *The Private and Social Returns to Research and Development*, in TECHNOLOGY, R&D, AND THE ECONOMY 140, 140–41 (Bruce L.R. Smith & Claude E. Barfield eds., 1996) (summarizing positive spillover effects from innovative activity); Mazzoleni & Nelson, *supra* note 5, at 1033 (reviewing several theories on the purpose of granting

uable market functions. For example, patents can act as a signal to competitors regarding a company's intent to research and market in a particular field.⁶¹ Additionally, patents can serve as negotiation tools and, if necessary, defensive mechanisms against the practices of competitors.⁶² They can also provide some breathing room to fully develop technology and products that would otherwise be pounced upon by free-riders.⁶³ In view of these returns, one could argue that focusing merely on the creation of a narrow type of incentive-aligned invention is too limited.

Moreover, employing overly powerful incentives can be detrimental. At some point, the incentive for one invention may bleed over and become a disincentive for another.⁶⁴ Because it is extremely difficult (if not impossible) to design a patent system that only rewards the inventions made specifically in view of the patent,⁶⁵ some broader category of inventions will necessarily be protected. This is acceptable if minimized,⁶⁶ but it makes the identification of specific goals (initial or downstream invention) that much more difficult.

This diversity of patent system goals creates a significant barrier to rational-comprehensive reform efforts. Fundamentally, it may be impossible to create incentives to satisfy all interested parties. Maximizing one goal, like disclosure, may axiomatically reduce the ability of a system to contribute to another, like exclusivity.⁶⁷ This confusion

patents); *Aronson v. Quick Point Pencil Co.*, 440 U.S. 257, 262 (1979) ("First, patent law seeks to foster and reward invention; second, it promotes disclosure of inventions to stimulate further innovation and to permit the public to practice the invention once the patent expires; third, the stringent requirements for patent protection seek to assure that ideas in the public domain remain there for the free use of the public.").

61. See generally Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625 (2002).

62. See Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101, 104 (2001).

63. See Kitch, *supra* note 19, at 266. But see John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 483-85 (2004) (arguing that unchallenged development of patented innovation does not completely underlie patent policy, because rivalries are as important after the grant as before).

64. See Part II.A, *infra*.

65. See, e.g., FTC REPORT, *supra* note 1, ch. 1, at 10-11 (expressing the difficulty of using patent-induced innovation as a patentability criteria, stating that "It is not usually possible, however, to use a 'but for' approach to analyze whether individual patents should be granted.").

66. See, e.g., Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CAL. L. REV. 803, 874-76 (1988) (arguing that the patent system must not employ patentability tests that compromise its primary goal: to identify and reward "significant technical advance").

67. For example, a patent right with more disclosure may transfer information that could otherwise be advantageously retained in secret. See, e.g., Strandburg, *supra* note 44, at 110-11 (discussing the trade off between exclusivity and disclosure). One

has factored heavily into the inability of empirical analysts to determine whether patent systems are beneficial overall.

*C. Evidence of Patent System Success Through
Invention Promotion*

To simplify the analysis, one could focus on IAI creation as the most important goal and assess patent system success accordingly on the assumption that this measure can at least be quantified. Surprisingly, the available data are decidedly ambiguous on this point. Taken together, the academic literature provides a weak indication that modern patent systems may induce the creation of IAIs, but in an amount less than most presume (and perhaps less than what is possible or optimal).

Logically, if one wished to quantify the incentive effect of patents, one would investigate the motivations of patentees. The most direct way to do this is to survey patent owners. To date, several surveys have addressed the specific question of whether the companies involved actually undertake a higher level of innovative behavior in response to patents. In 1986, Edwin Mansfield surveyed one hundred firms in twelve distinct industries and found only a weak dependency on patents.⁶⁸ According to the survey, four of the twelve industries reported no effect.⁶⁹ Even for those that did report an effect, more than eighty percent of the inventions introduced during a three-year period would have existed even if patent protection was unavailable (except in the pharmaceutical and chemical industries).⁷⁰ More recently, Iain Cockburn and Rebecca Henderson conducted a survey on behalf of the Intellectual Property Owners Association (IPO) on respondent attitudes and opinions about their IP practice.⁷¹ Among the results was the indication that losing the protection afforded by the patent system would “strongly affect” or “affect” the R&D spending of fifty-six percent of the respondents, while forty-one

may be more likely to favor the use of the patent system to the extent that one can maintain some level of secrecy and still meet the disclosure requirements.

68. See Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 *MGMT. SCI.* 173, 174–75 (1986).

69. *Id.* at 175 tbl.1.

70. *Id.*

71. See IAIN M. COCKBURN & REBECCA HENDERSON, *SURVEY RESULTS FROM THE 2003 INTELLECTUAL PROPERTY OWNERS ASSOCIATION SURVEY ON STRATEGIC MANAGEMENT OF INTELLECTUAL PROPERTY (2003)* (on file with the New York University Journal of Legislation and Public Policy).

percent indicated spending would not be affected.⁷² These results are in line with another set of studies indicating that companies rarely regard patents as the most important means of protecting innovation.⁷³ While this body of work does not suggest that patents are ineffective as IAI creation mechanisms, it provides some evidence that the patent system does not benefit all industries equally. Of course, the survey data is not conclusive on this point.⁷⁴

Given the difficulties in accurately assessing the motivations for existing patents, the majority of studies simply look for evidence of the effects of intellectual property protection on innovation proxies. Perhaps the most widely used measure of innovation in this context is R&D spending at the firm, industry, or country level.⁷⁵ It is particularly useful as a gauge of change over time. Interestingly, for the most part, studies of the effect of patents on R&D spending have demonstrated a weak effect at best. An example of one of the more intriguing works in this area is Walter Park and Juan Carlos Ginarte's 1997

72. *Id.* at C.4. In response to the question, "My company would spend significantly less on R&D and technology development without patents," thirty-two percent of the respondents "strongly agreed" and twenty-four percent "agreed." *Id.*

73. See, e.g., Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 793–98 (1987) (indicating that, apart from a few industries such as chemicals, most businesses do not rate patents as highly important in protecting investments); Wesley M. Cohen et al., *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)* 25–27 (Nat'l Bureau of Econ. Research Working Paper No. 7552, 2000), available at <http://www.nber.org/papers/w7552.pdf> (demonstrating that there are various reasons companies patent other than to protect investments).

74. There is the danger that respondents are providing the answers they believe (or want to believe) are accurate, but are actually different from the corporation's actions. For example, with the Cockburn and Henderson study, it is probably fair to say that, in most firms, corporate counsel do not make decisions on how or whether to spend funds on R&D. Conversely, one might expect lawyers to have an ingrained respect for the power of legal protections. Thus, it is plausible that the results are skewed toward finding patents important. Additionally, there is a well-characterized phenomenon known as "hypothetical bias," in which persons tend to provide hypothetical responses that differ from real-life actions simply because there are no consequences. See Ronald C. Dillehay & Michael T. Nietzel, *Constructing a Science of Jury Behavior*, in 1 REVIEW OF PERSONALITY AND SOCIAL PSYCHOLOGY 246, 253–54 (Ladd Wheeler ed., 1980) (discussing the problem in the context of jury and judge simulations). See also Vernon L. Smith, *Experimental Economics: Induced Value Theory*, 66 AM. ECON. REV. 274, 274–75 (1976) (noting that characteristics of real-world behavior such as self-interest motivation and subjective transaction costs inevitably occur in the experimental setting). Additionally, it is difficult to quantitatively assess whether the innovation component of R&D spending is optimally encouraged by the patent system.

75. See Hahn, *supra* note 5, at 3 (reviewing several measures of innovation in the literature: "Most commonly, research and development expenditures (R&D) are used as a proxy [for innovation].").

study to determine the link between patent “strength” and R&D investment using data from over sixty countries from 1960 to 1990.⁷⁶ They found a positive association, but only in countries with the highest median incomes, suggesting that other factors must work in concert with legal rights.⁷⁷ On the other hand, a 2002 study by Josh Lerner, using primarily nineteenth century data, found that instituting a patent system or strengthening an existing patent system did not produce more domestic innovation.⁷⁸ Similarly, Petra Moser, using evidence of innovations from nineteenth century world’s fairs, also finds scant proof that increasing patent rights leads to increasingly innovative behavior.⁷⁹ An interesting reverse perspective is provided in a recent paper by Ashish Arora et al., wherein the authors attempt to actually gauge the premium effect of obtaining intellectual property (*i.e.*, procuring patents) on the value of an innovation and then analyze the effect on R&D spending if that premium is changed.⁸⁰ The authors did find a positive impact, but it was quite small in all but a few industries like pharmaceuticals.⁸¹ Taken as a whole, these empirical studies seem to indicate that patent systems are not tremendously important. But the data is limited in its sensitivity,⁸² and the measures of success are narrow and somewhat arbitrary.

76. Walter G. Park and Juan Carlos Ginarte, *Intellectual Property Rights and Economic Growth*, CONTEMP. ECON. POL’Y, July 1997, at 51.

77. *Id.* at 60 (“The results also show that, while R&D is an important determinant of developed and developing country growth rates, IPRs [intellectual property regimes] matter for the R&D activities of the developed economies but not for those of the less developed economies.”).

78. Josh Lerner, *Patent Protection and Innovation Over 150 Years* 27, (Nat’l Bureau of Econ. Research Working Paper No. 8977, 2002), available at <http://www.nber.org/papers/w8977.pdf> (“Adjusting for the change in overall patenting, the impact of patent protection-enhancing shifts on applications by residents was actually negative . . .”).

79. Petra Moser, *How Do Patent Laws Influence Innovation? Evidence From Nineteenth-Century World Fairs* 38–39 (Nat’l Bureau of Econ. Research Working Paper No. w9909, 2003), available at <http://www.nber.org/papers/w9909.pdf>.

80. Ashish Arora et al., *R&D and the Patent Premium* 1–2 (Nat’l Bureau of Econ. Research Working Paper No. 9431, 2003), available at <http://www.nber.org/papers/w9431.pdf>.

81. *Id.* at 35 (“We find that on average patents provide a positive (greater than unity) expected premium gross of patent application costs in only a few industries, namely drugs, biotech and medical instruments, with machinery, computers, and industrial chemicals close behind.”).

82. The greatest problem with using R&D spending as a proxy for innovation is that R&D is a very broad category of firm expense; it is simply too insensitive a measure from which to extrapolate the quantity of incentive-based inventions. Investment in research that may produce pioneering innovation is but one of a number of types of spending companies may group under the umbrella of R&D in making public reports of expenditures, and it is by no means necessarily the largest. See ACCOUNTING FOR RESEARCH AND DEV. COSTS, Statement of Fin. Accounting Standards No. 2, ¶

In an attempt to focus only on innovative behavior, a few studies have attempted to gauge the production of a specific type of output over time, such as the number of patents obtained at the industry or firm level.⁸³ Although there are severe limitations to the most basic form of this analysis that may confuse the results,⁸⁴ a more refined study that differentiates patents by “impact” or “importance” is informative.⁸⁵ Such weighted patent counts can be related to IAI activity if one assumes that the most important patents correlate with the riskiest and most groundbreaking inventions, which would therefore be undertaken only pursuant to a significant incentive. Additionally, using indicators farther downstream than patents provides an even more sensitive output analysis; these indicators can serve as IAI proxies if the production of the associated inventions is deemed suffi-

8 (Fin. Accounting Standards Bd. 1974) (defining “research and development” for accounting purposes, which is the basis for the “R&D” designation in much of the empirical research data). Thus, such studies may not address whether the patent system is productive according to the criteria established above.

83. See, e.g., Zvi Griliches, *Patent Statistics as Economic Indicators: A Survey*, 28 J. ECON. LIT. 1661, 1701–02 (1990) (“In spite of all of the difficulties, patent statistics remain a unique source for the analysis of the process of technical change.”); Jean O. Lanjouw & Mark Schankerman, *Patent Quality and Research Productivity: Measuring Innovation with Multiple Indicators*, 114 ECON. J. 441, 441–43 (2004).

84. Most importantly, all patents are not equivalently valuable. See, e.g., John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 460–65 (2004) (arguing that inventions have a determinate value that is known by companies during the process of patent prosecution, and such companies modify prosecution techniques accordingly). Additionally, the absolute number of patents can be the product of patent strategy. See LANDES & POSNER, *supra* note 29, at 326–29.

85. Studies have recognized that some patents are more valuable than others, and have come up with different methods of determining value. See, e.g., Allison, *supra* note 84, at 439–43 (equating the fact that a patent is litigated to the notion that it is valuable); Mark Schankerman & Ariel Pakes, *Estimates of the Value of Patent Rights in European Countries During the Post-1950 Period*, 96 ECON. J. 1052 (1986) (weighing patent value by analyzing renewal data); Manuel Trajtenberg, *A Penny for Your Quotes: Patent Citations and the Value of Innovation*, 21 RAND J. ECON. 172 (1990) (discussing the correlation between social gains from innovations and heavily cited patents). The Organization for Economic Cooperation and Development’s (OECD) Patent Project, which is conducted by the U.S. National Science Foundation (NSF), the World Intellectual Property Organization (WIPO), the European Union, and the patent offices of the U.S., Japan, and the EU, has its own approach. See ORG. FOR ECON. COOPERATION AND DEV., COMPENDIUM OF PATENT STATISTICS (2005) [hereinafter OECD PATENT STAT.], available at <http://www.oecd.org/dataoecd/60/24/8208325.pdf> (using a “triadic” system that recognizes inventions that are covered by patents in the United States, Europe, and Japan over a given time period). Handling a more complicated set of data, CHI Research Inc.’s annual Patent Scorecard presents yet another method of computing patent value. The Scorecard compiles a “technological strength” rating for 150 companies by multiplying the number of patents in a particular time period by the average number of citations the company’s last five year’s worth of patents receives in the current year. See, e.g., *The TR Patent Scorecard 2002*, TECH. REV., May 2002, at 75.

ciently groundbreaking. This is particularly valuable in the context of areas in which such indicators are routinely tracked, such as health care innovation.⁸⁶ Unfortunately, there is a lack of in-depth investigation in the literature into whether alterations in patent incentives are correlated to changes in these measures. Thus, current studies provide less than conclusive answers about the vitality of the innovation environment.

Is the ambiguity of the data simply a consequence of limited empirical study, or is something else acting as a barrier to our understanding? Perhaps there is a level of complexity to even basic invention production that precludes rational analysis. In fact, it appears that such a barrier does indeed exist. There is no comprehensive theoretical or empirical understanding of the entirety of the incentive factors that impact patent owners, particularly with regard to their interrelationships and the magnitude of each in relation to the others. We simply lack a solid understanding of what influences IAI creation. And when combined with the desire for other beneficial patent spillover effects, optimizing the system becomes an exercise in futility. Going forward, it will be impossible to know the effect of revisions of the incentive structure. This is the linchpin in the case against a rational-comprehensive approach.

To highlight the problem in the context of the deceptively simple case of IAI creation, one can engage in a thought experiment to imag-

86. For example, assessments of the pharmaceutical industry often take into account the number of “new chemical entities” (NCE) or “new molecular entities” (NME) submitted for regulatory approval or approved that were produced by a given company or country during a particular time period. See Joseph A. DiMasi et al., *The Price of Innovation: New Estimates of Drug Development Costs*, 22 J. HEALTH ECON. 151, 154 (2003) (arguing that R&D costs are increasing by calculating adjusted cost per new chemical entity approved over time). New Active Substances (NAS) are also used in a similar fashion. Irene Buggle, *Low NAS Numbers Highlight the Need for New R&D Tactics*, IMS HEALTH, Mar. 23, 2004, http://www.ims-global.com/insight/news_story/0403/news_story_040323a.htm (“The trend is still on the decline for first launches of NASs, according to IMS LifeCycle New Product Focus’ annual review, which shows only 30 NASs in 2003, versus 36 in 2002. This marks an all-time low since IMS started monitoring NASs in the early 1970s, and the lowest in 25 years since the 32 drugs launched in 1979.”). Similarly, a greater number of primary regulatory approval submissions—such as new drug applications (NDA) or priority NDAs, (as opposed to supplemental or abbreviated applications)—may reflect a greater emphasis on pioneering discoveries. For example, the FDA reports separately approvals of priority NDAs due to their indication of important medical breakthroughs. See CTR. FOR DRUG EVALUATION AND RESEARCH, DEP’T OF HEALTH AND HUMAN SERVS., REPORT TO THE NATION: IMPROVING PUBLIC HEALTH THROUGH HUMAN DRUGS 13 (2003), available at <http://www.fda.gov/cder/reports/rtn/2003/rtn2003.pdf> [hereinafter CDER REPORT] (“These drugs represent significant improvements compared with marketed products.”).

ine all of the relevant factors. In the next section, this article undertakes such an analysis by attempting to comprehensively describe the full scope of patent incentives. In doing so, it provides a unique landscape that suggests a broad and varied array of influences operating on every prospective inventor. It demonstrates the extreme complexity of even the most straightforward economic model of patent rights, and why effective revision cannot presently occur.

II.

BARRIERS TO RATIONALITY IN THE CONSTRUCTION AND OPERATION OF PATENT INCENTIVES

The inability to reasonably address all the components of a complex system of incentives has been referred to extensively in policy design theory.⁸⁷ Pure rational decision making requires complete information, which is often impossible in highly complex systems,⁸⁸ leading to a kind of “bounded rationality.”⁸⁹ In such systems, rational policy making is impossible, and implementing ill-informed rules may cause more damage than maintaining the status quo.⁹⁰

Patent system design fits the definition of bounded rationality. To fully characterize patents, a survey of all aspects of the rights that create incentives is required, and these aspects must then be addressed as basic elements or factors. At the very least, such an analysis requires a discussion of the traditional legal boundaries of the right. It also must contain an examination of the governmental and societal institutions that affect property rights. Finally, it must account for the effect of cultural values regarding property on the patent incentive. Each of these aspects is discussed in detail below in the context of the goal of creating IAI. Although most of these broad categories of po-

87. See Diver, *supra* note 17, at 396–97; Edward J. Woodhouse & David Collingridge, *Incrementalism, Intelligent Trial-and-Error, and the Future of Political Decision Theory*, in *AN HERETICAL HEIR OF THE ENLIGHTENMENT* 131 (Harry Redner ed., 1993).

88. See Diver, *supra* note 17, at 396 (suggesting that comprehensive rationality may be impossible to attain, due to the difficulties inherent in comparing alternatives with each other).

89. Herbert Simon, one of the most prominent of the early theorists in methods societies use to address administrative complexity, originated the theory of “bounded rationality,” which describes the simplifications societies make to attempt rational decision making when the complexity is overwhelming. See Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q.J. ECON. 99, 103–10 (1955).

90. See Charles E. Lindblom, *Still Muddling, Not Yet Through*, 39 PUB. ADMIN. REV. 517, 518 (1979) (“[A]nalysts who think in the older conventional way about problem solving pretend to [engage in fully rational decision making]; but knowing no way to approximate it, they fall into worse patterns of analysis and decision than those who [acknowledge the limitations].”).

tential factors affect all technologies equally, some have greater industry-specific impact. Through such a detailed analysis, it becomes clear that the vast complexity of even the most basic economic rationale for patents is too much to fully address through legislation.

A. *Legal Attributes of Patent Property*

The fundamental nature of a property right is derived from its legal boundaries. In the context of patents, that defining structure creates the core incentives. An understanding of the legal attributes is therefore a logical starting point to categorizing patent incentives. To determine the extent to which patent legal rights are optimal for motivation of IAI creation, the individual aspects of the right must be considered in terms of their specific goals. These aspects can be broadly categorized as “availability” and “extent.”

1. *Availability of Patents is Related to Invention Activity*

The availability of patent coverage is generally accepted as a positive force for innovation. The more encompassing patent laws are with respect to patentable subject matter, the better. United States patent laws in particular have been read quite broadly in this regard. In one of the more expansive declarations of this concept, the U.S. Supreme Court in *Diamond v. Chakrabarty* declared that Congress intended patentable subject matter to be “anything under the sun that is made by man.”⁹¹ Thus, patents have gradually expanded from their traditional roots in the mechanical arts⁹² and now impact almost every field of technology from computers to biotechnology.⁹³

The rationale for making patent protection available to all fields of technology is reasonable, given certain assumptions. For the most part, it is believed that if an industry sector is important to society, it is equally important to provide incentives for investment in new discov-

91. 447 U.S. 303, 309 (1980) (interpreting the Committee Reports accompanying the Patent Act of 1952, the last major revision of U.S. patent law). The Court recently declined an opportunity to revisit the parameters of patentable subject matter when it dismissed the writ of certiorari issued for a case questioning the patentability of a method for diagnosing vitamin deficiencies as “improvidently granted.” *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2921 (2006).

92. See John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1139 (1999) (describing the expansion of patentable subject matter from the tools of the industrial revolution to the almost limitless categories permitted today).

93. See Rebecca S. Eisenberg, *Analyze This: A Law and Economics Agenda for the Patent System*, 53 VAND. L. REV. 2081, 2083–84 (2000) (stating that “[a] much-noted dimension of the apparent expansion of the patent system in recent years has been the range of patent-eligible subject matter” and recounting several fields into which it has expanded).

eries in that sector. If patents have the potential to create incentives for non-obvious and useful inventions that would not otherwise exist, every industry art should benefit. This is obviously dependent on the ability of other aspects of the patent right and the environment in which it exists to create the incentives (discussed below). Assuming patents create incentives that result in additional invention and that they contribute equally in all fields, the relationship should be straightforward and linear. IAI creation increases directly as the scope of subject matter increases. Within a particular technology field, the effect should be binary.

However, there are reasons to expect differences in the availability of patent coverage in certain contexts, and depending on the market, it may not have a significant impact on overall innovation incentives. For example, disputes often arise when a new area of patentability is recognized.⁹⁴ Indeed, a few areas are so controversial that they are patentable in only some countries.⁹⁵ While this fear of embracing new technology appears inconsistent with the underlying ideals of the patent system,⁹⁶ most such disagreements are the result of the concern in some countries that an endemic failure of the patent system's invention incentive structure permeates the narrow technology niche in question. The most common failures are in either the invention identification framework or the desirability of the reward.

Invention identification failures occur if a patent system cannot parse true invention—new, nonobvious/inventive step, and useful—from common business activity. If patents are allowed for the latter, there is no incentive to invest greater effort and resources in producing

94. Although the patenting of business methods is the most prominent recent example of controversy over the expansion of patentable subject matter, there have been others throughout history. See, e.g., Nancy Gallini & Suzanne Scotchmer, *Intellectual Property: When is It the Best Incentive System?*, in 2 INNOVATION POLICY AND THE ECONOMY 51, 51–52 (Adam B. Jaffe et al. eds., 2002) (“[C]ontroversies have swirled around every new technology in the twentieth century.”). Examples include purified chemical compounds, mathematical algorithms, and DNA fragments. See *id.*

95. The patenting of higher life forms is an example of one such controversy. While the USPTO and the EPO allowed a patent to issue some years ago on a genetically modified mouse that was predisposed to cancerous tumors, the Canadian Supreme Court recently rejected an analogous application from the same inventors. See *Harvard Coll. v. Canada* (Commissioner of Patents), [2002] SCC 76, 219 D.L.R. (4th) 577; Margo A. Bagley, *Patent First, Ask Questions Later: Morality and Biotechnology in Patent Law*, 45 WM. & MARY L. REV. 469, 519–30 (2003) (describing the highly contested approaches to determining the patentability of higher life forms).

96. See NAS REPORT, *supra* note 2, at 84 (“Historically, there has been strong resistance to a differentiated patent system and to subject matter exclusions and fairly consistent adherence to a relatively open-ended unitary system.”).

the former. The problem arises because the system's ability to differentiate in this manner may not be equivalent across technologies.⁹⁷

Similar failures may occur when the reward for patenting is insufficient to increase the level of invention above the base that would exist in the absence of the system. The benefit of patenting is the limited monopoly over the invention, and although all technologies receive the same property powers under a unitary system, market dynamics may render the powers effectively useless or of little value.⁹⁸ When additional years of patent protection will end up covering an obsolete product, businesses may not increase investment in innovative R&D in response to patent incentives.⁹⁹ Additionally, when existing rights—even intellectual property rights—provide sufficient

97. For example, the initial assessment by a competent patent office staff may be compromised when a technology is so new that few, if any, examiners have the background to find and apply the prior art. See, e.g., John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. ILL. L. REV. 305, 316–21 (2001) (describing among the many failures that can occur in a patent examination system under time and monetary stress: “Overreliance upon patents as indicia of the state of the art works far more mischief in fields long believed to be outside the patent system, however.”). Additionally, in new fields, the prior art necessary for proving a lack of novelty or obviousness may exist only in nontraditional sources like trade magazines. See, e.g., Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 589–91 (1999) (noting the problem of locating prior art for a non-traditional field like business methods, and suggesting that it contributes to poor patent quality). It could even be argued that some new fields are not sufficiently grounded as to demonstrate the application of an idea as opposed to the idea itself. Exactly such arguments were made with respect to business methods following the decision in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* confirming that they were patentable under U.S. law. 149 F.3d 1368, 1375 (Fed. Cir. 1998) (“Since the 1952 Patent Act, business methods have been, and should have been, subject to the same legal requirements for patentability as applied to any other process or method.”).

98. One instance in which this is alleged to occur is when technology changes so quickly that the exclusivity a patent adds to that achieved by simply being first to market is negligible. See, e.g., Hall & Ziedonis, *supra* note 62, at 102 (describing the use of patents in the semiconductor industry and stating, “Driven by a rapid pace of technological change and short product life cycles, semiconductor firms tend to rely more heavily on lead time, secrecy, and manufacturing or design capabilities than patents to recoup investments in R&D.”); Mark Schankerman, *How Valuable is Patent Protection?: Estimates by Technology Field*, 29 RAND J. ECON. 77 (1998) (analyzing the variation in value of patent rights across the pharmaceutical, chemical, mechanical, and electronic industries).

99. For example, Hall & Ziedonis demonstrate that the number of patents issued to companies in the semiconductor industry increased at a much higher rate than increases in R&D spending. Hall & Ziedonis, *supra* note 62, at 102. This suggests that patenting behavior in this industry became less connected with innovation spending. See also FTC Report, *supra* note 1, ch. 3, at 55–56 (“Panelists consistently stated that competition [as opposed to intellectual property rights] drives innovation in [the software and Internet] industries.”).

protection without patents, no benefit is obtained by broadening patentable subject matter.¹⁰⁰

2. *The Extent of Patent Rights Must Be Circumscribed to Promote Invention Creation*

The majority of legal rules that create innovation incentives address the boundaries of the property right. They produce a multi-dimensional picture of the property that declares to competitors exactly what is covered and how the right can be enforced. At base, the boundary rules are directed toward capturing every bit of a patentee's true invention, while ensuring that knowledge outside of it is not improperly drawn into the monopoly. This compels a balance on the power that should be conveyed to create incentives; stronger patents are not always better.

Four incentive factors make up the key components of patent boundaries: (1) the scope or breadth a patentee will be permitted to claim; (2) the type of activities over which the patentee will be able to assert the patent right; (3) the time period over which the patentee can claim the right; and (4) the amount of disclosure required to obtain a patent right. To determine how these factors feed back into IAI creation, the prospective inventor's incentives *before* the investment has begun must be examined. What guarantees are required to solicit investment in inventions that would not be made absent the possibility of a future patent? Additionally, what patent grants to competitors would prevent this investment? Each factor must be addressed separately in view of the manner in which it provides protection and restricts competition.

100. Some would argue that the computer software industry provides such an example, as the benefits from copyright, trade secret, and contract law give equivalent or superior powers to the patent grant. See FTC REPORT, *supra* note 1, ch. 3, at 46 ("Some commentators questioned whether it was necessary to have patent protection on software given the availability of copyright."). This was actually the position taken by a presidential commission studying the issue in the United States as far back as the 1960s. See PRESIDENT'S COMM'N ON THE PATENT SYSTEM, "TO PROMOTE THE PROGRESS OF . . . THE USEFUL ARTS": IN AN AGE OF EXPLODING TECHNOLOGY 13, *reprinted* in S. DOC. NO. 90-5, at 21 (1967). See also NAT'L COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT 1 (1978). Whether copyright protection should be extended as far as it has to software source code is an open question, and some courts appear to be reconsidering the issue based on software's ultimately utilitarian function. See LEXMARK INT'L, INC. v. STATIC CONTROL COMPONENTS, INC., 387 F.3d 522, 535-36 (6th Cir. 2004) (holding merger of idea and expression of software "lock-out" codes precluded copyright protection).

a) *Claim Scope and the Invention*

In theory, designing a set of rules to ensure that a patent incentive is linked directly to the patentee's true invention is simple and straightforward. It requires a mechanism for assessing the existing prior art—including existing patents—to determine if the invention is novel.¹⁰¹ Even if an invention has not been specifically described, but can be clearly intuited from a variation on or combination of the existing “prior art,” it can be fairly said to be in the public domain. A method for excluding such material from patent protection is also therefore necessary, and this takes the form of the “nonobviousness”¹⁰² or “inventive step” requirement.¹⁰³ The application of novelty and nonobviousness is bi-directional. It is rearward looking in that it will prevent a patentee from obtaining a patent if he or she cannot meet this threshold,¹⁰⁴ and it is forward looking in that it will prevent an issued patent from being interpreted to cover a competitor's article or act that would fall within these preclusions (either invalidating the patent¹⁰⁵ or narrowing the construction of the claims¹⁰⁶).

In addition to avoiding the prior art, the extent to which a patent system encourages an applicant to achieve reduction to practice is an important part of the incentive. A line is drawn between the amount

101. For example, in the United States, a complex series of novelty bars prevent certain types of inventions from being patented if they were created by others or known to the general public. See 35 U.S.C. § 102 (2000).

102. See 35 U.S.C. § 103 (2000).

103. The phrase “inventive step” as used in Europe and Japan is equivalent to the U.S. “nonobviousness” requirement. See EPC, *supra* note 41, at art. 56. (“An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art.”); David J. Abraham, *Shinpo-Sei: Japanese Inventive Step Meets U.S. Non-Obviousness*, 77 J. PAT. & TRADEMARK OFF. SOC'Y 528, 529–30 (1995).

104. See *Merges*, *supra* note 66, at 811–12 (“[The nonobviousness] requirement asks whether an invention is a big enough technical advance; even if an invention is new and useful, it will still not merit a patent if it represents merely a trivial step forward in the art.”).

105. See, e.g., *IRON GRIP BARBELL CO. v. USA SPORTS, INC.*, 392 F.3d 1317, 1322–23 (Fed. Cir. 2004) (affirming district court's determination in the context of a patent infringement litigation that asserted claims of a patent for barbell weight plate with handles were obvious in view of the prior art).

106. The Federal Circuit has been clear in stating that patent claims are to be construed to preserve their validity, if possible. See, e.g., *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed. Cir. 1984). While this does not mean that claims can be rewritten by courts, they can be subject to a reasonable, narrow interpretation if the claim would otherwise be obvious. See, e.g., *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 767 (Fed. Cir. 1988) (“The more narrowly a claim is construed, the more likely the claim may be upheld in light of the prior art.”).

of information sufficient to demonstrate that the invention is more than a vague idea, and that rising to the level of evidence of actual commercialization.¹⁰⁷ It is primarily achieved through a requirement that a patentee “enable” those of ordinary skill in the relevant art to practice the invention without undue experimentation.¹⁰⁸ In the United States, one is also obligated to provide a “written description” sufficient to demonstrate that the patentee has possession of the invention at the time the application is filed.¹⁰⁹ In most cases, enablement probably subsumes written description,¹¹⁰ but U.S. courts continue to see a distinction.¹¹¹

The patent that emerges from this system should reflect successful inventive effort. There is an effective prohibition on capturing existing public knowledge and precluding future invention, while providing a reward for the full extent of the invention. It is, of course, a balance that has negative effects if either side of the scale is too “strong.”

107. See ADELMAN, *supra* note 25, at 83 (“A patent can only issue if an invention achieves a tangible, practical result.”); POSNER, *supra* note 37, at 44 (“If granted too early—before the inventor actually knows how to make the product or process embodying the invention—a patent may actually retard innovation . . .”). This is not to say that inventions should be fully marketable when a patent application is filed, but the inventor should have an understanding of the practical application and be able to express it to others of ordinary skill in the art.

108. See 35 U.S.C. § 112 (2000); Lindemann Maschinenfabrik v. American Hoist & Derrick Co., 730 F.2d 1452, 1463 (Fed. Cir. 1984) (finding patent not invalid for non-enablement because undue experimentation was not required to practice the claimed invention). See also EUROPEAN PATENT OFFICE, GUIDELINES FOR EXAMINATION, pt. C, ch. IV, § 5.2 (2005), available at http://www.european-patent-office.org/legal/gui_lines/e/c_iv_5_2.htm [hereinafter EPO GUIDELINES] (stating the enablement requirement under the EPO convention); JAPAN PATENT OFFICE, EXAMINATION GUIDELINES FOR PATENT AND UTILITY MODEL IN JAPAN, pt. I, at 18–19 (2000) available at http://www.jpo.go.jp/quick_e/index_tokkyo.htm [hereinafter JPO GUIDELINES] (describing enablement requirement under Japanese Patent Law Section 36(4)).

109. See 35 U.S.C. § 112 (2000) (“The specification shall contain a written description of the invention, and of the manner and process of making and using it . . .”). The requirement compels a patent applicant to demonstrate that he or she was “in possession of the . . . claimed invention, including all of the elements and limitations.” Hyatt v. Boone, 146 F.3d 1348, 1353 (Fed. Cir. 1998).

110. In other words, how can you teach those of ordinary skill in the art an invention without being in possession of it? This hypothetical scenario probably occurs very rarely, if ever. See Univ. of Rochester v. G.D. Searle & Co., 375 F.3d 1303, 1312 (Fed. Cir. 2004), *cert. denied*, 543 U.S. 1015 (2004) (Rader, J. dissenting) (“If everyone of ordinary skill in the art knows from the disclosure how to make and use [a subsequent innovation], the exceptionally talented inventor will also.”).

111. See Univ. Of Rochester v. G.D. Searle & Co., Inc., 358 F.3d 916, 922 (Fed. Cir. 2004) (“In addition, and most significantly, our precedent clearly recognizes a separate written description requirement.”) (citing *In re Ruschig*, 379 F.2d 990 (C.C.P.A. 1967)).

Whether the rules should give preference to early, pioneering inventions is a question that has been raised from time to time.¹¹² It has been suggested that society should reward the successful “prospect-ing” of inventions with a scope of patent rights that exceeds the protection needed to simply recoup investment.¹¹³ A counter to this notion is the fact that it is exactly these groundbreaking inventions that set the stage for most follow-on inventions, much of it produced by parties other than the pioneering inventor.¹¹⁴ Allowing a super-potent pioneering right may eliminate some of this early innovation which can serve an important role in downstream innovation.¹¹⁵ While the latter position could be argued to be relevant only in fields that have a significant amount of follow-on innovation,¹¹⁶ it seems equally reasonable to presume that a larger reward would have no incentive effect in those industries in which follow-on innovation does not compete for market share.

b) Patent Rights and the Ability to Control Commercial Uses

The commercial uses of (or proposals to use) the inventions that are covered by the patent right are an essential aspect of the incentive structure.¹¹⁷ Commercial control gives a patentee effective power

112. See Duffy, *supra* note 63, at 440–41 (discussing Edmund Kitch’s prospect theory which would provide substantial power for early-stage innovation and noting that it has become “a standard part of the law-and-economics literature on patent law”). In addition to encouraging innovation, broad rights before substantial commercial investment has been made can provide greater economic efficiency. See POSNER, *supra* note 37, at 44 (“Patents are granted early—before an invention has been carried to the point of commercial feasibility—in order to head off costly duplication of expensive development work.”).

113. See Kitch, *supra* note 19, at 266–68.

114. See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 871–78 (1990) (“Yet we have little faith in the imagination and willingness of a ‘prospect’ holder to develop that prospect as energetically or creatively as she would when engaged in competition.”).

115. *Id.*; Lemley, *supra* note 24, at 1048–52 (“The problem with handing out property rights in advance of invention is the same problem with Kitch’s prospect theory—it is unrealistic to expect that property owners will be uniquely good at identifying potential future inventors or improvers.”).

116. See Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1620–24 (2003) (arguing that areas such as software, which are characterized by incremental change and depend on constant innovation and interoperability, require a system of many narrow patents); Eisenberg, *supra* note 48, at 1066–69 (suggesting that the ideal degree of coordination and control between innovators depends on the nature of the research).

117. For example, the U.S. Patent Act gives patent owners the right to exclude others from making, using, selling, offering to sell the invention in this country, or importing it from another without the authority of the patent owner. 35 U.S.C. § 271(a), 271(e)(4)(B) (2000).

over how the invention impacts the marketplace—or whether to allow it on the market at all¹¹⁸—during the period of the patent, especially since patent infringement is usually classified as a no-intent tort, requiring no knowledge of the patent owner's property right to incur liability.¹¹⁹ The grant of a patent in a particular jurisdiction is usually all the ammunition a patentee needs to control the invention.

On the other hand, it is worth noting that patent rights merely exist in the negative; they give the patentee the right to exclude others, but no right to use the invention.¹²⁰ This is in contrast to tangible property rights, which include the right to use the property along with the right to exclude others.¹²¹ The limitation is particularly important if the invention concerns merely an improvement on existing technology, and if marketing a product covered by the patent would infringe another's patent property. In this case, a patentee could obtain profits by some licensing arrangement, but the options are certainly narrower. Such a restriction on patent power follows from the intangible nature of the right. It also ensures that greater incentives exist for breakthrough inventions that do not depend on the use of another's protected idea.

Control over non-commercial uses of inventions, some of which serve a more general social benefit, is also a consideration. Experimental uses to satisfy scientific curiosity may be one type of non-commercial use.¹²² Limited use to understand the patented technology

118. See *supra* note 52 and accompanying text.

119. See, e.g., *Embrex, Inc. v. Serv. Eng'g Corp.*, 216 F.3d 1343, 1352 (Fed. Cir. 2000) (Rader, J. concurring) (“Similarly, because intent is irrelevant to patent infringement, an experimental use excuse cannot survive.”); *Jurgens v. CBK, Ltd.*, 80 F.3d 1566, 1570 n.2 (1996).

120. Under U.S. law, while the act of invention itself “vests an inventor with a common law or ‘natural’ right to make, use and sell his or her invention absent conflicting patent rights in others,” *Arachnid, Inc. v. Merit Indus., Inc.*, 939 F.2d 1574, 1578 (Fed. Cir. 1991), a patent conveys the additional right to exclude others from making, using, selling or offering to sell the invention. *Id.* (citing *Six Wheel Corp. v. Sterling Motor Truck Co.*, 50 F.2d 568, 571 (9th Cir. 1931)); WIPO HANDBOOK, *supra* note 34, at 17 (“[T]he owner is not given a statutory right to practice his invention . . .”).

121. See, e.g., *United States v. Craft*, 535 U.S. 274, 280 (2002) (listing the property rights held by a land owner, even if a tenant in common: “the right to use the property, to exclude third parties from it, and to receive a portion of any income produced from it”).

122. See, e.g., *Embrex*, 216 F.3d at 1349 (recognizing possible infringement exception for uses that constitute “amusement, idle curiosity, or for strictly philosophical inquiry”) (citing *Roche Prods., Inc. v. Bolar Pharm. Co.*, 733 F.2d 858, 863 (Fed. Cir. 1984)); see also *Semitool, Inc. v. Ebara Corp.*, No. CV 01-873-BR, 2002 U.S. Dist. LEXIS 21939, at *5–*6 (D. Or. Oct. 31, 2002) (recently noting the continued existence of the doctrine). Such uses are narrowly construed under U.S. law. See *Madey v. Duke Univ.*, 307 F.3d 1351, 1361–62 (Fed. Cir. 2002).

well enough to design around it may be another.¹²³ Giving a patentee control over these uses may incrementally add to the incentive to invent. However, many of these uses could feed back into the innovative efforts of others. Therefore, the benefits of increasing the incentive to a particular inventor reach an apex, after which broader rights actually decrease the innovative efforts that would have been otherwise made by others.

c) *Patent Term in Relation to the Invention's Period of Marketability*

An important but rather arbitrary aspect of patent incentive structure is the length of the patent term. The amount of time a patentee may count on for marketing exclusivity translates directly into the value of the right. By international agreement, most countries have agreed to provide exclusive rights for a period of not less than twenty years measured from the date the patent application is filed.¹²⁴ The effective patent life is shorter, as time spent prosecuting the application before the relevant patent examining authority comes off the top of the twenty-year term, leaving most patentees with approximately eighteen years.¹²⁵ The term is set without any relation to the time a particular invention needs to recoup its production costs.¹²⁶

123. See, e.g., Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1, 21–28 (2001) (describing the rationale for allowing a limited right to use patented software in order to reverse engineer the design).

124. See TRIPs, *supra* note 37, at art. 33 (“The term of protection available shall not end before the expiration of a period of twenty years counted from the filing date.”).

125. For example current PTO statistics show that the average time a patent is pending in the office before it is either issued or abandoned is twenty-nine months. See PATENT AND TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FOR FISCAL YEAR 2005, at 23 (2005), available at <http://www.uspto.gov/web/offices/com/annual/2005/2005annualreport.pdf>.

126. The twenty-year term actually began in the U.S. as a fourteen-year term modeled on the English Statute of Monopolies. C. Michael White, *Why a Seventeen Year Patent?*, 38 J. PAT. OFF. SOC'Y 839, 841 (1956) (reviewing the historical basis of patent terms in the United States). See also CHISUM, *supra* note 37, at § 16.04[1]; SUBCOMM. ON PATENTS, TRADEMARKS & COPYRIGHTS, S. COMM. ON THE JUDICIARY, 85TH CONG., AN ECONOMIC REVIEW OF THE PATENT SYSTEM 76 (Comm. Print 1958) (prepared by Fritz Machlup). In 1994, the TRIPs agreement mandated a twenty-year patent term that was calculated from filing, see TRIPs, *supra* note 37, at art. 33, producing little change for most patents given the average time period for examination. In fact, when Congress changed the term of enforcement for patents in 1995, it created a procedure for electing the old calculation method only for patents then in existence, not for future grants. 35 U.S.C. §§ 154(a)(2), 154(c)(1), 271 (1994 & Supp. V 1999); *Merck & Co. v. Kessler*, 80 F.3d 1543, 1546–48 (Fed. Cir. 1996).

The disconnect between the term and any act by the inventor raises the question of whether the current time period is optimal as an invention incentive. The modern rationale for a patent term—to provide a protected opportunity to profit as a reward for inventive results—suggests that the answer depends on the technology. The inventions produced in response to a particular time period should be those able to return a profit during that period; inventions requiring less time would of course be produced, but those requiring more likely would not. This suggests that there is no limit to the amount of inventions that could be encouraged with ever-longer patent terms.¹²⁷ However, negative effects may result from holding up the public use of some inventions (those with limited life cycles) for a period longer than necessary to create the incentive to produce them. Most prominently, follow-on inventions by others will be delayed,¹²⁸ and in fast-moving technology fields, this could actually reduce overall IAI creation. Ideally, then, the patent term should be tied to the useful life of the invention.

d) *Disclosure Balanced Between Enablement and Undue Devaluation of the Patent Incentive*

Patent incentives are inversely related to the amount of disclosure an applicant is compelled to make.¹²⁹ Functioning as a necessary condition to the societal contract to grant rights in exchange for invention,¹³⁰ disclosure allows subsequent inventors to improve upon or

127. It has been suggested that this is actually quite reasonable from an economic perspective. See Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106, 107 (1990) (“We show that in a homogenous-good market . . . the socially optimal way to reward innovation involves patents of infinite length.”).

128. See COOTER & ULEN, *supra* note 22, at 127–28 (“[T]he optimal life of a patent strikes the best balance between encouraging creativity and discouraging dissemination.”). This could also have negative effects in creating inefficient patent races for the inappropriately large incentive. See Duffy, *supra* note 63, at 466–67.

129. The significance of the disclosure function of patents is prominently reflected in both jurisprudence and academic literature. See, e.g., *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150–51 (1989) (“The ultimate goal of the patent system is to bring new designs and technologies into the public domain through disclosure.”); *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 484 (1974) (noting the tension between trade secret law and the disclosure requirement); *Seymour v. Osborne*, 78 U.S. 516, 533–34 (1870); Merges & Nelson, *supra* note 114, at 844–45; Mazzoleni & Nelson, *supra* note 5, at 1038–40; Scotchmer & Green, *supra* note 52, at 132.

130. U.S. courts are especially clear in articulating the “quid pro quo” relationship between patents and disclosure. See, e.g., *Kewanee Oil*, 416 U.S. at 484.

design around the invention.¹³¹ The disclosure requirement facilitates standing on the proverbial shoulders of giants. Such disclosure enhances invention by providing free access to the high level of advancement that is ostensibly encompassed by patents, thereby preventing this information from being kept as an advantageous trade secret.¹³²

Effective disclosure depends on maximizing access and extent. Access is accomplished simply by publication of a document that distinctly describes and claims the invention.¹³³ Whether such access is utilized is another matter that implicates issues of industry culture as well as the law.¹³⁴ The necessary extent of invention disclosure is determined by asking how much a follow-on inventor needs to know in order to benefit. The answer, according to most patent systems, is enough to enable one of ordinary skill in the art to practice the invention. This is known as the “enablement” requirement.¹³⁵ To provide the enforcement stick to this rule, if a patentee has failed to disclose sufficient information, the patent is declared invalid.¹³⁶

To a great extent, disclosure that does not detract from the right to exclude during the life of the patent should not impact the invention incentive. In most cases, more disclosure is better. However, there are ways in which a disclosure requirement could unduly reduce the value of patent rights. Disclosure may create an unreasonable burden,

131. See Lemley, *supra* note 37, at 1063 n.127 (citing several sources for the patent law doctrine of designing around and arguing that it is a positive externality of the property right); Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 36 (1997) (noting the beneficial nature of the “incremental innovator” who uses the patent disclosure to design around the invention).

132. See LANDES & POSNER, *supra* note 29, at 294–95. *But see* Strandburg, *supra* note 44, at 105–07 (noting that some inventions have a greater potential for secrecy than others).

133. 35 U.S.C. § 112 (2000).

134. See, e.g., Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007, 2014–17 (2005) (arguing that the patent system ends up disclosing little that would not otherwise be available to the public).

135. In U.S. patent law, the enablement requirement is provided explicitly by statute. See 35 U.S.C. § 112 (2000) (“The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . .”). Essentially the same standards exist in other countries, but it is debatable as to whether the disclosure is as complete. See ADELMAN, *supra* note 25, at 576 (describing the law of enablement in Japan and Europe and noting “most patent professionals familiar with foreign patent instruments will acknowledge that they tend to be quite shorter than those in the United States”).

136. See, e.g., Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 920–22 (2004) (describing in somewhat obtuse, but legally coherent, fashion the requirement of adequate disclosure for the validity of a patent), *cert. denied*, 543 U.S. 1015 (2004).

requiring voluminous recitation of all necessary scientific and engineering background, step-by-step production instructions, and an explanation of relevance to all possible fields of use. This is addressed by most patent systems, which generally do not require the disclosure of all information known to those of ordinary skill in the art,¹³⁷ but only that necessary for one of such skill to practice the invention.¹³⁸

The second kind of disclosure disincentive springs from the core of the patent-trade secret dichotomy. If the value in keeping the invention secret outweighs the benefits of patent exclusivity, the patent right does not provide an incentive to invest.¹³⁹ Certain types of inventions may be inherently more valuable as secrets than as exposed ideas with limited rights to exclude in the marketplace.¹⁴⁰ A patent system cannot parse these categories of invention for the purpose of maintaining some level of secrecy when necessary. Therefore, a reduction in the incentive from disclosure is a necessary consequence, and the extent of reduction is the essence of this factor.

B. Extra-Legal Attributes of Patent Property Add a Second Layer to the Incentive Structure

Although they often escape academic and political debate, the attributes of patent property rights beyond the legal structure are critical to the nature of the incentive. They may even outweigh or cancel out the effect of legal factors. Such additional influences are derived from two broad sources: (1) the legal institutions that provide the framework of property rights ownership and enforcement; and (2) cultural biases toward property ownership, and intellectual property ownership in particular. A comparison of the business environments of various countries evidences great differences,¹⁴¹ suggesting that extra-

137. See ADELMAN, *supra* note 25, at 576.

138. See WIPO HANDBOOK, *supra* note 34, at 21 (summarizing international rules and stating that “[t]he application must disclose the invention in a manner sufficiently clear for the invention to be carried out by a person skilled in the art”).

139. See LANDES & POSNER, *supra* note 29, at 294–95 (arguing that inventors will choose to keep inventions secret if the disclosures accompanying patent protection result in more losses than the exclusivity will provide in gains); Strandburg, *supra* note 44, at 105–07.

140. Trade secrets may provide perpetual protection, if secrecy is maintained. See Edward Lee, *The Public's Domain: The Evolution of Legal Restraints on the Government's Power to Control Public Access Through Secrecy or Intellectual Property*, 55 HASTINGS L.J. 91, 109 (2003). However, the ability to control follow-on innovation may still tip the balance in favor of patents. See Strandburg, *supra* note 44, at 105–07.

141. Data on the aforementioned proxies for innovation, such as R&D dollars and the production of highly innovative end products, suggest that the incentives to invent are not the same. See, e.g., ORG. FOR ECON. COOPERATION AND DEV., RESEARCH AND

legal factors are at work and must be addressed to understand a nation's patent regime. If one is to fully understand how well the patent system is performing and how changes will affect the existing innovation environment, these factors must be taken into account.

Differences in institutions and cultures are obviously reflective of the varied developmental histories of individual nations. Even among nations of a particular economic status, there can be fundamental distinctions in important elements, such as the common law or civil law nature of the legal system.¹⁴² The characteristics that are integral parts of a property law system have the potential to affect invention creation, but in complex ways that must be investigated in detail.

1. Institutions and Legitimate Intellectual Property Ownership

The value of property ownership is intimately tied to one's ability to enforce that right against infringers and retain that ownership against baseless challenges. However, the system with the most productive incentives is not necessarily that which automatically and strongly favors those who claim property rights. A danger in any property system is the potential for parties to illegitimately claim property ownership or enforcement powers by exploiting the defects in the system. Such tactics may allow illegitimate property claims to preclude future investment in invention creation by making the market inaccessible. Thus, some check on property powers must be incorporated, but not one so oppressive that it significantly reduces the property powers that provide the invention incentive. This sort of balance is sought in the institutions underlying property ownership and enforcement. How such institutions function under normal conditions and respond to emergent issues are the basis of this patent factor.

DEVELOPMENT EXPENDITURE IN INDUSTRY 1987–2001, at 32–39 (2003) (indicating disparities in rise in R&D spending in U.S. versus Japan and EU over last twenty years); OECD PATENT STAT., *supra* note 85, at 14–15 (showing differences in rate of growth of triadic patent families between countries and regions); EUROPEAN FED. OF PHARM. INDUS. AND ASS'NS (EFPIA), THE PHARMACEUTICAL INDUSTRY IN FIGURES 2004, at 3 (2004), available at http://www.efpia.org/6_publ/infigure2004a.pdf [hereinafter "EFPIA REPORT"] ("As a whole, Europe remains less attractive for R&D investments than the U.S. The economic and regulatory framework, the science base, the investment conditions, and societal attitudes towards new technologies all contribute.").

142. See, e.g., Philippe Bruno, *The Common Law from a Civil Lawyer's Perspective*, in INTRODUCTION TO FOREIGN LEGAL SYSTEMS 1, 7 (Richard A. Danner & Marie-Louise H. Bernal eds., 1994) ("There is no doubt that the two systems are very different from linguistic, conceptual, and philosophical points of view.").

a) *Property Ownership with Rational Scrutiny*

Mechanisms for determining the true owner of a property are strongly linked to investment incentives. Complex deeding requirements, title searches and registration/notice systems are common features of tangible property systems.¹⁴³ However, the fact that no patent property exists until it is granted by a government entity means that unique procedures must exist for ensuring that the rules for recognizing a creation are followed. Additionally, the intangible nature of intellectual property rights guarantees that overlapping rights are frequent occurrences,¹⁴⁴ and any property award procedure must also carefully account for boundary determination and notice to the public. A complicating factor in the property award system is the fact that no international patent right exists,¹⁴⁵ which conflicts with the increasingly global nature of information.

The complexities of patent ownership create a double-edged relationship to invention activity. On one hand, creation is supported when inventions that meet patentability requirements are awarded patent protection quickly and without undue expense. On the other hand, IAI creation is potentially reduced when applications that do not disclose patentable inventions are approved in the same way as when patents with an overly broad scope are allowed. Therefore, the system must attempt to balance the costs (both social and monetary) of a meticulous award system with the costs of invalid patents entering the market.

In most countries, patent rights are awarded based on the outcome of a detailed examination of the patentability of a claimed inven-

143. See, e.g., Robert C. Ellickson, *Property in Land*, 102 *YALE L.J.* 1315, 1328–30 (1993) (describing technologies for marking, defending, and proving boundaries for land, and economic efficiencies of having private individuals do so).

144. This is the basis of the contention that multiple patent rights overlapping to cover various aspects of a single product can create a “patent thicket.” See, e.g., Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 *INNOVATION POLICY AND THE ECONOMY* 119, 124–26 (Adam B. Jaffe et al. eds., 2001) (describing as a basis of patent thicket, “holdup” problem when “hundreds if not thousands of patents . . . can potentially read on [the same] product”); but see Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 *TEX. L. REV.* 961, 1002–04 (2005) (presenting survey evidence from industry executives suggesting patent thickets are not reducing innovative activity). Another reason for the overlap is that patent rights include no use rights, but only the right to exclude others (see *supra* note 34 and accompanying text); thus, there is no reason to create an examination mechanism for assessing a patent applicant’s freedom to operate.

145. See *WIPO HANDBOOK*, *supra* note 34, at 17 (describing the national or regional nature of patent grants).

tion.¹⁴⁶ Because such a system is expensive to operate, some countries that see a large proportion of secondary filings from foreign entities defer to the determination of a governmental body with a sophisticated examination corps, like the United States or the European Patent Office (EPO).¹⁴⁷ International agreements like the Patent Cooperation Treaty (PCT) streamline the process somewhat by centralizing as much as possible, but the application is still forwarded to the governments of individual countries for a final determination.¹⁴⁸ In general, at least part of a patent examination is conducted as a secret, *ex parte* procedure to allow a patent applicant the ability to retain trade secret rights in the invention if the prosecution is unsuccessful.

In addition to an examination process, most countries employ a method of retracting or invalidating patents that were erroneously issued. This is generally accomplished through a government agency in addition to or instead of a court system.¹⁴⁹ The invalidation process can be just as time-consuming and resource-intensive as the initial examination, if not more.¹⁵⁰ That can add up to a double tax on the patentee and may act as a disincentive to create inventions if the procedure is not sufficiently circumscribed. The court model is fairly straightforward, with an invalidation decision generally precluding further enforcement of the patent in a given country.¹⁵¹ Streamlined

146. *See id.* at 24–27 (outlining the generic procedure of a patent examination in most WIPO countries).

147. *See* Thomas F. Peterson & John J. Chrystal, *How the Patent Harmonization Treaty Will Co-Exist with the Patent Cooperation Treaty and the Effects and Advantages in Harmonizing the Two Treaties*, 26 J. MARSHALL L. REV. 613, 620 n.36 (1993) (discussing how some countries “piggyback” on the successful patent prosecution in other countries).

148. *See* WORLD INTELLECTUAL PROP. ORG., BASIC FACTS ABOUT THE PATENT COOPERATION TREATY 9–10 (2002) (explaining in basic terms how the “international search” can ease the process through the national patent office, but does not supplant them).

149. *See* Bronwyn H. Hall et al., *Prospects for Improving U.S. Patent Quality via Postgrant Opposition*, in 4 INNOVATION POLICY AND THE ECONOMY 115, 121–29 (Adam B. Jaffe et al. eds., 2004) (describing opposition and litigation proceedings in U.S. and EU used to address questions of patent validity, and noting substantial differences in structure and efficacy within the same basic forums).

150. *Id.* at 128 (noting mean duration of European opposition proceedings is about three years); NAS REPORT, *supra* note 2, at 100 (stating U.S. reexaminations and EPO oppositions last at least two years).

151. In the context of the EU, *see* Hall, *supra* note 149, at 128 (stating that invalidation of an EPO patent can take place in a national court, but there is no trans-EU court that can invalidate a patent for all EPC signatory countries). In the U.S. the courts have been clear that an invalidation determination has collateral estoppel effect against other potential infringers. *See* *Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found.*, 402 U.S. 313, 349–50 (1971).

agency procedures have the potential to be more efficient and more accurate, but present problems of their own.

Courts ideally play a cleanup role in the ownership game. Only if the examination and opposition/reexamination processes are unsuccessful will courts be involved. Although court review has the potential to be quite comprehensive—particularly in countries like the U.S. which have very liberal discovery rules¹⁵²—it is an inefficient method of disposing of invalid patents.¹⁵³ Patent litigations can drag on for years and may settle without a public resolution to the validity issues.¹⁵⁴ Also, patentees are awarded a presumption of ownership that may preclude an even-handed review of whether the patent should have issued.¹⁵⁵

The extent to which the patent ownership factor influences invention activity may also depend on the industry. When patent rights are aggressively sought by a large and varied number of competitors, an examination standard that is low may be more likely to give rise to a “thicket” of rights that must be negotiated to bring any invention to market.¹⁵⁶ Alternatively, in a market wherein companies depend on a relatively few patents covering independent products, the danger of invalid third-party patents may be minimal.

b) Efficient Enforceability with Full Compensation

Perhaps the most important but often overlooked aspect of any property incentive is the owner’s ability to enforce the right against infringers/trespassers. Surprisingly, the world’s intellectual property

152. See Stuart J.H. Graham et al., *Patent Quality Control: A Comparison of U.S. Patent Re-Examinations and European Patent Oppositions*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 74, 86 (Wesley M. Cohen & Stephen A. Merrill eds., 2003) (noting that extensive use of pretrial discovery means that average cost of patent litigation in the U.S. is between one and three million dollars).

153. See Merges, *supra* note 97, at 610 (noting that, in view of high costs of district court litigation, a substantial reexamination procedure has obvious appeal).

154. See Shapiro, *supra* note 144, at 142–44 (“As a matter of economic theory, there is no reason to expect the two parties’ collective interests in settlement . . . to coincide with the public interest . . .”). Typically, a patent case will settle with the accused infringer acknowledging infringement and a valid patent in exchange for a smaller damage award than originally sought. Such arrangement can fall under antitrust scrutiny when the converse occurs, and it appears that a patent holder is compensating an accused infringer for dropping the litigation and staying off of the market. See *In re Cardizem CD Antitrust Litig.*, 332 F.3d 896 (6th Cir. 2003), *cert. denied*, 543 U.S. 939 (2004).

155. See NAS REPORT, *supra* note 2, at 98 (presenting a chart stating that both the EPO opposition proceeding and U.S. litigation accord patent owners a presumption of validity that must be overcome by a challenger).

156. See Shapiro, *supra* note 144, at 120–22.

regimes are quite different in their enforcement mechanisms. Harmonization is now being addressed, but it is a complex endeavor.¹⁵⁷ Enforcement mechanisms involve everything from the powers of the courts in the context of private infringement actions to the system of compensation for government infringement of patent rights and takings. As there are strong elements of institutional traditions in each country's procedures, some aspects are more malleable than others. But there is no doubt as to the critical nature of enforcement; it is the *sine qua non* of property, and a hobbled enforcement regime can greatly reduce its incentive value.

One traditionally views enforcement as a collection of two powers: the ability to prevent trespass/infringement (injunction)¹⁵⁸ and the potential to collect compensation from infringers for any harm to the property (damages).¹⁵⁹ Many regimes include mechanisms to increase damages awards to punish willful behavior,¹⁶⁰ but punitive damages are generally not available.¹⁶¹ If the analysis is refocused on the perspective of the potential innovator and what protections are necessary to retain the full weight of the patent incentive, one can conclude that almost everything comes down to basic damages. This is because the value of the patent right relates almost solely to the ability to profit, and a patentee should be indifferent if he or she can obtain the same profits through enforcement as would be obtained in the normal course of business.¹⁶² Of course, the costs of enforcement would seem to require some premium be available above the straightforward assessment of the actual harm. Thus, heightened damages, to the ex-

157. See, e.g., Council Directive 2004/48, 2004 O.J. (L 157) 45 (EC) [hereinafter Enforcement Directive] (setting forth several provisions to unify intellectual property enforcement rules across European Union).

158. See, e.g., 35 U.S.C. § 283 (2000) (providing injunctive relief to compensate for patent infringement harm, the terms of which are at discretion of the court).

159. See, e.g., 35 U.S.C. § 284 (2000) (providing for damages "adequate to compensate for the infringement").

160. In the United States, a damage award up to three times actual harm is permitted at the discretion of the court. 35 U.S.C. § 284 (2000). In the EU, countries can employ various mechanisms to supplement actual damages, including an infringer's profits. See Enforcement Directive, *supra* note 157, at 55. In Japan, there is no supplement, but damages may be measured by an infringer's profits as an alternative to patentee damages. Japan Patent Law, Law No. 121 of 1959, art. 102, translated in 6 EHS LAW BULL. SER. no. 6850A at SA-A 76 (2004).

161. See ADELMAN, *supra* note 25, at 1160 ("Foreign legal systems almost universally reject the notion of an award of punitive damages for patent infringement.").

162. Even the injunctive right can be included in the damages analysis. We know the ability to exclude others from the market is ultimately worth an assessable price, because courts award past damages even in the absence of actual patentee loss. In the U.S., this minimum amount is a reasonable royalty. 35 U.S.C. § 284 (2000).

tent that they ensure patentee indifference, can increase IAI creation beyond actual damages.

There is a limit to the amount of infringement damages that will induce invention activity. At some point, the amount of damages could be so high that a patent holder may be able to obtain a larger share of the market than appropriate due to competitor's fears that their marketing activities may arguably fall within the scope of the patent. Because enforcement mechanisms are unlikely to be correct one hundred percent of the time, there is always the possibility that a non-infringer will be found liable.¹⁶³ If excessively high damages make even the slight chance of losing unbearable for most challengers, it could outweigh the advantages of challenging an improperly asserted patent, and reduce overall invention incentives.

2. *The Cultural Embrace of Private Property Impacts Incentives*

A complete analysis of patent incentives must recognize that institutional structure and legal regimes exist against a larger backdrop of culture that reflects a society's values and desires. Differences in culture can affect the ability of property to induce innovation. To be sure, one must take care in attributing a certain societal behavior to particular groups based on limited or biased perspectives, but it does seem fair to make the more limited judgment that there are values in business and economic relationships that seem to be embraced by some societies more than others.¹⁶⁴ These are important, if often overlooked, patent incentive factors.

One cultural value in which many scholars have recently taken an interest is private property ownership.¹⁶⁵ Great differences exist across countries in the degree to which individuals own and invest in

163. See JAFFE & LERNER, *supra* note 4, at 114–15 (arguing that the Federal Circuit has increased patent owners' remedies significantly, leading to a potentially dangerous situation: "Even if an alleged infringer is convinced that it is in the right, given the uncertainty of the litigation process and the possibility of a very costly punishment, it may choose to settle.").

164. The recent economic turmoil in Russia provides an excellent example of the havoc a lack of private property incentives can wreak. See Erin E. Arvedlund, *Investors of the World, Here's the Word on Putin Inc.*, N.Y. TIMES, Mar. 2, 2005, at A4 ("Instead of embracing free-market capitalism, Russia has veered away: renationalizing oil assets, weakening property rights and signaling to foreign investors that their millions—and their presence—are not entirely welcome.").

165. See, e.g., HERNANDO DE SOTO, *THE MYSTERY OF CAPITAL* 153–54 (2000) (discussing the confounding problem developing countries seem to have with opening up their property systems).

private property.¹⁶⁶ It has been argued that at least some of this difference is attributable to a variation in cultural respect for private property rights—a respect that is also reflected in the institutions and legal rules developed by the society.¹⁶⁷ A lower cultural value for private property ownership could play a role in reducing the incentive to invest in property in two ways: (1) It may promote alternatives to property ownership that attempt to achieve the same goals, perhaps to the detriment of property owners; and (2) the sanctity and dependability of private property interests may be subordinate to other social goals when convenient. The question of property valuation is absolutely critical to the success of patent systems, which are built on nothing more than the perceived value of private property rights.¹⁶⁸

In the context of the present analysis, it is important to concentrate on the more specific issue of respect for intellectual property rights. While it has been suggested that cultural beliefs impact intellectual property rights, specifically,¹⁶⁹ it is not entirely clear that they will mirror the general attitude about property ownership. A difference in perceptions about intellectual property may arise due to a lack of experience with information ownership or fear regarding the ability to control such intangible expressions.¹⁷⁰ Even within a single country's more homogenous population, it is possible for different industry sectors to have diverse cultures regarding information ownership. For example, one might argue that, due to a more communal culture, the computer software industry in the United States experienced a delay in

166. See, e.g., Lynn M. Fisher & Austin J. Jaffe, *Determinants of International Home Ownership Rates*, 18 Hous. Fin. Int'l 34, 37 (2003) (observing international variation in home ownership rates and suggesting that contributing factors may be “[l]egal, economic, political, and cultural institutions”).

167. See, e.g., DE SOTO, *supra* note 165, at 171–74 (arguing that extralegal social contracts are an implicit part of every nation's property law, and “property arrangements work best when people have formed a consensus about the ownership of assets and the rules that govern their use and exchange”).

168. See NORDHAUS, *supra* note 35, at 70–72.

169. See Park & Ginarte, *supra* note 76, at 60 (reflecting on results indicating that, in some economies, stronger patent laws do not necessarily indicate more R&D investment, and concluding “either their R&D responds to different incentives (such as cultural rewards) or a significant part of their R&D activity is imitation”). See also Schankerman, *supra* note 98, at 104 (“The finding that patent rights are surprisingly less valuable in pharmaceuticals where there is stringent price regulation in France, highlights the important point that R&D incentives are shaped not only by patent law but also by other institutional constraints that affect the appropriability environment.”).

170. For example, some nations with relatively strong tangible property histories like India may incorporate weak intellectual property laws to serve a national interest in an area such as pharmaceuticals. See Rishi Gupta, *TRIPS Compliance: Dealing with the Consequences of Drug Patents in India*, 26 Hous. J. Int'l L. 599, 602–05 (2003).

the integration of patent rights for longer than expected after they became available.¹⁷¹ In contrast, in the biotechnology industry, company management, as well as institutional investors, demands dependable, predictable development and ownership of patented inventions.¹⁷²

One would expect that increasing respect for private property supports IAI creation encouraged by patents fairly directly and proportionally. Greater security and predictability of the property investment mechanism would reasonably enhance its incentive power. Whether any part of the culture factor can be reasonably modified is an open question, but its influence must be assessed in the overall innovation incentive matrix.¹⁷³

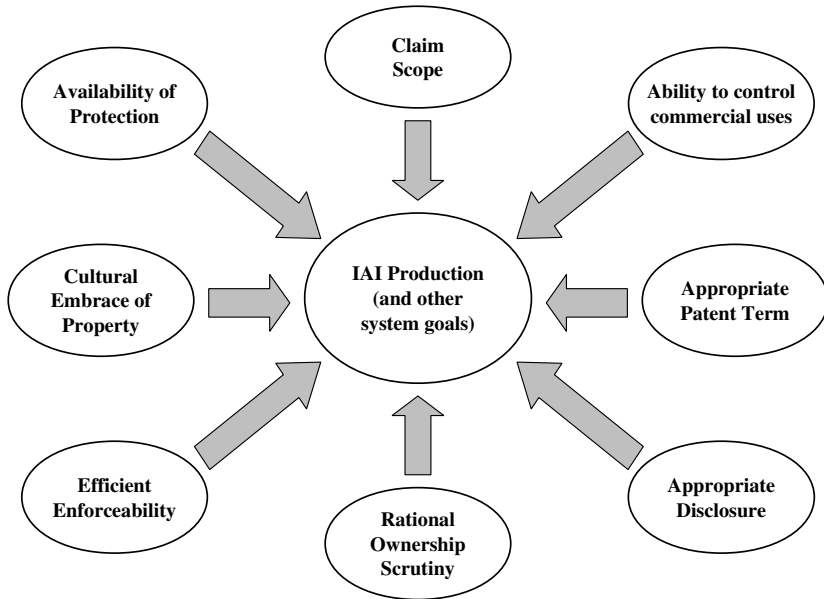
C. *An Unmanageable Mix of Policy Levers with Uncertain Outcomes*

Taking all of the above factors into account, one can see that the character of a particular system of patent rights is derived from a collection of independent variables affecting a dependent variable, private invention, in subtly different ways.

171. See, e.g., FTC REPORT, *supra* note 1, ch. 3, at 47–48 (describing the option of open source software as an alternative to legal property controls).

172. See, e.g., *id.*, ch. 3, at 17–20 (noting the almost universal recognition of importance of patents in biotechnology industry; “[p]articipants stated that the biotechnology industry would not have emerged but for the existence of predictable patents”) (internal quotation omitted).

173. Evidence suggests that appreciation and respect for property commonly associated with certain Western societies can be both learned and unlearned. Michael Fairbanks has boiled down the necessary elements of a cultural change process to several steps. See Michael Fairbanks, *Changing the Mind of a Nation: Elements in a Process for Creating Prosperity*, in CULTURE MATTERS: HOW VALUES SHAPE HUMAN PROGRESS 268 (Lawrence E. Harrison & Samuel P. Huntington eds., 2000). The steps could be applicable to property rights. However, it is reasonable to presume that even if cultural attributes can evolve to become more favorable to private property rights, it is not as simple as revising a legal rule. See DE SOTO, *supra* note 165, at 164–71 (explaining why cultural revision is not as simple as imposing “mandatory law” that achieves the desired property rights on paper). A lengthy political process is likely required. In the short term, the disincentives must be minimized as best as can be.



Each has the power to hobble the patent incentive if sufficiently out of the optimum range. None is powerful enough on its own to support the incentive structure without the others. A successful patent system requires all factors to be at the appropriate level to support the greatest amount of invention activity. Keeping in mind that seeking patent rights is generally viewed as the alternative to keeping an invention as a trade secret¹⁷⁴ (or not inventing at all if trade secret protection will not provide an opportunity to profit on a particular type of invention), one can begin to imagine the complex dynamic underlying a private invention incentive's power to push innovators into the patent system.

Another complicating factor is that one must make judgments as to which factors have the most influence, or arbitrarily set them all as equal. While patent system incentive strength is certainly the sum of these parts, the weight that should be attributed to each is not entirely clear. In other words, should a factor with as broad an impact as respect for property rights have a weight equal to one narrower, like the scrutiny of patent validity? In fact, it seems rather unlikely that such equivalency is accurate. Therefore, a complete assessment of a patent system using the above variables should include an appropriate multiplier. Doing so would pose an extremely difficult endeavor.

On top of the intricate environment created by the multi-faceted model of patent-induced invention incentives is the aforementioned

174. See LANDES & POSNER, *supra* note 29, at 326–29.

fact that baseline empirical evidence of the overall effect of patents on innovation or IAI creation, specifically, is ambiguous at best. Like trying to optimize an audio equalizer when the volume cannot even be detected, the difficulty in effecting rational change rises to a maddening level.

How can serious reform—significant incentive realignment that will have an appreciable effect on invention output—take place in this context? In short, it cannot. An alternate approach that eschews radical change for a more restrained process that preserves the good of the current system while slowly rooting out the bad is the best (but imperfect) strategy.

III.

AN INCREMENTALIST APPROACH TO FUTURE REFORM

The limitations to a comprehensive understanding of complex systems may at first glance suggest that we are impotent to intelligently improve them. Positive changes in such an environment would be expected to be rare, and are more likely to be in response to political whim or patronage. One might conclude that systems with some level of functionality should generally be left alone. This state is not entirely uncommon for large organizations in recent history, and has arguably cast a shadow over such U.S. policy initiatives as education and Social Security reform.¹⁷⁵ Patent incentive structures may simply be another species subject to paralytic inaction.

However, it has been noted that governments, businesses and other policymaking organizations manage to function despite the cognitive failures by apparently using a much more limited, but not entirely irrational approach. An initial explanation of the phenomena suggested that the utilization of a kind of “bounded rationality” accounts for forward progression in light of unwieldy complexity.¹⁷⁶ In a famous 1959 essay, Professor Charles Lindblom took this a step further by articulating a defined decision-making process that permitted

175. For example, the recent push for a dramatic reform to the U.S. Social Security system, widely acknowledged to be in need of repair, has not generated a great amount of support. See, e.g., *Bush Failing in Social Security Push*, SURVEY REPORT, (Pew Research Ctr., Washington, D.C.), Mar. 2, 2005, at 1–4, available at <http://people-press.org/reports/display.php3?ReportID=238> (finding declining support between 2000 and 2005 for the Bush Administration’s Social Security reform initiatives). This can reasonably be attributed to concern over revising a half-century-old security net in favor of an uncertain new plan, versus simply increasing funding for the existing system.

176. See Simon, *supra* note 89, at 103–10.

one to “muddle through” the limitations.¹⁷⁷ He argued that organizations accomplish this most successfully, not through random trial and error or complete inaction, but with measured steps that progressively move toward a limited goal.¹⁷⁸ The decision theory Lindblom proposed has come to be called “incrementalism.”¹⁷⁹ It provides a useful outline for a policy strategy that may substantially improve patent law with less risk than radical reform.

A. *Incrementalism as an Affirmative Policy Choice*

The constrained consideration of change to a very complex system when the outcome cannot be determined with confidence is the essence of incrementalism. Proposed as a direct alternative to purely synoptic decision-making,¹⁸⁰ it involves undertaking a more circumscribed or “local” search for solutions to problems, while accepting that the entire scope of the problem is not being addressed.¹⁸¹ The utility of an incrementalist strategy is predicated on the notion that many changes subject to frequent, reactive revision will, over time, eventually achieve a better result than dramatic policy realignment.¹⁸² Additionally, policy making is dispersed rather than a product of central control.¹⁸³

A common misperception of incrementalism is that it is necessarily equivalent to small change, or even conservative change.¹⁸⁴ It is a process that looks to close alternatives for existing policy, but those alternatives may in fact be a major change from the status quo if lo-

177. See Lindblom, *supra* note 11.

178. *Id.* at 80.

179. See *supra* note 12 and accompanying text.

180. *Id.* For an overview of the literature since Lindblom’s seminal essay as well as some pointed criticism of Lindblom’s conclusions in certain contexts, see Jonathan Bendor, *A Model of Muddling Through*, 89 AM. POL. SCI. REV. 819 (1995).

181. See Lindblom, *supra* note 11, at 79–80; Diver, *supra* note 17, at 399.

182. See Lindblom, *supra* note 11, at 79–80. It can be argued that this is a successful approach in judicial policy making as well. In many respects, Justice Sandra Day O’Connor’s moderate approach to Supreme Court jurisprudence is an example of incrementalism. See Keith J. Bybee, *The Jurisprudence of Uncertainty*, 35 L. & SOC’Y REV. 943, 943–44 (2001) (reviewing CASS R. SUNSTEIN, *ONE CASE AT A TIME: JUDICIAL MINIMALISM ON THE SUPREME COURT* (1999)).

183. See Woodhouse & Collingridge, *supra* note 87, at 132 (“Lindblom offered a point-by-point refutation of the notion that central decision makers ordinarily will make better decisions than a more decentralized or democratic system.”). This could be argued to be supportive of democracy as a governmental model. See *id.*

184. See Woodhouse & Collingridge, *supra* note 87, at 135 (“A . . . criticism holds that incrementalism is an overly conservative approach, which ‘would tend to neglect basic societal innovations’”) (quoting Amitai Etzioni, *Mixed Scanning: A “Third” Approach to Decision Making*, 27 PUB. ADMIN. REV. 385, 387 (1967)).

cal.¹⁸⁵ Similarly, incrementalist revision need not be slow. If the trial and error evaluation of alternatives is conducted in rapid succession, incrementalist approaches may actually move more quickly than rational-comprehensive design.¹⁸⁶ Differences will obviously exist depending on how policy is implemented, but preservation of the current environment is not necessarily an inherent objective.

To be sure, a number of criticisms have been launched against Lindblom's theory. Most significant is that incrementalism is insufficiently goal-oriented, and policy may meander without direction—even circularly—if such an approach is followed.¹⁸⁷ This is somewhat unfair, as goals may be incorporated into the identification of policy alternatives.¹⁸⁸ It is true that adherence to a particular end is not the only measure of policy preference in incrementalism; remedying a perceived ill may be emphasized even more.¹⁸⁹ Such an approach is certainly second best when specific goals can be agreed upon and ranked for the entirety of policy impacts. However, when there is a lack of clear consensus, incrementalism may facilitate the implicit movement along a path that is satisfactory to most partisans, and probably reflective of underlying but presently unidentifiable goals.¹⁹⁰

What does an incrementalist policy look like? Although it is somewhat difficult to articulate specific criteria that distinguish an in-

185. See *id.* at 138 (“[T]here is nothing in the denotation of incrementalism that rules out *large* steps: the key method is successive limited comparisons among alternative policies”); Weiss & Woodhouse, *supra* note 12, at 257 (“So the concept of incrementalism needs to be rescued from its unfortunate association with ‘small steps,’ for there can be no general, inherent limitation on the desirable size of a policy move.”).

186. See Charles E. Lindblom, *Still Muddling, Not Yet Through*, 39 PUB. ADMIN. REV. 517, 520 (1979) (“A fast-moving sequence of small changes can more speedily accomplish a drastic alteration of the *status quo* than can an only infrequent major policy change.”).

187. See, e.g., Weiss & Woodhouse, *supra* note 12, at 258–59 (“Perhaps the most common criticism of incrementalism concerns its perceived lack of goal orientation.”); Woodhouse & Collingridge, *supra* note 87, at 135 (citing works that argue incrementalism is “insufficiently goal oriented,” uses steps that proceed “without knowing where we are going,” and is “guided by ill-defined themes”) (citations omitted).

188. See Weiss & Woodhouse, *supra* note 12, at 259 (noting that incrementalist scholars do not agree that the theory interferes with active pursuit of goals). Lindblom himself did not argue against goals, but rather argued that “they always are intertwined with and embodied in the specific policy options being compared.” *Id.*

189. See Lindblom, *supra* note 186, at 517.

190. See Weiss & Woodhouse, *supra* note 12, at 260 (“[P]artisans operating from one set of goals and supporting analyses usually must make common cause with others who have somewhat different goals and analyses.”).

crementalist result from a pseudo-synoptic one,¹⁹¹ the general decision making approach can be defined. An analogy is helpful in this regard. Imagine a growing business with a factory producing a product at capacity. The management team comes to realize that more capacity is needed if the business is to continue growing. Two options emerge: (1) gradually expand the existing factory or (2) build a new factory. One would choose the former option to incorporate the existing building into the final factory. Much of the support structure will be common, and perhaps many of the design elements will remain. The expanded factory will be familiar to its employees and change will be relatively easy. More expansions can be initiated if necessary. On the other hand, one would be foregoing the incorporation of new technologies not compatible with the older design, some of which could provide for truly fundamental change that could dramatically improve production. If the option for a new factory is chosen, it is likely because the end goal of greater production guides the decision above other considerations. In this analogy, the expansion option is incrementalism. Which is better? It depends on the certainty of goals and the outcomes. When there is much ambiguity, local searching is more secure and likely to move in a positive direction.

It is critical to understand that incrementalist approaches are in no way the ideal. The process is not by nature as effective as rational-comprehensive policy making *when the latter is possible*. Lindblom and subsequent scholars following his theory did not suggest incrementalism as an ultimate goal to which society should aspire, but merely the best alternative strategy as dictated by the realities of complex policy making.¹⁹² Proponents merely believe that applying a methodological approach that incorporates cognitive failings is more likely to be successful than one that presumes they don't exist. In other words, "The choice between synopsis and disjointed incrementalism . . . is simply between ill-considered, often accidental incompleteness on one hand, and deliberate, designed incompleteness on the other."¹⁹³ However, it goes without saying that if, in the future, synopsis or some close approximation is reasonably achievable, it should be promoted and attempted.¹⁹⁴

191. A pseudo-synoptic approach is one in which the proponent proceeds under the belief that he or she understands all of the relevant factors, but does not due to bounded rationality.

192. See Lindblom, *supra* note 186, at 517, 524–25 (“[M]ost people . . . want to separate the ‘ought’ from the ‘is.’ They think we should try to do better. So do I.”).

193. *Id.* at 519.

194. Bendor makes an interesting and supportive finding in this regard through his modeling of incrementalism. He concludes that, when outcomes of broad searching

B. *General Incrementalist Approaches to Patent Law Reform*

In the specific context of patent policy, it is possible to use the principles of incrementalism to derive some general guidelines for reform. The local search for alternatives that will reduce existing ills in the system should be the primary focus. Goals such as the creation of IAs and the dissemination of innovative information should, of course, enter into the process. But such consideration should help to identify policy alternatives, rather than dictate the ends of policy means. Concerns regarding anticompetitive and social policy effects should not be ignored. Legislative, administrative, and judicial mechanisms should be employed to ensure that new policy initiatives are tested for success rapidly and frequently, and modified accordingly. Finally, legal revision should take into account the special nature of patents as a property regime, and incorporate protections to guarantee that vested interests are not arbitrarily eliminated to the detriment of the entire incentive system.

Certainly, the specific ills that should be addressed by an incrementalist approach will depend on the empirical and anecdotal evidence developed by analysts. There is no shortage of perceived problems in modern patent systems. However, it is useful to identify a broad category of problems to be addressed and general principles to be followed under an incrementalist approach. Since most issues in patent law involve the tension between the benefits of exclusive rights to information and the need for public/competitor access, initial forays should address situations in which deadweight losses can be reduced while preserving the majority of invention compensation.¹⁹⁵ This provides the boundaries of the local search that will produce alternatives for reform.

1. *Attenuate Patent Powers Where Incentives are Weak and Expand Rights Gradually*

The ability of patent property rights to induce invention that would not otherwise be created is a rationale for strong rights in many technology areas. Policy participants should be wary of making radical system revisions that would negatively affect areas in which there are indications of patent system success. However, there is evidence that certain technologies do not respond as well (or at all) to patent

are known, they are favored over incrementalism. Bendor, *supra* note 180, at 833. Bendor's results also suggest that when the inconsistency of goals reaches a majority of decision makers, incrementalist approaches are no longer superior to bold searches. *Id.* at 832.

195. See *supra* notes 56–58, and accompanying text.

rights,¹⁹⁶ and that basic property powers may provide patentees with outsized leverage in certain contexts.¹⁹⁷ In such cases, alternatives should be considered that would cautiously reduce the impact of patent rights in these areas. This could be achieved, for example, by limiting enforceability¹⁹⁸ or raising the bar for patentability.¹⁹⁹ Because the impact on patent incentives is lower, consensus between interested parties is more likely than large-scale revisions to the entirety of the law. Moreover, efforts to attune patents to the specific needs of an industry need not be entirely (or even optimally) based in new legislation.²⁰⁰ Courts and administrative agencies may be in a much better position to create and revise the law based on institutional flexibility.²⁰¹ Maximizing reform on this level may also reduce the potential conflict between industry-specific initiatives and international treaties mandating uniformity across technologies.²⁰²

Importantly, it should be recognized that incrementalist approaches to patent reform do not preclude local searches outside of patent law for alternatives. In fact, this is arguably more encouraged under this form of strategic decision-making.²⁰³ When an ill attrib-

196. See, e.g., Arora et al., *supra* note 80, at 35; FTC REPORT, *supra* note 1, ch. 3, at 46–48; Cohen et al., *supra* note 73, at 24–27; Levin, *supra* note 73, at 793–98; Michael A. Carrier, *Unraveling the Patent-Antitrust Paradox*, 150 U. PA. L. REV. 761, 826–27 (2002).

197. See, e.g., James Bessen & Michael J. Meurer, *Lessons for Patent Policy from Empirical Research on Patent Litigation*, 9 LEWIS & CLARK L. REV. 1, 16–18 (2005) (describing strategic patent litigation, including presence of “patent trolls” and suggesting a rationale for why companies submit to an otherwise weak patent infringement case).

198. The mechanism for enforcing patents through injunctive relief or damages could be attenuated in an industry-specific manner without eliminating the entirety of the powers (which would have the effect of destroying the patent right). Permitting courts more flexibility in applying such enforcement mechanisms is a reasonable method of doing so. See Burk & Lemley, *supra* note 116, at 1665–66.

199. Raising the patentability bar can also be accomplished at the administrative or court level in addition to the legislative level.

200. See Burk & Lemley, *supra* note 116, at 1634–38 (arguing that industry-specific legislation has traditionally been ineffective in the United States for a variety of reasons, including the inability to respond to fact-specific issues and industry change).

201. See *id.* at 1638–40 (suggesting that courts are best able to make use of existing “policy levers” in patent law).

202. Most importantly, the TRIPs agreement prohibits technology-specific discrimination in the award and use of patent rights. See TRIPs, *supra* note 37, at art. 27(1) (“[P]atents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced.”). It is not clear to what extent enforceability can be curtailed before conflicting with the “enjoyability” of the right.

203. Since a local search necessarily addresses the problems caused by current policy rather than solely reflecting on adherence to theory (see *supra* notes 189–190 and accompanying text), non-patent solutions may be more prominently entertained. For

uted to the patent system is identified, alternative corrective means that involve government or market solutions should be entertained along with legal revision.

Additionally, as a general matter, new technology areas should not be immediately added to the patent regime, nor should existing areas be excluded. Decisions as to the very existence of patent rights in a particular industry is non-incremental; it is analogous to building (or razing) a factory. Commentators have argued that the benefits of intellectual property rights in new areas should be established *a priori*, rather than proceeding on the basis of theoretical returns.²⁰⁴ Incrementalism generally supports this point of view.

The specific long-term result of all such revisions is difficult to predict due to the nature of the incrementalization process, but in a general sense, it seems likely to lead to the gradual erosion of the unitary patent system. This in and of itself could be a shocking and unpalatable outcome for goal-oriented patent advocates, who see theoretical advantages of incentive-alignment as wholly translatable to all industries.²⁰⁵ However, commentators have noted that patent systems have been moving away from a strict unity of treatment for years, often through more subtle means such as the imposition of technology-specific judicial doctrine.²⁰⁶ In fact, many who favor unity do so because of the costs and risks associated with synoptically determining the best way to achieve technology specificity.²⁰⁷ Incrementalism, then, may actually serve as a long-sought solution in this regard.

2. *Revisit and Consider Change to Patent Rules More Frequently*

To make the potentially measured pace of incremental patent reform effective, trial and error analysis must be incorporated. An admittedly introspective, non-inclusive, and stepped fashion of legal

example, if the problem at issue is the unduly high price of patented pharmaceuticals, a simple price-control measure or health care funding initiative may be among the alternatives considered along with reducing patent rights.

204. See, e.g., Lawrence Lessig, *Keynote: The International Information Society*, 24 LOY. L.A. ENT. L. REV. 33–34 (2004) (admonishing the generalization of patent benefits without considering the impact, and stating that “intellectual property protections are to be balanced across the contexts in which they get enforced, and in different contexts they need to be enforced differently”).

205. See NAS REPORT, *supra* note 2, at 83–84 (describing the historical reticence to depart from a unitary patent system, and generally supporting the notion that the unitary nature of the U.S. system be kept intact).

206. See, e.g., Burk & Lemley, *supra* note 116, at 1630–34, 1641–42.

207. See, e.g., NAS REPORT, *supra* note 2, at 84–85 (“The committee also agrees that given the state of our knowledge there are strong reasons to preserve a formally unitary system.”).

revision is only positive if errors can be identified and corrected relatively quickly.²⁰⁸ Otherwise, incrementalism is much more equivalent to simple conservatism or minimalism, which is a dangerous innovation policy.²⁰⁹

Traditionally, patent reform is a legislative exercise that could generously be termed infrequent. Statutory revision amounting to more than technical correction seems to occur at pace of approximately every five to ten years.²¹⁰ Such lengthy deliberation is a reasonable legislative process only if one could produce a comprehensive, consistent, and correct result in one fell swoop. On the other hand, the local searching and limited analysis of incrementalism does not require such involved discussion, and would optimally be addressed at much more frequent intervals. Unfortunately, there are institutional barriers to frequent legislative revision; namely, legislatures can only focus on so many initiatives per session.

One way around the inability to garner frequent legislative attention is to focus on more revision of administrative and common law rules. This approach can be particularly effective in the context of setting patentability standards and restricting enforceability. For example, USPTO rules frequently address examination standards for specific technologies,²¹¹ and courts have a great deal of authority to control the administration of property law's equitable powers.²¹² Both institutions are more adept at achieving year-to-year change. Additionally, although such institutions are nominally autonomous, there are ways to introduce the comments of interested parties to demonstrate consensus.²¹³ To make this even more effective, the legislature

208. See BRAYBROOKE & LINDBLOM, *supra* note 12, at 99–102 (discussing the advantages of serial analysis and evaluation in which the same problem and values are considered again and again every few years to continually create policy changes).

209. See Burk & Lemley, *supra* note 116, at 1669–70 (arguing that a “minimalist” policy of inaction is no better than making incorrect policy, at least in a fast-moving field like patent law).

210. The last *major* overhaul of the patent system in the United States was the Patent Act of 1952, which integrated many common law concepts like obviousness into the statute. Patent Act of 1952, ch. 950, 66 Stat. 792 (codified as amended in scattered sections of 35 U.S.C.). The most recent substantive revision was the American Inventors Protection Act of 1999, which introduced the eighteen-month publication of most patents. Pub. L. No. 106-113, § 4001, 113 Stat. 1501A-552 (1999).

211. In the context of biotechnology inventions, the PTO has promulgated a rule that raises the bar for establishing that an invention is useful as required by 35 U.S.C. § 101. See Utility Examination Guidelines, 66 Fed. Reg. 1092, 1098 (Jan. 5, 2001).

212. See Burk & Lemley, *supra* note 116, at 1665–66.

213. See, e.g., NAS REPORT, *supra* note 2, at 85–87 (noting that administrative agency rulemaking procedures and court rules provide opportunities for stakeholder opinions, and specifically recommending such information be delivered to the Federal

could essentially delegate power by reducing statutory language to more general principles.

3. *Favor Prospective Impacts over Retroactive Change*

An important limitation on the local search for alternatives should be considered in the context of property rights regimes. Given the intimate relationship between investment incentives and a dependable right to exclude, an incrementalist policy should be reticent to adopt changes that would greatly disrupt existing interests. The expectation of predictable rights lies at the core of the property incentive structure.²¹⁴ In the absence of such limitations, prospective inventors will be forced to take into account the likelihood that some amount of future rights will be reduced along with any associated value in market exclusivity.²¹⁵ This is a generally accepted concern related to tangible property rights, and there is reason to presume an equally strong (or stronger) effect for intellectual property rights like patents.²¹⁶ An attempt to incorporate the impact of retrospective change complicates the analysis and makes incremental searching harder to accomplish. Limiting change related to incentives for the creation of IAs to prospective application alleviates this pressure.

Arguably, an exception to the rationale for limiting retrospection exists for patent rights in industries that do not view them as invention incentives.²¹⁷ However, it is possible that the disruption of patent property rights in one field will have a spillover effect to other industries, reducing property-related incentives due to the uncertainty. If such revision provides the only alternative to redressing an ill, then perhaps it is better to consider this type of industry-specific retroactive revision than no change at all.²¹⁸ At the very least, caution is justified

Circuit by (1) briefing; (2) increased appointment of district court judges; and (3) increased use of regional circuit judges).

214. See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 739 (2002) (reversing a Federal Circuit revision of the application of “file wrapper estoppel” in the doctrine of equivalents on the basis that “Fundamental alterations in [patent] rules risk destroying the legitimate expectations of inventors in their property.”).

215. See Daniel R. Cahoy, *Changing the Rules in the Middle of the Game: How the Prospective Application of Judicial Decisions Related to Intellectual Property Can Promote Economic Efficiency*, 41 AM. BUS. L.J. 1, 21–29 (2003) (arguing that intellectual property is more sensitive to retroactive treatment than tangible property).

216. This is not to say that patent rights should be equivalent to tangible property rights in all respects. There is a reasonable argument that the particular externalities associated with intellectual property rights mandate slightly different rules. See Mark A. Lemley, *What’s Different About Intellectual Property?*, 83 TEX. L. REV. 1097, 1099–1102 (2005).

217. See *supra* note 196, and accompanying text.

218. See Burk & Lemley, *supra* note 116, at 1669–70.

in the additional evaluation of goals that policy makers may be unequipped to address.

Depending on how retroactive reform is conducted, there may also be legal barriers to retrospective revision. In the United States, the Constitution provides a very strong protection against the reduction or elimination of existing property rights, unless just compensation is paid.²¹⁹ This clearly applies to legislative enactments, and the U.S. Supreme Court has noted that this sentiment underlies, in part, the presumption that changes in the law will have a prospective effect unless otherwise stated.²²⁰ However, legal change through the courts is not apparently so constrained.²²¹ To the extent incremental change is imposed beyond the legislature, legal restriction will be less important than incrementalist limitations.

*C. Incrementalist Perspectives on Current Reform Initiatives:
Embracing Local Searches, Ex Ante Incentives, and Ex
Post Policy Drivers*

Despite the lack of comprehensive empirical data on the effectiveness of IAI or general innovation incentives, there is a fairly widespread sense that the patent system is in need of serious repair. Some have gone as far as to refer to the current state as a crisis,²²² while others openly fear that this property right has become an anticompetitive tool for savvy monopolists and undeserving “trolls.” Certainly, there are many examples of seemingly non-inventive patents exiting the world’s patent offices, but it is unclear how pervasive the problem is.²²³ To some extent, the push for reform may simply reflect the no-

219. U.S. CONST. amend. V.

220. *United States v. Sec. Indus. Bank*, 459 U.S. 70, 79 (1982) (“The principle that statutes operate only prospectively, while judicial decisions operate retrospectively, is familiar to every law student.”).

221. *Id.*; Cahoy, *supra* note 215, at 21 n.75 (noting that the just compensation clause has never been applied to judicial decision making and suggesting a likely rationale).

222. See, e.g., Paul Edward Geller, *An International Patent Utopia?*, 85 J. PAT. & TRADEMARK OFF. SOC’Y 582, 582 (2003) (“The patent system is in crisis.”); Robert P. Merges, *One Hundred Years of Solicitude: Intellectual Property Law, 1900–2000*, 88 CAL. L. REV. 2187, 2232 (2000) (“[T]he increased volume of [business method] patent applications stemming from this newly patentable subject matter has pushed the patent system into crisis.”).

223. See, e.g., *Patent Quality Improvement: Hearings Before the Subcomm. on Courts, the Internet, and Intellectual Prop. of the H. Comm. on the Judiciary*, 108th Cong. 21 (2003) (testimony of David Simon) (defining patent trolls and the negative effect they have on industry); Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 44 B.C. L. REV. 509, 516–525 (2003) (describing the negative effect of “opportunistic” and “anti-competitive” intellectual property lawsuits).

tion that such statute-based regimes require periodic updating to ensure currency with modern technologies and social policy. Regardless, patent reform is at the policy forefront in the U.S. and a number of other countries.²²⁴ The challenge is to do more good than harm in the reformation.

As explained above, since current reform efforts cannot realistically proceed through synoptic reasoning, an incrementalist approach is warranted. In fact, many existing proposals have the hallmarks of incremental adjustment. However, others suggest a more perilous pseudo-synoptic approach. One can generally identify preferable attributes, which include local alternatives and the consideration of evidence of bad outcomes—*ex post* drivers—as well as the possible failure of the *ex ante* incentives in the status quo or any change. A review of some common patent reform measures illustrates the important distinctions. The measures below are derived from arguments in the literature as well as pending legislation that is exemplary of the reform movement.

1. *Measures to Limit Coverage and Enforceability to Prevent Social Injustice*

Private ownership of socially important knowledge presents one of the most difficult and persistent conflicts between intellectual property owners and the public. This is perhaps most apparent in the context of health care innovation, but strains can be detected in other fields if public good is more broadly defined. When it appears that a patent owner may be inclined to place profits over immediate public benefit, calls for limitation abound and may be enacted due to a pseudo-synoptic mindset.

224. See, e.g., NAPA REPORT, *supra* note 3, at 23 (“‘Patent reform’ has become a prominent topic in magazines and newspaper articles, industry publications, and, as noted, academic publications.”) (footnotes omitted). In the United States, comprehensive patent reform legislation is under scrutiny. See H.R. 2795, *supra* note 8. Several hearings and conferences on the provisions in this bill and others have been held throughout the last year. See *supra* note 8. Patent reform is also a topic of international interest, and recent initiatives include a broad enforcement directive promulgated by the European Union, see Enforcement Directive, *supra* note 157; the UK Patent Office’s decision to render non-binding opinions on the validity or infringement of issued patents, see THE PATENT OFFICE, THE PATENTS ACT 2004: PATENT OFFICE OPINIONS AND OTHER CHANGES TO THE PATENT RULES 5 (2005), available at <http://www.patent.gov.uk/about/consultations/patact2004/patopinions.pdf>; and India’s agreement to provide protection for pharmaceutical composition of matter inventions, see The Patents (Amendment) Act, 2005, No. 15, Acts of Parliament, 2005, available at http://www.patentoffice.nic.in/ipr/patent/patent_2005.pdf.

Some regimes effectuate social policy limitations *a priori* by excluding certain kinds of invention from protection. Interestingly, the desire to create such limitations appears to be proportional to the importance of the technology—the most groundbreaking inventions for the most important problems—due to the general belief that personal property rights should not restrict access to technology that can alleviate suffering or even save lives.²²⁵ One of the broadest of these exclusions is enshrined in the law of the European Patent Convention (EPC), the signatories of which recognize patents issued by the governing agency known as the European Patent Office.²²⁶ According to Article 52 of the Convention concerning patentable inventions, among the information not recognized as an invention subject to protection are “[m]ethods for treatment of the human or animal body by surgery or therapy and diagnostic methods practiced on the human or animal body.”²²⁷ This eliminates some of the incentive to invest in uncovering, *inter alia*, new methods of administering pharmaceutical or biotechnology compounds. Such methods have in the past transformed compounds of interest with questionable value into useful medical treatments.²²⁸ To somewhat compensate for the reduction in patent

225. This sentiment is reflected in the WTO’s development agenda relating to intellectual property articulated at the recent Doha Ministerial Conference in 2001. The statement makes it very clear that intellectual property rights grounded in TRIPs should yield to national public health emergencies. See World Trade Organization, Ministerial Declaration on the TRIPS Agreement and Public Health, WT/MIN(01)/DEC/2, 41 I.L.M. 755 (2002) [hereinafter Doha Declaration], available at http://www.wto.org/English/thewto_e/minist_e/min01_e/mindecl_trips_e.pdf (“We agree that the TRIPS Agreement does not and should not prevent members from taking measures to protect public health.”).

226. See EPC, *supra* note 41, at art. 2(2) (“The European patent shall, in each of the Contracting States for which it is granted, have the effect of and be subject to the same conditions as a national patent granted by that State, unless otherwise provided in this Convention.”). Interestingly, the EPO is a separate entity from the European Union. See Memorandum, European Commission, The Community Patent—Frequently Asked Questions (July 5, 2000), available at <http://europa.eu.int/rapid/press-ReleasesAction.do?reference=MEMO/00/41&format=HTML&aged=1&language=EN&guiLanguage=en> (“The [European Patent Convention], however, is not a Community but an intergovernmental regime.”).

227. See EPC, *supra* note 41, at art. 52(4) (“Methods for treatment of the human or animal body by surgery or therapy and diagnostic methods practiced on the human or animal body shall not be regarded as inventions which are susceptible of industrial application within the meaning of paragraph 1.”).

228. For example, some ground breaking drug treatments actually have patents only on the most effective method of using the compound, rather than the compound itself. See U.S. GENERAL ACCOUNTING OFFICE, TECHNOLOGY TRANSFER: NIH-PRIVATE SECTOR PARTNERSHIP IN THE DEVELOPMENT OF TAXOL, 24 (2003) (noting that, although the active ingredient of the blockbuster anti-cancer drug Taxol (paclitaxel) has not been patented, methods of administration of the drug have been patented). In such a case, the core compound may be otherwise freely available.

incentives, the EPC permits recapturing patent protection over a substance's "first medical use," even if the compound or substance is in the prior art.²²⁹ This is obviously an imperfect solution, particularly if a new method of treatment is possible but some other medical use of the involved pharmaceutical already exists. An additional example is provided by the fact that many countries have traditionally restricted patent rights on certain medical goods, like pharmaceuticals.²³⁰

One of the most obvious examples of the enforcement limitation paradigm occurred relatively recently in the United States. In 1996, legislation was enacted that prohibited the enforcement of patent rights regarding medical procedures against physicians.²³¹ The law was a clear response to the apparently repugnant notion that a lifesaving medical procedure would be withheld by (or permitted subject to a payment to) the property owner.²³² Patents on lifesaving medical procedures could still be obtained and in some cases enforced through third-party liability,²³³ but the intent to limit patent powers was upfront. A related and equally intriguing limitation measure involves the attempt to circumscribe the exhaustive effect of sales of patented goods in foreign countries and its impact on IAI creation.²³⁴ Revising

229. See EPC, *supra* note 41, at art. 54(5).

230. See, e.g., Gupta, *supra* note 170, at 602–03 (describing India's current regime that precludes the patenting of pharmaceutical products but not methods of manufacturing them); Frederick M. Abbott, *Protecting First World Assets in the Third World: Intellectual Property Negotiations in the GATT Multilateral Framework*, 22 VAND. J. TRANSNAT'L L. 689, 743–45 (1989) (detailing regimes in countries that do not allow patenting of pharmaceuticals).

231. See Limitations on Patent Infringements Relating to a Medical Practitioner's Performance of a Medical Activity, Omnibus Consolidated Appropriations Act of 1997, Pub. L. No. 104-208, § 616, 110 Stat. 3009, 3009-67 to 3009-68 (1996).

232. See Gerald J. Mossinghoff, *Remedies Under Patents on Medical and Surgical Procedures*, 78 J. PAT. & TRADEMARK OFF. SOC'Y 789, 789–90 (1996) (reviewing background behind adoption of the limitation). Interestingly, other types of property, such as drugs, surgical instruments, tables, gowns would certainly be withheld without payment. Regardless, the less severe option of a compulsory license was apparently not entertained as a substitute. See Courtenay C. Brinckerhoff, *Medical Method Patents and the Fifth Amendment: Do the New Limits on Enforceability Effect a Taking?*, 4 U. BALT. INTELL. PROP. L.J. 147, 154–57 (1996).

233. Importantly, the limitation on medical procedure liability is a damages restriction rather than a declaration that no infringement exists. See 35 U.S.C. § 287(c) (2000). When infringement occurs, U.S. patent law permits recovery against parties who contribute to infringement, 35 U.S.C. § 271(c) (2000), or induce others to infringe, 35 U.S.C. § 271(b) (2000), regardless of whether recovery is sought against the primary infringers.

234. In a few countries (including the U.S.), a patent owner retains full rights of exclusion for goods sold under the authority of that patentee overseas. See, e.g., *Jazz Photo Corp. v. Int'l Trade Comm'n*, 264 F.3d 1094 (Fed. Cir. 2001). Other countries find that the first sale overseas exhausts the rights related to sale, use and importation. See Daniel R. Cahoy, *Patent Fences and Constitutional Fence Posts: Property Barri-*

national rules to provide universal exhaustion of patent rights upon the first sale permits parallel importation of goods, particularly pharmaceuticals, which may be sold at mandated lower prices in some countries.²³⁵ Public availability is maximized at the expense of the patent owner.

The reason such dramatic *ex post* subject matter-specific limitations are undesirable from an analytical standpoint is that they fail to take into account the eventual impact of the reduction of IAI incentives. In particular, any possible social benefit from the “availability” aspect of invention incentives is eliminated.²³⁶ Despite the fact that patent incentives may provide the most effective or efficient way to generate better treatments in the future, public policy advocates often attempt to frame the debate to focus on the short-term goal of immediate access.²³⁷ Ironically, the need for patent incentives may be strongest in exactly the industries with high R&D costs and risks that are most commonly the targets of exclusion.²³⁸ While such measures may satisfy a rational moral imperative to subjugate property rights to social policy when emergent conditions dictate, such an analysis cannot

ers to Pharmaceutical Importation, 15 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 623, 696–702 (2005) (noting that there are a variety of approaches in the international community, including international exhaustion and regional exhaustion rules).

235. See AUSTRALIAN PRODUCTIVITY COMM’N, INTERNATIONAL PHARMACEUTICAL PRICE DIFFERENCES 29 (2001), available at <http://www.pc.gov.au/study/pbsprices/finalreport/pbsprices.pdf>. Perhaps the most relevant example of a direct price control system is Canada’s. The Canadian government, through the Patented Medicine Prices Review Board (PMPRB), sets the maximum price at which patented medicines may be sold to ensure that they are “not excessive.” See PATENTED MED. PRICES REVIEW BD., COMPENDIUM OF GUIDELINES, POLICIES AND PROCEDURES 4–6 (2003), at <http://www.pmprb-cepmb.gc.ca/CMFiles/2004compendium-e21LTW-152004-1350.pdf>.

236. See *supra* Part II.A.1.

237. See, e.g., Susan K. Sell, *TRIPS and the Access to Medicines Campaign*, 20 WIS. INT’L L.J. 481, 490–91 (2002) (“[I]n the ongoing deliberations over intellectual property rights in the context of the sub-Saharan African HIV/AIDS crisis, ‘public health’ has emerged as an increasingly effective counter-framing to the high-protectionist activists.”); Jean O. Lanjouw, *Intellectual Property and the Availability of Pharmaceuticals in Poor Countries*, in 3 INNOVATION POLICY AND THE ECONOMY 91, 91–95 (Adam B. Jaffe et al. eds., 2003) (describing the efforts of public interest groups to change patent systems to increase access to essential medications).

238. The pharmaceutical industry, in its role as a producer of life-saving medicines, is frequently singled out for its use of patents to obtain high profits, despite evidence that patents are essential to the success of the industry. See FTC REPORT, *supra* note 1, ch. 3, at 4–14 (“Representatives from the pharmaceutical industry stated that patent protection is indispensable in promoting pharmaceutical innovation for drug products containing new chemical entities.”).

reasonably be conducted without an appreciation of what is being lost.²³⁹

A more incremental approach to addressing social policy concerns is the identification and reduction of patent powers in areas where they are most likely to inspire little innovative behavior due to the limited commercial nature of the covered patents, resulting in primarily deadweight losses.²⁴⁰ A good example is the recent NAS Report's suggestion that patent protection over basic research methods should be reduced to better permit the progress of fundamental science.²⁴¹ Implicit in this recommendation is the idea that such uses are of insufficient value to induce significant invention activity²⁴² or are supplemented by non-proprietary incentives,²⁴³ but have the potential to significantly reduce follow-on research by creating an "anticommons" of conflicting intellectual property rights.²⁴⁴ If true, limitation could be achieved without substantive loss of IAs. While this is certainly an arguable proposition with little empirical support²⁴⁵ requir-

239. See Lanjouw, *supra* note 237, at 95–96 (“When inventors capture only a part of the benefit to society of their innovations, private returns do not reflect social returns and the result is too little investment in R&D.”). To be fair, there may be an argument that uncertainty in the law, such as with exhaustion rules, has prevented the establishment of an incentive structure in this area, making elimination of rights inconsequential. This has yet to be adequately explored, however.

240. See *supra* Part II.A.2.(b).

241. NAS REPORT, *supra* note 2, at 110–11 (commenting on the *Madey v. Duke* decision and the possible ill effects for biotechnology: “We nevertheless believe that there are three other reasons to consider providing some explicit protection from infringement liability.”).

242. If the patenting of basic research methods could be demonstrated to consistently lead to groundbreaking advancements like the widely used Cohen-Boyer recombinant DNA technique or Kary Mullis's discovery of the polymerase chain reaction (PCR) method of DNA production, see, e.g., Heather Hamme Ramirez, Comment, *Defending the Privatization of Research Tools: An Examination of the “Tragedy of the Anticommons” in Biotechnology Research and Development*, 53 EMORY L.J. 359, 374–78 (2004) (describing the two techniques and corresponding patents), one might be more willing to accept the loss of some innovation, assuming that the inventor is rational and uses or otherwise makes the valuable research available. But the literature implicitly suggests that most research tools represent less significant “upstream” innovation that is necessary to achieve more important downstream “highly beneficial and lucrative therapeutic and diagnostic products.” See NAS REPORT, *supra* note 2, at 71.

243. See, e.g., Eisenberg, *supra* note 48, at 1070–71 (“[R]esearchers who are motivated to earn scientific recognition may disclose their discoveries through publication even without patent protection, calling into question the assumption that exclusive patent rights are necessary to prevent secrecy.”).

244. See Heller & Eisenberg, *supra* note 53, at 699.

245. Due to the lack of empirical evidence, the committee behind the NAS Report initiated a study to determine the potential effect of patents in this area. See John P. Walsh et al., *Effects of Research Tool Patent and Licensing on Biomedical Innovation*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY, *supra* note 152, at 285. The

ing the acceptance of several predicate assumptions, it is closer to an incrementalist approach. However, extreme caution must be exercised in excluding aspects of patent rights in an industry-specific manner. One may conclude that little commercial value exists in a particular use at a certain time, but if there is a future possibility of a market for inventions in that area, eliminating the patent rights may dramatically reduce or eliminate important, incentive-aligned inventions.²⁴⁶ Frequent trial and error analysis—the hallmark of incrementalism—is necessary.

TABLE 1
PROBLEM: PROPRIETARY CONTROL OVER INVENTIONS RELATED TO
ESSENTIAL SOCIAL NEEDS

	Pseudo-Synoptic Approach	Incrementalist Approach
Alternatives Considered (Searches)	Eliminate all or part of patent right covering essential social need	Limit enforceability of patent rights over non-commercial research uses (patent “fair use”) Compulsory licensing regime with fair compensation provision Industry-specific patent term adjustment Government supplementation of invention investment
Evaluation Criteria	Greater access to essential technologies	Preservation of <i>ex ante</i> incentives Reduction of economically inappropriate bottlenecks Fair allocation of financial burden (greater public rather than private)
Consensus Mechanism	Marginalization of IP owners	Industry and public interest group participation Comments on rulemaking Amicus briefing
Mechanism for Change	Legislative	Legislative Court Administrative agency

study found no current impediments (but suggested conditions are appropriate for future problems). See NAS REPORT, *supra* note 2, at 72.

246. This is the primary argument for retaining a unitary patent system. See, e.g. JAFFE & LERNER, *supra* note 4, at 204 (“[T]here is no theoretical or empirical basis for saying specifically how patent treatment should differ across specific technologies.”).

If reducing the availability of patent rights for social policy reasons seems too severe in many cases, one may be inclined to employ pseudo-synoptic reasoning in attenuating one of the “extent” elements. The most common context is the compulsory license, wherein a patentee is compelled to cede its rights of exclusion to a government in exchange for a licensing royalty. It is a mechanism explicitly acknowledged by international agreement,²⁴⁷ but not universally employed.²⁴⁸ The compulsory license can be justified as a relief valve to the patentee’s otherwise total control over the use of the invention; a holdup without any connection to market forces is morally untenable when it comes to essential medications, and economically indefensible.²⁴⁹ However, compulsory licenses have more recently become a favored instrument to bring down the cost of protected products.²⁵⁰ This is accomplished due to the unclear nature of the required compensation for such a mechanism. The TRIPs agreement provides that “adequate remuneration” must be accorded the patentee in such a case, but fails to define the term, leaving it up to the host country exercising the licensing option.²⁵¹ The potential for open abuse aside, one can seriously argue whether a compulsory license should give rise to some

247. See TRIPs, *supra* note 37, at art. 31.

248. For example, the United States has no general compulsory licensing scheme, though it does impose a mandatory licensing scheme for the benefit of the U.S. government in select technology areas. See Daniel R. Cahoy, *Treating the Legal Side Effects of Cipro®: A Reevaluation of Compensation Rules for Government Takings of Patent Rights*, 40 AM. BUS. L.J. 125, 146–47 & n.91 (2002). Additionally, by statute, the federal government is committed to pay “[r]easonable and entire compensation” to any patentee whose patent is infringed by or under the authority of the government. See 28 U.S.C. § 1498 (2000). Although the courts have been fairly clear in stating that this measure of compensation is based in the U.S. Constitution’s Fifth Amendment requirement of “just compensation,” it is not entirely certain that market value of the right infringed is always required. See Cahoy, *supra*, at 155–61 (reviewing arguably inconsistent case law that alternatively suggests that a reasonable royalty is all that is ever required for § 1498 compensation or lost profits may be obtainable). As with the compulsory license, if a minor royalty fee instead of full patent damages measures compensation, some impact on innovation would be expected. See *id.* at 169–71.

249. There can be economically rational reasons for not using or licensing a patent, such as when a company invents a technology useful only to a competitor and refuses to allow the competitor access due to the high transaction costs of coming to an agreement on an appropriate licensing fee. See LANDES & POSNER, *supra* note 29, at 320–21.

250. See, e.g., F.M. Scherer & Jayashree Watal, *Post-TRIPs Options for Access to Patented Medicines in Developing Nations*, 5 J. INT’L ECON. L. 913, 913–15 (2002) (describing the obligation of developing countries to initiate patent protection for pharmaceuticals and the potential of compulsory licensing to work as a means of holding down the expected price increases).

251. See TRIPs, *supra* note 37, at art. 31(h).

discounted fee or must correspond to market costs.²⁵² Assuming the former, the use of this mechanism necessarily reduces the patentee's potential for profit and should correspondingly reduce the incentive to innovate. Whether the reduction is justified in comparison to the immediate health care gains is a question of public policy, but one that should not be ignored.

Another natural focus of extent limitations is the patent term. Because the most invention-friendly patent length has some connection to invention marketability, it seems obvious that the term of a patent should be technology-specific. Conversely, an arbitrary term of twenty years is likely to be too long for some industries such as computer-related inventions, and too short for others such as pharmaceuticals and biotechnology. Economists who have studied the issue have argued that a more effective term is possible.²⁵³ Even some in the corporate world who arguably have benefited from the twenty-year term have suggested modifying the current rules to provide for a more nuanced system.²⁵⁴ Some countries straddle the issue by providing a tiered patent grant that depends on the type of invention submitted.²⁵⁵ Such systems tend to convey less protection to incremental improvements than pioneering inventions.²⁵⁶ Additionally, others provide term extensions for unusual delays in the prosecution/examination process²⁵⁷ or, in rare cases, in a regulatory approval process.²⁵⁸

252. See Scherer & Watal, *supra* note 250, at 920–22.

253. See, e.g., Gilbert & Shapiro, *supra* note 127, at 107.

254. Famously, Amazon.com founder and one-click patent owner Jeff Bezos proclaimed that a (then) seventeen-year patent term was too long for business method and software patents. Jeff Bezos, An Open Letter from Jeff Bezos on the Subject of Patents (Mar. 9, 2000), http://www.oreilly.com/news/amazon_patents.html (proposing changes to the way that patent law addresses business method and software patents).

255. See COOTER & ULEN, *supra* note 22, at 129 (describing Germany's system of three-year "petty patents" for minor improvements); Mark D. Janis, *Second Tier Patent Protection*, 40 HARV. INT'L L.J. 151, 160–66 (1999) (describing the German and Australian petty patent models that provide shorter term protection with less rigorous requirements).

256. See Janis, *supra* note 255, at 188 ("Second tier patent proposals also routinely promise to provide 'quick' protection that is effective in securing intellectual property rights for products having life cycles shorter than the average pendency of a regular patent application."). Additionally, such systems theoretically provide greater access to the patent system for small business entities. *Id.* at 178.

257. The U.S. system contains one example of a (rather complicated) term extension scheme based on prosecution delay. See 35 U.S.C. § 154(b) (2000). It was instituted as a result of the recent American Inventors Protection Act of 1999. Pub. L. No. 106-113, § 4001, 113 Stat. 1501A-552 (1999) (amending the patent law and reorganizing the USPTO).

258. In the context of certain submissions to the U.S. FDA, up to five year-long term extensions may be obtained, so long as the effective patent life totals no more than fourteen years from the date of FDA approval. See 35 U.S.C. § 156 (2000); DONALD

Because the desire to maximize social policy goals often produces a conflict with the most powerful and effective patent incentives that is difficult to resolve through consensus, an incrementalist approach that employs an alternate invention incentive system will be more effective. The most important alternate system is government investment, development, and (sometimes) ownership of inventions.²⁵⁹ While government control is generally considered to be an imperfect substitute for private property ownership—in many cases private property ownership provides a better model for ensuring certain resources are efficiently allocated²⁶⁰ and inventions are created that meet the needs of society²⁶¹—it is often employed as a gap filler in those areas that do not have strong market incentives.²⁶² This is particularly common in the context of basic scientific research; government organizations like the U.S. National Institutes of Health and national research universities may spend heavily to investigate molecular mechanisms, newly-created compounds, etc., without any assurance that a profitable application will develop.²⁶³ Unfortunately, if government-sponsored basic research uncovers an important and highly profitable invention, the government is rarely in a position to conduct the follow-on research and development necessary. But if the invention could be transferred to private ownership, private investment in the necessary R&D can occur. This was the impetus behind the so-called Bayh-Dole Act in the United States, a provision that permits private companies to take ownership rights in intellectual property developed with federal government funding.²⁶⁴ Such government funding of invention creation can therefore positively influence the amount of private invention, so long as the property rights conferred are reliable and predictable. Additionally, programs have been proposed in which governments buy back intellectual property rights to

O. BEERS, *GENERIC AND INNOVATOR DRUGS: A GUIDE TO FDA APPROVAL REQUIREMENTS* § 4.04[D][4] (1999).

259. See NSB REPORT, *supra* note 20, at 4–9 (the federal government provided 28.3% of the United States' R&D funding in 2002).

260. See POSNER, *supra* note 37, at 36–39.

261. See LANDES & POSNER, *supra* note 29, at 12–16.

262. See, e.g., NSB REPORT, *supra* note 20, at 4–11 to 4–12 (noting the large amount of federal R&D spending in health-related basic research).

263. See Eisenberg, *supra* note 48, at 1046–48 (describing the communal ownership ideal in scientific societies that rewards “recognition and esteem”) (citing ROBERT K. MERTON, *The Normative Structure of Science*, in *THE SOCIOLOGY OF SCIENCE* 267, 273 (1973)).

264. Pub. L. No. 96-517, 94 Stat. 3015 (codified as amended at 35 U.S.C. §§ 200–212, 301–307 (2000)).

essential medications as a possible means of asserting public control over essential medications.²⁶⁵

2. *Measures to Limit Coverage and Enforceability to Prevent Procedural Abuse*

Even among those who generally believe in the necessity of private intellectual property rights to generate the optimal amount of invention across industries, there is a conviction that failures in procedural aspects of the system—*e.g.*, the scope of enforcement—are creating problems. In addition to the perceived anticompetitive effect of certain patents, there is a belief that follow-on invention is reduced in the fields most affected.²⁶⁶ The reforms proposed to alleviate this harm are the primary focus of current patent legislation as well as litigation advocacy. However, if proposals are not carefully crafted with an eye toward relevant patent incentive factors and the apparent *ex post* problems, they may obscure alternatives that address avenues more deserving of reform.

One concern that has received significant support is that an excessively powerful or overbroad penalty for infringement could be an anticompetitive and invention-reducing force. This is particularly likely when the remedy greatly exceeds the market value of the invention. An extremely controversial ameliorative move in this regard has been proposed in the context of injunctions, one of the most sacred powers of the property right.²⁶⁷ Several commentators have noted recent sentiment that non-practicing patent holders are nothing more than “patent trolls” when they assert a patent against a manufacturing entity.²⁶⁸ This behavior is particularly pernicious if it permits a patentee to enjoin the sale of an entire product when the patent covers but a

265. See, *e.g.*, Michael Kremer, *Patent Buy Outs: A Mechanism for Encouraging Innovation*, 113 Q.J. ECON. 1137, 1138 (1998) (suggesting a mechanism in which the government values a patent and then offers to purchase it for the public domain at a fixed mark-up).

266. See, *e.g.*, FTC REPORT, *supra* note 1, ch. 3, at 23–26, 50–55. See also Bessen & Maskin, *supra* note 52, at 2.

267. See Wendy H. Schact & John R. Thomas, *Patent Reform: Innovation Issues*, CONG. RES. SERV., Rpt. No. RL32996, 32–34 (2005) (reviewing recent arguments for reforming injunctive rights in patent law).

268. See, *e.g.*, Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry*, 83 TEX. L. REV. 961, 962 (2005) (defining patent trolls as “small nonoperating firms formed solely to litigate patents”); *Edited and Excerpted Transcript of the Symposium on Ideas into Action: Implementing Reform of the Patent System*, 19 BERKELEY TECH. L.J. 1053, 1101 (2004) (comments of Professor Mark Janis concerning patent trolls).

small part, allowing the extraction of outsized settlement payments.²⁶⁹ In response, an early committee print of the 2005 U.S. patent reform legislation contained a provision precluding injunctions except on a showing of irreparable harm,²⁷⁰ but it was removed in a later draft substitute.²⁷¹ The Supreme Court subsequently entered the fray with a ruling that an automatic, inflexible mechanism for imposing injunctions is inappropriate.²⁷² Further adjustment to relax the standard ever further is still very possible.

While making injunctions the exception instead of the rule may reduce abuse by a few gadflies with inventions that make little contribution to the art, it could dramatically devalue the incentive for legitimate players. The confusion in the reform proposals is how to balance the incentive of property rights with unfair hold-ups of substantially non-infringing technology. Taking an incremental approach, one can see that the issue should address compensation premised on the inducement of invention versus compensation for indignity of trespass/infringement. In recent comments before the Senate Judiciary Committee, Professor Mark Lemley encapsulated this notion by stating that although “[t]he presumptive right to injunctive relief is an important part of the patent law,” some plaintiffs use the injunctive power to “settle for an amount of money that significantly exceeds what the plaintiff could have made in damages and ongoing royalties had they won.”²⁷³ The injunctive right can reasonably be limited. But this

269. See W. David Westergard, Presentation at Fordham Law School, Remedying the Growing Abuse of the Patent System Through Targeted Legislation (Mar. 31, 2005), at 7 (describing inventor abuse of the patent system by pursuing “system claims” that permit broader claim scope than warranted by the invention) (on file with The New York University Journal of Legislation and Public Policy).

270. SUBCOMM. ON COURTS, THE INTERNET, AND INTELLECTUAL PROP., H. COMM. ON THE JUDICIARY, 109TH CONG., DRAFT PATENT REFORM BILL 31-32 (Comm. Print 2005), available at <http://www.ipo.org/TemplateRedirect.cfm?template=/ContentManagement/ContentDisplay.cfm&ContentID=18410>.

271. H.R. 2795, 109th Cong. (Substitute offered by Chairman Lamar Smith, July 26, 2005), available at <http://www.ipo.org/TemplateRedirect.cfm?template=/ContentManagement/ContentDisplay.cfm&ContentID=19482>. In a related vein, it has been suggested that some patentees have been successful in obtaining royalty awards based on the entire market value of an infringing product, rather than the contribution of the invention. See Schact & Thomas, *supra* note 267, at 35–36. Recent reform legislation has included clarifying language to reduce the incidence of any such damages miscalculation. H.R. 2795, *supra* note 8, at 36–37.

272. *eBay, Inc. v. MercExchange, L.L.C.*, 126 S. Ct. 1837, 1839, 1841 (2006) (overruling the Federal Circuit’s controversial injunction standard and holding that the traditional four-factored test articulated in cases like *Weinberger v. Romero-Barcelo*, 456 U.S. 305, 311–313 (1982), is to be applied to patent injunctions).

273. *Patent Law Reform: Injunctions and Damages: Hearing Before the Subcomm. on Intellectual Prop. of the S. Comm. on the Judiciary*, 109th Cong. (2005) (comments of Mark A. Lemley).

should occur only to the extent that injunctive power can currently be manipulated to provide a windfall for litigants who have the accidental good fortune (or legal skill) to possess patent claims that read on a technological advance truly developed by another.

TABLE 2
PROBLEM: IMPROPER USE OF PROCEDURAL DEFECTS TO ASSERT
OUTSIZED PROPRIETARY CONTROL OVER INVENTIONS

	Pseudo-Synoptic Approach	Incrementalist Approach
Alternatives Considered (Searches)	Reverse presumption regarding injunctive relief for patent property rights Eliminate damages enhancement for willful behavior	Attenuate the award of injunctive relief by permitting the consideration of impact on commerce in relation to the actual invention Create industry or technology-specific criteria for the award of injunctive relief Simplify willfulness assessment and make the criteria more predictable
Evaluation Criteria	Eliminate the effect of patent thickets and trolls	Preservation of <i>ex ante</i> incentives Reduction of economically inappropriate bottlenecks Appreciation of industry or technology-specific factors
Consensus Mechanism	Marginalization of certain technology-specific IP owners	Comprehensive industry and public interest group participation Amicus briefing
Mechanism for Change	Legislative	Legislative Court

In the damages context, the debate regarding the penalty for willful infringement is similarly illustrative of the dangers of an overly goal-oriented focus. The question of whether willfully wrong behavior should be punished addresses when and to what extent patent damages should serve as a deterrent rather than a compensation mechanism.²⁷⁴ In the United States, an infringer whose conduct is found to be willful may be liable for up to three times the amount of actual damages.²⁷⁵ The circumstances under which this provision can

274. See, e.g., Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law's Willfulness Game*, 18 BERKELEY TECH. L.J. 1085, 1122–23 (2003) (noting that over-deterrence increases litigation cost barriers).

275. See 35 U.S.C. § 284 (2000).

be imposed have been recently restricted,²⁷⁶ but it remains a controversial remedy. Some countries go further and actually apply criminal penalties to patent infringement.²⁷⁷ This is perhaps more troublesome, as a prospective innovator is indifferent to an accompanying fine that is forfeited to the state, and would be unlikely to adjust his or her efforts in response. The complexities and uncertainties in avoiding the willfulness penalty have led some commentators to call for an elimination of this measure of damages assessment.²⁷⁸ The recent amendment to the 2005 U.S. patent reform legislation does not go quite so far; it simply codifies recent case law and identifies specific scenarios wherein willfulness can be considered.²⁷⁹

However, an analysis of the relevant incentives to invent suggests that complete elimination of willful infringement damages could have a dramatically negative effect on IAI creation. Although such enhanced damages provisions may be written into the relevant statute, they are more properly viewed as “extra-legal” because they relate a property owner’s ability to enforce the right and the attendant institutional barriers that exist. The point of the increased damages is nominally respect for patent rights, but it operates to ensure that a patentee will not be compelled to avoid enforcement that would result in compensation not sufficient to account for the actual damages and the transaction costs in filing the suit.²⁸⁰ If the costs of enforcement become such a burden that a patent fails to serve as an investment recouping mechanism, the incentive is essentially nonexistent. To

276. See *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1344–46 (Fed. Cir. 2004) (eliminating the presumption of willfulness when a defendant has either not obtained legal advice or refuses to waive privilege on legal advice obtained).

277. See Larry Coury, Note, *C’est What? Saisie! A Comparison of Patent Infringement Remedies Among the G7 Economic Nations*, 13 *FORDHAM INTELL. PROP. MEDIA & ENT. L.J.* 1101, 1138–39, 1145–46 (2003) (reviewing the infringement remedies of several countries and noting that Germany and Japan provide criminal penalties for patent infringement).

278. See, e.g., *NAS REPORT*, *supra* note 2, at 119–20 (“Lacking evidence of its beneficial deterrent effect but with evidence of its perverse antidisclosure consequences, the committee recommends elimination of the provision for enhanced damages based on a subjective finding of willful infringement . . .”). There is, in fact, a rather strong argument for ridding patent law of other subjective tests (e.g., best mode, inequitable conduct) due to the presumption that the uncertainty of the outcome is a drain on patent value. *Id.* at 120–23. But it is unclear that fear of negative consequences for failure to follow patent prosecution rules actually impacts the incentive to invent.

279. H.R. 2795, *supra* note 8, at 37–39.

280. See *FTC REPORT*, *supra* note 1, ch. 5, at 28–31 (“[T]he record also reveals that the doctrine serves some use, such as when one firm knowingly and deliberately uses another’s patented invention because the likelihood that the patentee can afford to bring suit, and the expected value of single damages, are low.”).

determine whether willfulness is an appropriate remedy, one must also assess any net positive effect it has on *ex ante* incentives minus follow-through invention disincentives.

3. *Measures to Increase the Scrutiny of Institutional Review*

Perhaps the most common complaint about modern patent systems is that too many patents seem to be issuing on inventions that are not groundbreaking, but rather mundane or arguably even obvious.²⁸¹ Examples of “silly patents” are bandied about and the notion is spread that the system rewards game-playing more than invention.²⁸² Reform proposals in this regard primarily focus on increasing the ability of institutional reviewers to scrutinize patents. Though this could have some positive effect depending on the increased transaction costs, suggestions to raise the level of patentability may ultimately prove a better alternative.

The examination process itself is a frequent source of criticism. Those seeking patents complain about undue delay and the quality of examiners.²⁸³ Those who believe that the quality of issued patents is poor (*i.e.*, that clearly invalid patents are granted) complain about the bureaucratic structure, the funding, and lack of oversight.²⁸⁴ It may be impossible to make an examination process perfect, and it has been argued that it would in fact be inefficient to try based on the small number of patents that are ever asserted against others.²⁸⁵ Reform at this level is generally directed to attempting to bolster administrative

281. See NAPA REPORT, *supra* note 3, at 23; NAS REPORT, *supra* note 2, at 103–04 (“The quality of [the PTO’s] output is often questioned and its decisions are widely considered to take too much time.”).

282. There is even a Website called “Patently Silly,” one of many devoted to the display of arguably ridiculous patent grants. See <http://www.patentlysilly.com> (last visited Sept. 9, 2005).

283. See, *e.g.*, FTC REPORT, *supra* note 1, ch. 5, at 4–6 (“Several panelists from a cross-section of industries indicated that current pendency periods are a significant problem.”).

284. See, *e.g.*, Thomas, *supra* note 97, at 316–21; JAFFE & LERNER, *supra* note 4, at 130–42 (detailing three major problems that impact U.S. PTO quality: (1) budgetary constraints, (2) maintaining adequate incentives for examiners, and (3) poor management of resources).

285. See Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. REV. 1495, 1508–11 (2001) (“The strong implication . . . is that society ought to resign itself to the fact that bad patents will issue, and attempt to deal with the problem *ex post*, if the patent is asserted in litigation.”). *But see* John R. Thomas, *The Responsibility of the Rulemaker: Comparative Approaches to Patent Administration Reform*, 17 BERKELEY TECH. L.J. 727, 730–40 (2002) (refuting Lemley’s notion of rational ignorance by focusing on the societal costs of such ignorance).

resources.²⁸⁶ However, one interesting measure to address problems perceived to affect one particular art more substantially is worth noting. The U.S. Patent and Trademark Office (PTO) utilizes an enhanced, second-level review for patent applications classified as business methods.²⁸⁷ Ostensibly, it is a second opportunity to catch invalidating prior art and review the application for statutory compliance. At this early stage it is unclear whether this has resulted in a stronger focus on IAs or simply procedural noise.²⁸⁸

More comprehensive opportunities for post-grant review in the United States are an oft-cited measure to improve patent quality. A comparison of two prominent models, the EPO “opposition” and the U.S. “reexamination,” demonstrates the complexities of creating a system with reasonably succinct procedures that still ensures that bad patents can be effectively eliminated. The European system, often praised for its comprehensiveness and degree of use,²⁸⁹ allows third parties to participate in a detailed inquiry into all major aspects of the patent grant.²⁹⁰ Although multiple oppositions may be filed, one of the most significant aspects of this system is that any opposition must be filed *within nine months* of the patent grant; after that, the patent can only be opposed through a national procedure in one of the EPO countries.²⁹¹ In contrast, a U.S. reexamination may be filed at the PTO by a third party or the patentee and conducted as an *ex parte* review (really, a second examination),²⁹² or a third party may request an *inter partes* procedure.²⁹³ There is no time limit on requesting

286. See NAS REPORT, *supra* note 2, at 104 (“The current discussion of the patent fee structure, fee revenue, and USPTO appropriations suggests that many observers believe that the answer lies mainly in providing more financial resources.”).

287. See NAPA REPORT, *supra* note 3, at 66–67 & tbl.3-2.

288. A recent study tends to support the former conclusion. See John R. Allison & Starling David Hunter, *On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods* 56 (Sloan Sch. of Mgmt., Mass. Instit. Tech., Research Paper No. 4564-05, 2005) (addressing the impact of the “second look” initiative and concluding that it has “significant positive effects on the number and type of prior art references cited”).

289. See, e.g., Graham, *supra* note 152, at 114 (noting advantages in the EPO opposition system such as the fact that it handles many more disputes than the U.S. analog).

290. See NAS REPORT, *supra* note 2, at 98–99 tbl.4-1 (comparing issues that may be addressed in EU and PTO oppositions/reexaminations and demonstrating the much more restricted nature of reexaminations on issues not related to prior art).

291. See Graham, *supra* note 152, at 87.

292. See 35 U.S.C. § 302 (2000). See also Graham, *supra* note 152, at 83–84 (explaining traditional reexamination process).

293. See 35 U.S.C. § 311 (2000). See also NAS REPORT, *supra* note 2, at 98 tbl.4-1 (comparing the ability of patent challengers to participate in reexaminations and oppositions, noting third-party participation in the context of *inter partes* reexamination).

reexaminations, but the subject matter is limited essentially to prior art issues,²⁹⁴ which may not be the strongest argument to revoke a patent. The percentage of U.S. patents reexamined pales in comparison to the percentage of EPO patents opposed.²⁹⁵

Which system is better? It is certainly clear which one has more support. Most commentators, including associations that include large numbers of intellectual property owners, believe that the European-style system better balances the ability to challenge patents with limits on unnecessary delay in legitimate patent enforcement.²⁹⁶ Many support adopting a similar procedure in the U.S., but only if it replaces rather than simply adds to the existing time and cost of litigation.²⁹⁷ The distinction between the two comes down to whether either the EPO or U.S. procedure supports more downstream invention by freeing up subject matter improperly captured than is inhibited by any additional costs of enforcement and uncertainty. Because the similarities far outstrip the differences, the effect of change is likely to be minimal. This is an extremely difficult analysis to conduct, and arguably requires comprehensive rationality. For that reason, an incremental approach would favor retention and revision of the U.S. system.

On the other hand, a more effective remedy to the problem of bad patents would seem to be raising the patentability bar, so long as legitimate IAs are not precluded. This is easier said than done, of course. The fact that patents are the product of linguistic interactions between real people—often before the final marketplace application of the invention becomes clear²⁹⁸—provides opportunities for misinterpretations and errors in judgment. The obviousness/inventive step determination in particular is open to interpretation and, to some extent, the possibility of different degrees of restriction depending on

294. See 35 U.S.C. §§ 301, 311 (2000).

295. See Graham, *supra* note 152, at 90 (reporting that, between 1980 and 1998, there were 33,599 EPO oppositions but only 4547 U.S. reexaminations).

296. See, e.g., AIPLA RESPONSE, *supra* note 7, at 14–15.

297. See, e.g., *id.* at 19 (“[T]o aid in preventing the review proceeding from becoming a vehicle for harassing patentees, AIPLA believes that strict time limits should apply and be adhered to by the administrative patent judges.”). The concern about the additional costs of harassment to patent owners was a primary reason that the initial U.S. *ex parte* reexamination procedure was so circumscribed. See H.R. Rep. No. 96-1307, pt. 1, at 3–4, as reprinted in 1980 U.S.C.C.A.N. 6460, 6462–63 (1980).

298. Under U.S. law, there is no requirement that inventions be actually reduced to practice before filing; a patent application itself is considered to be a constructive reduction to practice. See 37 C.F.R. §1.626 (2004); *Hyatt v. Boone*, 146 F.3d 1348, 1352 (Fed. Cir. 1998) (“The filing of a patent application serves as conception and constructive reduction to practice of the subject matter described in the application.”) (citing *Yasuko Kawai v. Metlesics*, 480 F.2d 880, 885 (C.C.P.A. 1973)).

TABLE 3
 PROBLEM: INSUFFICIENT INSTITUTIONAL REVIEW PERMITS PATENTS
 WITH INAPPROPRIATE SCOPE

	Pseudo-Synoptic Approach	Incrementalist Approach
Alternatives Considered (Searches)	Institute European-style opposition proceeding in the United States Raise the obviousness/inventive step requirement by shifting burden of proof to applicant Eliminate the doctrine of equivalents entirely, or in arbitrary circumstances	Broaden review of existing U.S. reexamination proceedings Create industry or technology-specific criteria for the consideration of obviousness Create industry or technology-specific criteria for consideration of the utility and written description requirement Institute "second look" pre-grant patentability review procedures that are industry or technology-specific
Evaluation Criteria	Prevent patents that do not award true technological advancement but rather act as deadweight obstacles	Control transaction costs associated with obtaining a patent Reduce the number of invalid patents that issue and act as anticompetitive devices Appreciation of industry or technology-specific factors
Consensus Mechanism	Comprehensive industry and public interest group participation	Comprehensive industry and public interest group participation Amicus briefing Comments on rulemaking
Mechanism for Change	Legislative	Legislative Court Administrative Agency

how the test is applied.²⁹⁹ Some see the raising of the obviousness bar as a useful mechanism to restrict patentability in response to the concern that certain types of patents are issued too readily.³⁰⁰ In some cases, courts seeking to achieve predictability in its application may settle on overly formalistic rules.³⁰¹ The Federal Circuit's obvi-

299. See Burk & Lemley, *supra* note 116, at 1651–52 (noting how secondary considerations of obviousness enable a court to incorporate non-statutory factors at will).

300. See, e.g., NAS REPORT, *supra* note 2, at 91–95 (arguing for a more stringent application of obviousness in the context of gene sequence patents).

301. In the context of chemicals, obviousness can be inferred from the similarity of chemical structures alone. See CHISUM, *supra* note 37, at § 5.04[6] ("A key problem is whether a compound that is 'chemically obvious' in the above sense should be

ousness test³⁰² has come under particular scrutiny for relying too heavily on indications of a teaching, suggestion, or motivation to combine prior art as a proxy for a true flash of genius.³⁰³ It will be reviewed, and perhaps revised, by the Supreme Court in the near future.³⁰⁴ All in all, raising the patentability bar across all fields is a non-incrementalist approach; it would require great knowledge of the impact of the current standard and the risk of losing some legitimate patents through any revision.

Additionally, the requirement for precise claiming³⁰⁵ is complicated by the limitations of the language in which the patent is drafted. Concern that imprecise wording could result in a patentee inadvertently claiming less than he or she was entitled has led U.S. courts to create a rule that extends narrow patent claims to clear “equivalents.”³⁰⁶ As another court-created rule, this “doctrine of equivalents” suffers from the unpredictability of various—and to some extent conflicting—guidelines that must be derived from the case law.³⁰⁷ Attempts to clarify the confusion with more simple, but arbitrary, rules have been rejected.³⁰⁸

Similarly, how much reduction to practice is required to support broad claims is another area with many shades of gray. While patents are nominally required to cover inventions that are useful³⁰⁹ (or have

viewed as nonobvious for the purposes of the patent laws when the inventor shows that it possesses unexpected properties not in fact possessed by the prior art.”). This arguably means that patentability standards for chemicals are higher than other arts.

302. See *Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1354 (Fed. Cir. 2003) (“A showing of obviousness requires a motivation or suggestion to combine or modify prior art references, coupled with a reasonable expectation of success . . .”).

303. See, e.g., NAS REPORT, *supra* note 2, at 89–90 (referring to the problem of the obviousness criteria in the context of business method patents).

304. See *KSR Int’l Co. v. Teleflex, Inc.*, 126 S. Ct. 2965 (2006) (granting certiorari on the question of whether an invention can be rendered obvious absent a teaching, suggestion, or motivation to combine the prior art).

305. See, e.g., 35 U.S.C. § 112 (2000).

306. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 731 (2002) (“Unfortunately, the nature of language makes it impossible to capture the essence of a thing in a patent application.”).

307. See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 573–75 (Fed. Cir. 2000) (reviewing divergent lines of cases and commentary regarding the application of prosecution history estoppel to the doctrine of equivalents), *vacated and remanded*, 535 U.S. 722 (2002).

308. See *Festo*, 535 U.S. at 739–40 (rejecting the application of bright line rules to resolve doctrine of equivalents issues due to the impact on existing patent property rights).

309. See 35 U.S.C. § 101 (2000).

“industrial application”³¹⁰), one presumes that few would be pursued for creations that are not in fact useful.³¹¹ Regardless, this requirement has been heightened in some cases, not as a means of preventing useless or inoperable inventions from being patented, but to ensure that the applicant knows enough about the potential application of the invention to state a firm, credible utility.³¹² Whether this is a simpler mechanism than heightened obviousness is unclear, but both attempt to prevent easy, broad inventions from precluding later IAI creation that may contribute progress of the useful arts.

All patentability-raising measures have the potential to make a significant impact on IAI creation and the reduction of deadweight loss if the effect of all factors is well understood. However, it is difficult to imagine how one could be crafted in a unitary manner that would satisfy all parties. The possibility of elevated standards through the incremental process of court revision is a more likely possibility and, if successful, may end up becoming the most successful reform measure.

D. *The Return of Synopsis*

As a final note on reform methods, it is important to understand that a rational-comprehensive approach to innovation policy need not remain forever unachievable. As more information is gathered on the performance of patent systems, and if greater consensus is reached as to the proper goals, it may well be possible to account for the effect of legal revision on various factors. It is a policy problem with which society is acquiring greater sophistication. At some point, when outcomes can be predictably determined, synoptic design and reform may be achievable and optimal.³¹³

A particular bright point in our understanding of patent systems is the increasing amount of theoretical and empirical research on the patent system. Several prominent economic research organizations have patent-oriented sections to accumulate and study this data, such

310. See, e.g., EPO GUIDELINES, *supra* note 108, pt. C, ch. IV, § 4.1 (“An invention shall be considered as susceptible of industrial application if it can be made or used in any kind of industry, including agriculture.”).

311. Such guidelines are occasionally used to prevent inventions that violate basic laws of physics, like perpetual motion machines, from being patented. Thankfully, most large companies submit few applications of this type.

312. See Burk & Lemley, *supra* note 116, at 1644–45 (“The PTO’s Utility Guidelines for such patents require a showing of “specific,” “substantial,” and “credible” applications not found in examination of other technologies.”) (citing Utility Examination Guidelines, 66 Fed. Reg. 1092, 1098 (Jan. 5, 2001)).

313. See Bendor, *supra* note 180, at 832–34.

as the National Bureau of Economic Research (NBER),³¹⁴ the United States's National Academies,³¹⁵ and the Organization for Economic Cooperation and Development (OECD).³¹⁶ Legal scholarship on patents has also dramatically increased and has been integrated into interdisciplinary work on the operation of the system.³¹⁷

Additionally, the non-economic social issues are debated openly in prominent international settings.³¹⁸ While there is still a great divide between objectives of owners (and industrialized nations) and the non-owners (and developing nations), it is possible that continued discussion along with greater economic evidence will generate some level of consensus on the raking of system goals.

CONCLUSION

Patent systems are phenomenally complex and our ability to rationally direct them is limited. This is due in no small part to reasonable disagreement over the system's most important goals. It also stems from the ambiguity regarding most of the key questions concerning the economic incentive levers, despite a multitude of studies and years of experience. Because a thorough understanding is of fundamental importance for setting innovation policy and designing appropriate rules, modern attempts at rational-comprehensive reform are doomed to failure. It is time to reassess our approach to patent reform and accept a more moderated method that is, by design, less than perfect.

314. NBER's Productivity Program includes an initiative entitled "Innovation Policy and the Economy" and has produced original and significant work in patent economics. See Ernst R. Berndt, *Program Report: Productivity*, 2002 NBER REPORTER 3, available at <http://www.nber.org/reporter/spring02/spring02.pdf>.

315. The National Academies' Board on Science, Technology and Economic Policy (STEP) has played a role in fostering research and debate on the patent system, including hosting a recent series of "town hall" meeting with AIPLA and the FTC. See *Events*, STEP NEWSLETTER (Bd. on Sci., Tech. and Econ. Policy, Washington, D.C.), Oct. 22, 2004, at 1, available at http://www7.nationalacademies.org/step/STEP_Newsletter_September-October_2004.pdf.

316. OECD sponsors a number of intellectual property-oriented initiatives through its Science, Technology and Industry Directorate; Economics Department; and Trade Directorate. See ORG. FOR ECON. COOPERATION AND DEV., COMPENDIUM OF OECD ACTIVITIES RELATED TO IPR (2006), available at <http://www.oecd.org/dataoecd/60/61/34305040.pdf>.

317. See NAS REPORT, *supra* note 2, at 40 ("There is also a growing body of research on the relationship between patents and innovation across countries and time.").

318. For example, the issue of access to essential medicines was an integral part of the 2001 Doha Development Agenda regarding the TRIPs agreement. See Doha Declaration, *supra* note 225.

An incrementalist approach provides the best outline for immediate reform of the patent system. By using methods that maximize local searching for less radical alternatives and stakeholder consensus, a less dangerous policy can be fashioned. Frequent trial-and-error analysis will ensure that the patent system avoids stagnation and continues to progress forward. The reduced risk for serious disruption of existing investment-backed interests and the incentive to create future inventions mandates an incrementalist approach over potentially misguided, pseudo-synoptic reform. And in the future, as more theoretical and empirical information is obtained, rational-comprehensive methods should be reconsidered. While incrementalism may be a tacit acknowledgement of our current inability to design a perfect patent system, it is the best modern formula for preserving the benefits of an important innovation tool while permitting some of the costs to be reduced.

