Patenting Innovation:
Intellectual Property Rights
in the New Economy

by

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ABSTRACT

In advanced industrial economies where, increasingly, intellectual assets are the principal source of value, productivity, and growth, strong intellectual property rights (IPRs)—conferred by patents, copyrights, and penalties for misappropriation of trade secrets—are an important inducement to invention and investment. For this reason, the extension and strengthening of IPRs in the United States and elsewhere in the past twenty-five years were appropriate and probably necessary. It may be that in some respects those processes should proceed further. On the other hand, there is growing friction over the assertion and exercise of some IPRs, particular patents, and claims that in some circumstances they may be discouraging research, its communication, and use. The question arises whether in some respects the strengthening and extension have proceeded too far.

It is well known that the use of, reliance upon, and effects of patent protections vary across industries and technologies, but until recently there has been remarkably little empirical research documenting these differences. Fortunately, this is beginning to change, and the effects of some of the policy changes in the 1980s and 1990s are beginning to be investigated. Some evidence suggests that the effort to strengthen patent rights has indeed increased their importance and may have contributed to the growth of industrial R&D funding. On the other hand, recent survey evidence indicates that U.S. manufacturing firms in most industries rely more heavily on trade secrecy, lead time, and other technological protections to recoup their R&D investments than they do on legal mechanisms such as patents.

This thesis examines the effects that a stronger, broader patent regime is having on today's industries. The main issues that emerge are those of patent quality and scope, as caused by problems with patent administration and litigation. Various solutions to these problems are then investigated, and recommendations made for future reform.
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I. INTRODUCTION

As the industrialized nations of the world forge into the twenty-first century, they are being propelled by the information-based technologies of tomorrow, not the resource-based businesses of old. For the software and telecommunications companies of the new economy, success depends far more on technical know-how than manufacturing might. Brainpower, not steam-power, now drives the wheels of economic progress.

In a world where intellectual assets are fast becoming the principal source of productivity and growth, it is increasingly important to protect those assets with the rights conferred by patents, copyrights, trademarks and trade secrets. Usually by virtue of a statutory monopoly, such intellectual property rights provide penalties for the unauthorized use of proprietary ideas and inventions.

Yet the real value of such rights lies not in the rightholder’s power to protect against imitation or theft but in society’s ability to benefit from that protection. Creative or innovative activity typically involves substantial expenditures of time, effort, and money. If artistic works or inventions are easily copied, there is a smaller prospect of profits with which to recoup those costs, and so some innovators will choose not to devote the resources required to produce them. The protection offered by intellectual property rights counteracts this effect, thereby increasing innovative activity and providing society with valuable inventions and works of art which might not otherwise exist.

Technological progress is further enhanced by the disclosure incentives of copyright and patents. By enticing an innovator to publicly disclose his invention or discovery in exchange for the grant of exclusivity, the technical advance embodied in the invention is added to the store of public knowledge, thereby stimulating other ideas and leading to further innovation.

Based on this simple model, the past twenty-five years has witnessed a dramatic expansion of the world’s intellectual property systems. If the intellectual property laws create incentives for people
to invent, then stronger intellectual property protection should result in increased innovative activity and technological advance—more protection, more innovation.

Nowhere was the expansion more evident than in the United States. In the midst of the most severe recession since World War II and faced with the rapid emergence of Japanese and European competitors in the computer and semiconductors industries, U.S. policy-makers in the mid-1970s had become particularly concerned about the technological competitiveness and productivity of the country's economy. Seizing upon stronger intellectual property protection as a way to regain the comparative advantages they had once enjoyed, the United States embarked on a number of initiatives aimed at significantly strengthening and extending intellectual property rights, both at home and abroad. The following chronology highlights the most important of those events:

- The 1976 Copyright Act, completely overhauling copyright law to include new forms of media.
- The 1980 amendments to the Copyright Act, expressly permitting copyright protection for computer programs.
- The 1980 Bayh-Dole Act, enabling universities and other non-profit federal contractors to obtain exclusive rights to their inventions.
- The Supreme Court's decisions in *Diamond v. Chakrabarty*, which established the patentability of genetically-engineered organisms, and *Diamond v. Diehr*, which opened the door to the patenting of computer software.
- The creation in 1982 of the Court of Appeals for the Federal Circuit (CAFC), a unified federal court with exclusive jurisdiction over patent appeals.
- The Semiconductor Chip Protection Act of 1984, creating an entirely new intellectual property right for the protection of semiconductor designs.
- The 1984 Hatch-Waxman Act, extending the patent terms on regulated pharmaceuticals.
• The 1994 Uruguay Round Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and various bilateral agreements, ostensibly strengthening foreign IPR protection and harmonizing national standards.

• The Economic Espionage Act of 1996, creating new federal criminal and civil penalties for theft of trade secrets.

• The Digital Millennium Copyright Act of 1998, further strengthening U.S. copyright protection.


• The 1999 Anti-Cybersquatting Act, protecting the rights of trademark holders in cyberspace.

• The Napster appeals court ruling in March 2001, denouncing the cyber-circumvention of copyright laws.

Looking back, it seems incontrovertible that the strengthening and extending of intellectual property rights has translated into greater innovation and economic growth. The past two decades have played host to the greatest technological advances in the history of human civilization. The current rate of technological advance is simply amazing. Research and development expenditures have never been higher. Productivity numbers are way up.

Yet there is growing friction over the acquisition and assertion of intellectual property rights, especially patents. Recent litigation has highlighted the existence of patents on inventions which seem patently obvious or overly broad, particularly in the new area of business method patenting. In the software and semiconductor industries, the proliferation of patents appears to be erecting significant barriers to innovation.

Furthermore, there is limited evidence that a stronger patent system has actually led to increased spending on research and development in the United States. Indeed, a number of surveys
Part I. Introduction

have revealed that patents are considered to be among the least effective means for recouping investments in research and development.

Paradoxes abound, forcing us to seriously question the traditional incentive model. It may be that patents aren’t actually fostering innovation, they’re hindering it—either directly, with barriers that discourage companies from innovating, or indirectly, by funneling resources away from research and development and into patent portfolio management, patent applications, litigation costs and damages.

Using recent economic data, this thesis takes a hard look at the link between patents and technological innovation and whether it is, in fact, just a disconnect. Is the traditional model upon which the entire patent system has been built—a theory so patently intuitive as to remain essentially unquestioned for over 200 years—so far off the mark? And could that simple assumption, relied on for decades of patent reform in the United States and elsewhere, be doing more harm than good?

In Part II: Strengthening and Extending the Patent System, I’ll trace the developments in U.S. patent law over the last twenty years and identify how patent rights have been strengthened and dramatically extended.

Part III: Concerning the Effects on Innovation will examine the effects that the new patent rights are having on the various industries of the new economy, including semiconductors, software, and the Internet.

In Part IV: Identifying the Issues, I will review the theory behind the patent system and its recent expansion and fortification, and then lay out the main issues, including patent scope, patent administration and patent litigation.

Part V: Formulating the Solutions will survey the proposed reforms. What can be done to make the patent system work better? What has been done so far to address the problems? How can we reconnect the patent system with innovation?
II. STRENGTHENING & EXTENDING THE U.S. PATENT SYSTEM

Nineteen-eighty was a watershed year for the United States patent system. A series of legislative initiatives extended patent protection to a whole new set of players—universities and federally-funded laboratories. Then, in two landmark decisions, the Supreme Court extended the reach of the patent system into two entirely new areas of endeavour—biotechnology and software. Two years later, the creation of a new patent court—the Court of Appeals for the Federal Circuit—resulted in a significant reinforcement of those rights and their further expansion beyond the traditional frontiers of patentable subject matter.

A. The Patenting of Publicly-Funded Research

Traditionally, U.S. law regarding the patentability of federally-funded research provided that the government held title to any invention generated with its funds. As patent holder, it could then issue royalty-free non-exclusive licenses to any private manufacturers wishing to commercialize the technology. Post-war efforts to allow federal contractors and universities to assume title to their inventions were met with opposition by those arguing that the results of federally-funded research should inure to the benefit of the public, not a private monopoly under which the public is charged for the use of a technology it had funded.

This debate continued through the 1950s, and, despite being the topic of over four special commissions and forty congressional hearings or reports, in 1979 there was still no comprehensive policy regarding the patenting of publicly-funded research in place. A few universities patented fairly actively, but their patents represented either the fruits of research performed with no federal funding,

\[\text{\textsuperscript{1}}\]

patents sought for public or professional prestige and not commercial development, or inventions that had received a title rights waiver from the federal agency funding the research. Some agencies routinely granted such waivers, a few others signed blanket agreements that permitted certain universities to patent the results of all research funded by that agency, but the majority of agencies kept full title and offered only non-exclusive licenses.

By the late 1970s, it was obvious that such a system was almost completely ineffective at commercializing federal research. Private firms had little incentive to spend resources on developing federal research into marketable products if that research remained in the public domain for anyone else to develop as well. Quite rightly, businesses viewed the government’s non-exclusive licenses as “no patent protection at all,” and stayed away in droves—of the 28,000 patents owned by the government at the time, a mere four percent had been licensed to private industry for further development. Faced with additional evidence that the failure to patent federally-financed discoveries had allowed foreign competitors to expropriate them instead, Congress began to pass various pieces of legislation that eventually allowed all publicly-funded research to be either patented or exclusively licensed.

The most important of these was the Bayh-Dole Act of 1980, which allowed universities and other non-profit institutions to automatically retain title to patents derived from federal research,
thereby removing the need to get an explicit waiver from the funding agency. The legislation explicitly recognized that technology transfer to the private sector was a desirable outcome of publicly-funded research, and endorsed the principle that exclusive licensing of such research was sometimes necessary to achieve that objective. To further stimulate innovation, the Bayh-Dole Act also required that universities share patent royalties with individual inventors, thus giving both parties an incentive to be on the lookout for patentable inventions.

In addition to opening up university patenting, the Bayh-Dole Act also allowed government-operated laboratories such as the National Institute of Heath to grant exclusive licenses on government-owned patents. The simultaneous passage of the Stevenson-Wydler Technology Innovation Act of 1980, made technology transfer a mission of all federal laboratories and created a variety of institutional structures and regulations to facilitate it. Over the course of the 1980s, a series of initiatives further expanded the possibilities for patenting by these labs, while a variety of implementing memoranda and legislative clarifications extended many of these provisions to those facilities owned by the government but operated by research contractors, including the National Laboratories of Los Alamos, Oak Ridge, Lawrence Livermore, and others.

The wave of legislation did not completely resolve the debate over how much ownership of government-funded R&D ought to be transferred to private sector entities—in recent years, the controversy has impinged on the patenting activities of federal labs and raised questions about the

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5 The stated policy objective of the Bayh-Dole Act was "to use the patent system to promote the utilization of inventions arising from federally supported research or development." 35 U.S.C. § 200 (1994).


Part II. Strengthening & Extending the U. S. Patent System

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desirability of at least some forms of university patenting. Nevertheless, the 1980s witnessed an extraordinary transformation of the U.S. patent system from one in which the patenting of publicly-funded research was the exception to one in which it is the norm.9

B. The New Realm of Patentability

Concurrent with these changes in who could patent were momentous changes in what could be patented.10 In the landmark 1980 case of Diamond v. Chakrabarty, the Supreme Court was asked to decide whether a living bacterium designed to degrade crude oil was patentable subject matter.11 The Court ruled in the affirmative, establishing for the first time the patentability of genetically-engineered organisms, and by extension, biotechnology and genomics. For purposes of patentable subject-matter determination, said the Court, the relevant distinction is not between living and non-living materials, but rather "between products of nature, whether living or not, and human-made inventions."12

Less than four months later, the Court heard Diamond v. Diehr, a case involving the patentability of a process for curing synthetic rubber using a well-known mathematical algorithm and a

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9 The extension of patenting and licensing privileges to inventors in universities and government laboratories can be viewed as an extension of the larger trend toward corporatization of research in general. See Catherine L. Fisk, "Removing the 'Fuel of Interest' from the 'Fire of Genius': Law and the Employee-Inventor, 1830-1930" (1998) 65 U. Chi. L. Rev. 1127; Robert P. Merges, "The Law and Economics of Employee Inventions" (1999) 13 Harv. J. Law & Tech. 1.

10 In order to be eligible for U.S. patent protection, an invention must fit into one of the four categories specified by section 101 of the Patent Act, namely, "process, machine, manufacture, or composition of matter." 35 U.S.C. § 101 (1994). See Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470 at 483 (1974): "[N]o patent is available for a discovery, however useful, novel and nonobvious, unless it falls within one of the express categories of patentable subject matter of 35 U.S.C. § 101." As we'll see, the new technologies of the 1980s and 90s would seriously test these traditional boundaries.


computer for the calculation of the appropriate cure time. An attempt to patent a similar computerized process in 1978's Parker v. Flook was rejected because it violated the "mathematical algorithm" exception, yet the Court upheld the patent in Diehr, relying on the fact that the program acted in cooperation with an "otherwise statutory" industrial process (the curing). This distinction resulted in some rather inventive patent drafting, but the door was now open to the patenting of computer software.

While neither Chakrabarty nor Diehr actually involved traditional research, both decisions were likely motivated by the new Congressional mandate to better exploit the fruits of basic research. In Chakrabarty, the Court looked to the committee reports accompanying the 1952 Patent Act to conclude that "Congress intends statutory subject matter to 'include anything under the sun that is made by man.'" In Diehr, the Court reiterated that bold statement, and by allowing a patent on a process based almost exclusively on a mathematical algorithm, suggested that it would permit patenting of all inventions that moved even slightly in the direction of applied work.

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14 Parker v. Flook, 437 U.S. 584 (1978). Throughout the 1960s and 70s, computer software had been deemed unpatentable on the basis that it was really just a concatenation of mathematical algorithms or mental steps. See Gottschalk v. Benson, 409 U.S. 63 at 67 (1972): "Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." This was based on longstanding judicial doctrine. See Rubber-Tip Pencil Co. v. Howard, 87 U.S. (20 Wall.) 498 at 507 (1874) ("An idea of itself is not patentable..."); O'Reilly v. Morse, 56 U.S. (15 How.) 62 at 116 (1854) ("The discovery of a principle in natural philosophy or physical science, is not patentable."); Le Roy v. Tatham, 55 U.S. (14 How.) 156 at 175 (1852) ("A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.").
15 The legal strategy employed after Diehr might be called the "Doctrine of the Magic Words"—software was now patentable subject matter, but only if you spoke the magic words and pretended you were patenting something else entirely. In the 1980 and early 90s, patent attorneys did just that, claiming software inventions as various hardware devices or machines—or even as pizza ovens. See Julie E. Cohen & Mark A. Lemley, "Patent Scope and Innovation in the Software Industry" (2001) 89 Calif. L. Rev. 1 at 9.
16 As expressed by the Bayh-Dole and Stevenson-Wydler Technology Innovation Acts, supra.
18 This softened considerably the requirement of practical utility laid down in the 1966 Supreme Court decision of Brenner v. Manson, 383 U.S. 519 (1966).
If the Supreme Court had unlocked the doors to biotechnology and software patenting, its successor kicked them wide open. In 1994, the Court of Appeals for the Federal Circuit essentially eliminated the “otherwise statutory process or apparatus” requirement from Diehr, and established that a mathematical algorithm becomes patentable subject matter merely by virtue of its being programmed into a “general purpose” computer.\(^{19}\) Then, in 1998’s State Street Bank & Trust Co. v. Signature Financial Group, Inc., the Federal Circuit effectively ended what was left of the software debate, requiring only that the “practical application of a mathematical algorithm, formula, or calculation” produce a “useful, concrete, and tangible result.”\(^{20}\) And it opened another door—the patenting of methods of doing business.\(^{21}\)

It’s been a similar story for biotechnology. Although the Federal Circuit has retained the idea that “products of nature” per se are not patentable, it has routinely upheld patents on purified and isolated forms of molecules that occur in nature, including full gene sequences whose physiological function (i.e., the protein for which they code) has been identified.\(^{22}\) Today, genes and gene fragments are routinely patented by genomics companies such as Human Genome Systems, Inc. and Incyte Genomics, Inc.\(^{23}\)

\(^{19}\) *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) *en banc*.


\(^{21}\) Business method patents will be discussed in more detail in Section III.E, *infra*.

\(^{22}\) See, e.g., *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495 (Fed. Cir. 1997).

\(^{23}\) The patenting of gene fragments, known as expressed sequence tags (ESTs), has been controversial because, unlike full-length sequences, their functions are typically unknown. Many of these EST patent claims are also notable for their broad scope—the applications claim not only the EST but also the full gene of which it is a part, as well as future uses of the gene. See *Rai*, *supra* note 3, at 103-04. Again, a detailed examination of the issues in biotechnology patenting is outside the scope of this paper (and my limited scientific proficiency).
C. The Creation of the Federal Circuit

In the late 1970s, the U.S. patent system was widely perceived to be weak and ineffective, or at best, too slow. The Patent and Trademark Office (PTO) was so overworked that for a while in 1979, they stopped granting patents altogether.24 Distrustful of monopoly power in general, the Justice Department and the Federal Trade Commission (FTC) took a rather dim view of patents, often colouring attempts to enforce them with shades of anti-trust.25

The judiciary was even less kind. The U.S. Supreme Court had been hostile to patents since the Great Depression—between 1931 and 1976, it had invalidated the patent at issue in fifty-one, or 84%, of the 61 patent cases argued before it.26 Although the majority of lower courts were somewhat more receptive to patent holders, some were worse—during the same period, the Eighth Circuit invalidated 89% of the patents coming its way.27

Such discrepancies had led to the further problem of "forum shopping"—the practice whereby patent holders would try to bring cases in court circuits sympathetic to patents, while alleged infringers would seek out jurisdictions believed to be hostile. This further increased the costs and delays associated with patent cases, and acted to undermine the uniformity of the federal patent laws.28

25 The Department of Justice had a special section of its Antitrust Division devoted to anti-patent advocacy and litigation, and to some it appeared that the antitrust noose would constantly be tightened. See Easterbrook, "Is There a Ratchet in Antitrust Law?" (1982) 60 Tex. L. Rev. 705. The FTC, not to be outdone, attacked Xerox for building a great company through the judicious use of patents. See Xerox Corp., 86 F.T.C. 364 (1975).
27 Id. at 762.
In 1980, the patent system started to get stronger. Shortly after the *Chakrabarty* decision, the Supreme Court ruled that since monopoly power was indeed the purpose of the patent grant, efforts to extract the monopoly rents generated by them were not violations of anti-trust law.\(^{29}\) The Department of Justice removed itself from the business of patent bashing.\(^{30}\) Congress enacted a series of laws directed at strengthening and streamlining the Patent Office,\(^{31}\) and then, with the passage of Federal Courts Improvements Act of 1982, created a new federal patent court—the Court of Appeals for the Federal Circuit (CAFC)—replacing the regional appeals courts as the court of exclusive jurisdiction for all patent appeals.\(^{32}\)

Although ostensibly a procedural reform—it was expected that the Federal Circuit would not only solve the problem of forum shopping, but also bring a degree of specialization and in-depth knowledge to a complicated area of law, and contribute to more uniform decisions by the various district courts—the creation of the Federal Circuit had a rapid and profound impact on U.S. patent law. In only a few short years, the doctrine laid down by nearly 150 years of Supreme Court decisions was reconsidered, revised, and re-written.\(^{33}\)

\(^{29}\) *Dawson Chem. Co. v. Rohm & Haas Co.*, 448 U.S. 176 at 201-02 (1980).


\(^{33}\) Though, technically, the Supreme Court retained *certiorari* authority to hear an appeal from the Federal Circuit, it rarely does. See Mark D. Janis, "Patent Law in the Age of the Invisible Supreme Court" [2001] U. Ill. L. Rev. 387 at 387: “The Supreme Court has rendered itself well nigh invisible in modern substantive patent law. The Court of Appeals for the Federal Circuit, created in 1982, has become the de facto supreme court of patents. In those rare patent cases when the real Supreme Court has materialized, the Court has left behind a largely uninspiring jurisprudence.”
The most significant of the Federal Circuit’s changes was the dramatic lowering of patentability standards—particularly the “nonobviousness” requirement of section 103. Indeed, the standards came down so swiftly and so significantly that a “patentability gap” was created, as companies scrambled to obtain patents for research considered unpatentable a few years before. Coupled with a reinforcement of the presumption of validity itself, the result was no less than a new “pro-patent” era.

The numbers tell the story. During the first three years of its existence, the Federal Circuit invalidated only forty-four percent of the patents it adjudicated, nearly half the Supreme Court rate of 83%, and far less than the old appeals court rate of approximately 70%. Before 1980, a district court

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34 In pertinent part, section 103 requires that “[a] patent may not be obtained … if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a) (1994). Essentially, “prior art” is a measurement of the current state of technological advance. See infra, note 79, and accompanying text. The reduction of the nonobviousness standard was accomplished primarily by elevating the importance of secondary factors such as commercial success and long-felt need “to a central place in the law of patentability.” Robert P. Merges, “Commercial Success and Patent Standards: Perspectives on Innovation” (1988) 76 Calif. L. Rev. 803 at 834.


36 Section 282 of the U.S. Patent Act says that a patent challenged in court should be presumed valid. 35 U.S.C. § 282 (1994). Prior to 1982, a party could overcome this presumption with a mere preponderance of the evidence, but in Connell v. Sears, 722 F.2d at 1549 (1983), the Federal Circuit ruled that “clear and convincing evidence” of invalidity must be put forth by the patent challenger before the court finds the PTO’s decision of validity erroneous.

37 The emergence of the Federal Circuit was not only the most influential patent policy development of the past twenty years, it was the most important ever. See Robert P. Merges, “One Hundred Years of Solicitude: Intellectual Property Law, 1900-2000” (2000) 88 Calif. L. Rev. 2187 at 2215: “Patent law, no less than copyright and trademark, has had to adapt to several major waves of innovation this century. These innovations have produced monumental changes in the fabric of the law. … [T]he three I consider most important: (1) the ‘corporatization’ of patent law, following similar trends in industrial research and development (R&D) in the early years of the century; (2) the consolidation of eighty years’ worth of doctrinal adjustment in the Patent Act of 1952; and—most significant of all, in many ways—(3) the creation of the Court of Appeals for the Federal Circuit in 1982.”


39 Baum, supra note 26, at 760. From 1935 to 1974, the validity rate for the federal appeals courts (including the CCPA) was approximately 30%. Id.
ruling of patent validity was upheld on appeal approximately 62% of the time.\textsuperscript{40} Between 1982 and 1990, however, the Federal Circuit upheld 90% of such cases; conversely, where pre-CAFC appeals courts had overturned only 12% of district court findings of patent invalidity, the Federal Circuit reversed over half.\textsuperscript{41}

A more recent study from 1998 estimated that the overall probability a patent might eventually be invalidated now stands at 54%.\textsuperscript{42} Ten years earlier, expectations of patent invalidations hovered at around 70%.\textsuperscript{43} Perhaps more importantly, patent lawyers now believe the court favors patentees, and presumably, advise their clients accordingly. Thus, the new pro-patent sentiment of the courts was communicated to the potential applicants to the patent system—the high-tech companies of the late 1980s.

The Federal Circuit strengthened patents in a couple of other important ways. Not only is it far more likely to have a the validity of a patent hold up in court, the Federal Circuit has also made the consequences of infringing a U.S. patent much more serious. It is now far easier for a patent holder to obtain a preliminary injunction halting the sale of the alleged infringing product, and, if successful, to win damages that far exceed those awarded prior to 1982.

The \textit{Polaroid v. Kodak} battle of the early 1980s is often singled out as exemplifying this trend. After claiming an astronomical $12 billion for Kodak’s infringement of its instant photography patents, Polaroid managed to win a judgment for the still-stratospheric sum of $837 million, including $233 million in lost profits, $204 million in royalties, and another $436 million in interest.\textsuperscript{44} Other

\begin{footnotesize}
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\item Id.
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enormous awards include $1.2 billion from Honeywell to Litton for ring laser gyroscopes, over $1 billion thus far to the Lemelson Trust for bar coding, $212 million from Steelcase to Hayworth for movable office panels, and $171 million from Mobil to Exxon for a plastic catalyst.\footnote{See F.M. Scherer, Presentation to the National Academies' Board on Science, Technology and Economic Policy (STEP), \textit{Intellectual Property Rights: How Far Should They Be Extended?} (2-3 February 2000: Washington, DC). See also Gary Forger, "Common sense patents" \textit{Modern Materials Handling} (1 May 2000) at 7.}
III. CONCERNING THE EFFECTS ON INNOVATION

The growth of the United States patent system has been meteoric. Once a fragile right, valuable to few and enforced by even fewer, the patent now stands colossal, dominating entirely new areas of scientific endeavour, directing previously non-proprietary research settings and demanding adherence by formerly hostile regions of the world. Meanwhile, major modifications to U.S. patent doctrine have made patents more valid, and more valuable, than ever.

But have these changes been beneficial? What effect has this expansion and fortification had on technological innovation, the raison d'etre of the patent system? Has all this patent reform actually encouraged more innovative activity, as predicted by the traditional incentive theory?

At first glance, it seems the answer is yes. As shown in Figure 1, on the next page, the number of patents has exploded over the last twenty years. More or less constant at 40 to 50 thousand per year for most of the century, and actually declining through the 1970s, utility patents granted to American inventors totaled over 85,000 in the year 2000, more than double the number issued in any year from 1979 to 1986. Applications, meanwhile, rose to nearly triple what they were in 1984, and seem to be on a lunar trajectory.

Research and development spending has followed a similar path. As illustrated in Figure 2, R&D expenditures—measured in inflation-adjusted dollars—have never been higher. Though R&D spending by the public sector, while rising through the 1980s, has been declining through the 90s, spending by U.S. industry has doubled since 1980.

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46 Note that Figure 1 shows only domestic patents—that is, those patents applied for and granted to U.S. companies, institutions and individuals, typically about 55-60% percent of total patenting. As shown in Figure 3, on page 61, the overall trend is the same—from 315,015 applications, total patent grants numbered 175,983 in the year 2000, including 85,072 domestic utility patents, 72,425 foreign utility patents, 17,414 design patents, 548 plant patents, and 524 reissues.
Part III. Concerning the Effects on Innovation

Figure 1: U.S. Patent Activity (Domestic)\textsuperscript{47}

Figure 2: U.S. Research & Development Spending\textsuperscript{48}

\textsuperscript{47} Sources: United States Patent & Trademark Office, http://www.uspto.gov/; Jaffe, supra note 24, at 54, Fig. 1; Robert M. Hunt, "Patent Reform: A Mixed Blessing for the U.S. Economy?" (Dec. 1999) Federal Reserve Bank of Philadelphia Business Review at 17, Fig. 2.

\textsuperscript{48} Sources: National Science Foundation, Division of Science Resources Studies, http://www.nsf.gov/sbe/srs/; Jaffe, \textit{ibid.} at 54, Fig. 1; Hunt, \textit{ibid.} at 16, Fig. 1.
Thus, the increases in both patenting and R&D activity seem to be prima facie evidence that a stronger patent system does indeed foster innovation. Shortly after the policy changes of the early 1980s, patenting by U.S. inventors began to skyrocket. At about the same time, spending on research and development started its upward march. If innovation can be measured by patent activity or R&D spending, then surely the policy changes of the last twenty years have been successful.

On closer examination of Figures 1 and 2, however, we see that while the surge in patenting began in the mid-1980s, the increase in R&D spending started in the mid-70s. This suggests that while the increase in patenting may be due to changes in the patent system, it seems that the increase in research and development spending—or at least the beginning of it—is unrelated to those changes.

Furthermore, the decade-long lag between the upturn in R&D and the upturn in patenting is too long to be consistent with evidence showing that there is little or no lag between changes in R&D spending and changes in patent application rates. One might expect that it might take some time for money spent on research and development to manifest itself in the form of patentable inventions, but not that long. This suggests that the increase in R&D spending is not correlated to the increase in patenting. We need to take a closer look at what actually caused the surge in U.S. patenting, and how exactly patents are related to research and development spending.

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A. The Patent Surge

The most thorough analysis of U.S. patenting trends to date is that of Samuel Kortum and Josh Lerner.\textsuperscript{50} In their 1997 National Bureau of Economic Research paper, the authors consider four possible explanations for the unprecedented surge in patenting.

The first is what they call the "friendly court" hypothesis—that, as discussed above, the doctrinal modifications made by the Federal Circuit have made patents more valid, and hence increased the so-called propensity to patent of U.S. inventors. Not all inventions are patented, nor even all potentially-patentable ones. Inventors balance the time and expense of the patent process—and the possible loss of secrecy that results from patent publication—against the protection that a patent potentially affords to the invention. The "friendly court" of the Federal Circuit, posit Kortum and Lerner, has increased the probability of success in obtaining and defending a patent and has therefore shifted that balance, causing a higher proportion of potentially-patentable inventions to be patented.

A variant of the friendly court hypothesis sees the changes of the 1980s as an example of "regulatory capture"—that the large firms which dominated the research and patenting processes in the United States managed to induce the government to change the rules in their favour, making patenting easier. Under this theory, the increase in patenting would be dominated by those firms, taking advantage of the new environment they had created.

The third hypothesis is that a shift in technological opportunity has made more invention possible. This "fertile technology" theory points particularly to the new areas of biotechnology and information technologies as the source of the patent surge. Surely, opening these new frontiers to patenting must account for some of the growth in patenting.

The fourth, and perhaps least likely, supposition considered by Kortum and Lerner is that the process of research and invention has become more productive, either by changes in research technology, such as the application of computers and advanced statistics to problems that had previously been handled heuristically, or by changes in the management of the research process, including an emphasis on the kind of applied research that is likely to generate patents.

To distinguish among these hypotheses, the authors look at the patent data in several ways. First, they posit that the “friendly court” theory suggests that U.S. patents should have become more valuable for all inventors, both domestic and foreign. Thus, we should see an increase in patenting in the United States by foreigners roughly equal to the increase by domestic inventors. This hypothesis also suggests an increase in the propensity to patent in the United States only, and not in other countries—where the patent systems have remained relatively unchanged—and so U.S. inventors should not necessarily have increased their rate of patenting in other countries.

Neither of these implications, however, is borne out by the data. Patenting by foreign entities in the U.S. has increased, but it was increasing rapidly before the 1980s, and there was no sign of acceleration after the creation of the Federal Circuit in 1982. Furthermore, patenting by American inventors has increased abroad. An analysis of the United States and other industrialized countries as both “sources” and “destinations” for patent applications showed the U.S. has become a significantly greater source, but not a more important destination. Surprisingly, this clearly suggests that the brave new era of patenting ushered in by the Federal Circuit is not the primary explanation for the surge in U.S. patenting activity.

Kortum and Lerner also show that the data doesn’t support the “fertile technology” or the “regulatory capture” hypotheses either. After a comprehensive analysis based on the international patent classification (IPC) system, they found that biotechnology patents grew from 3% of all patents in 1969 to about 6% in 1991, and that software increased from 4% to almost 7% over the same period.
Part III. Concerning the Effects on Innovation

The authors found, however, that this kind of growth wasn’t confined just to the new technologies—approximately 70% of all patent classes exhibited an increased rate of patenting. Similarly, the increase was not confined to those firms which had traditionally dominated the patenting process. On the contrary, the growth in patenting was skewed toward those firms which previously had relatively few patents.

Through this process of elimination, Kortum and Lerner conclude that there must have been an increase in the productivity of the research process, at least in terms of its ability to produce the kind of innovation that leads to patents. The most unlikely of the causes set forth—the so-called “managerial process” theory—seems to be the primary reason for the patent surge of the past decade.

The authors go on to ask whether an increase in the productivity of research is consistent with the observed behaviour of research and development expenditure, and develop a simple model of research-driven economic growth in which an unexpected permanent increase in the productivity of R&D is predicted to lead to a transitory increase in R&D as well as patents. The difficulty with reconciling this prediction with the data is that, as noted above, R&D began its increase so much sooner than patenting. If research productivity began to increase in the 1970s, there should have been an effect on patenting rates within a few years.

Thus, the inference of Kortum and Lerner’s careful analysis is that the explanation for the patent surge lies largely outside the patent system, despite the coincidence of timing with momentous changes in patent policy. Much of the increase in patenting can be associated with an increase in real R&D spending that began much earlier, and much of the rest can be attributed to “improvements in the management or automation of the innovation process itself.”51 The strengthening of the patent system did, presumably, reinforce these initiatives—i.e., it is possible that the R&D boom would not have been so large or lasted so long without this reinforcement—but there appears to be little or no

51 Id at 4.
empirical evidence that strengthening and extending U.S. intellectual property protection resulted in any significant changes to the innovation process.

Studies by other economists have also failed to find evidence that the strengthening of patent rights during the 1980s directly stimulated industrial spending in research and development. Robert Hunt of the Federal Reserve Bank of Philadelphia recently examined the market valuation of R&D investments made by a dozen U.S. semiconductors companies from 1976 to 1994 and found that while there was a significant increase in the market value of those investments, it occurred after 1989—more than five years after the significance of the changes in the patent system were widely known.52 A more recent study by James Bessen and Eric Maskin at the Massachusetts Institute of Technology showed that rather than increasing, real R&D intensity (defined as R&D spending relative to sales) in information technology-related industries—including semiconductors, telecommunications and computers—has fallen steadily since about 1982.53

B. The Patent Paradox

This lack of correlation between stronger patent rights and increased R&D spending is reinforced by survey evidence. A 1983 study by Levin, Kleverick, Nelson and Winter at Yale University asked R&D managers across various manufacturing industries about the effectiveness of different mechanisms for appropriating the returns to research and development.54 Somewhat surprisingly, they found that the

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52 See Hunt, supra note 47, at 24.
53 Bessen & Maskin, "Sequential Innovation, Patents, and Imitation" (January 2000) Working Paper No. 00-01, Department of Economics, Massachusetts Institute of Technology. Similarly, a study by economist Bronwyn Hall at the University of California, Berkeley found that the market value of R&D investment made by about 1000 publicly-traded companies increased through most of the 1970s, began to decline after 1983, and then rose again around 1990. Hall, "Industrial Research During the 1980s: Did the Rate of Return Fall?" Brookings Papers: Microeconomics (1993) 289.
54 Levin, Kleverick, Nelson & Winter, "Appropriating the Returns from Industrial Research and Development" (1987) 3 Brookings Papers on Economic Activity 783. The authors surveyed 1,478 R&D labs in 43 industries. In an earlier study, Scherer had also found that respondents did not consider patents to be particularly important in
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protection from imitation offered by patents was seen as a relatively unimportant source of incentives for technological innovation.\textsuperscript{55} Instead, lead time and quality of service were perceived as far more useful tools for recouping R&D expenditures, as shown below.

Table 1: Effectiveness Rankings of Various Appropriability Mechanisms

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<td>Number of Industries</td>
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<td>1st</td>
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<tr>
<td>Patents</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Secrecy</td>
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<tr>
<td>Lead Time</td>
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<td>21</td>
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<td>Sales &amp; Service</td>
<td>24</td>
<td>19</td>
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<tr>
<td>Manufacturing</td>
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Table 1 also shows the results of a 1994 follow-up study administered by Cohen, Nelson and Walsh at Carnegie Mellon University.\textsuperscript{56} Although patents were ranked higher, first-mover advantages were still seen to be the most effective way to appropriate returns on investment. Thus the so-called "patent paradox"—that despite the fact that firms are taking out so many more patents, R&D managers do not perceive patents to be much more effective than they did over a decade before. What could explain this paradox?

Cohen and his co-authors suggest that the reconciliation of the exponential rise in patenting and the modest increase in their perceived effectiveness may lie in the multiple ways that firms use patents. In particular, their survey shows that in addition to protecting the returns to specific

\textsuperscript{55} See Scherer, \textit{supra} note 45.

inventions, firms also use patents to block their competitors’ products, as bargaining chips in cross-licensing negotiations, and to prevent or defend against infringement suits. It is possible, says Cohen, that the respondents didn’t consider these benefits of patents when evaluating the effectiveness of patents in protecting their investments in innovation.

C. **Semiconductor Patenting**

These suppositions are supported by the work of Bronwyn Hall and Rosemarie Ham-Ziedonis. Intrigued by the Levin and Cohen studies, they embarked on a detailed examination of the one industry where the contrast between the increase in patenting and perceived unimportance of patenting as a means of securing returns to innovation was the strongest—the semiconductor industry.\(^57\) Indeed, in both surveys, R&D managers in semiconductor companies consistently reported that patents were among the least effective mechanisms for appropriating returns to R&D investments. Driven by the 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 any other industry.

And yet the surge in patenting was highest in the semiconductor industry. Even accounting for increases in research and development spending, Hall and Ham-Ziedonis found that the propensity for semiconductor firms to patent essentially doubled between 1982 and 1992.\(^58\)

In order to illuminate the factors underpinning the semiconductor patent surge and the effects of stronger patent rights on the innovative activities of semiconductor firms, the two researchers

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\(^{58}\) Realizing that increases in research and development spending are correlated to patenting rates, Hall and Ham-Ziedonis normalized the patenting rate as a function of R&D expenditures to find patent yields (or propensities), i.e., the number of successful patent applications per million dollars of R&D spent (in constant 1992 dollars). Doing the same for other industries, they found that the patent surge in semiconductors was exceptional—while patent yields in computing and electronics rose slightly, yields for manufacturing as a whole was fairly stagnant and those for pharmaceuticals actually declined over the same period.
employed a two-fold research strategy. First, they conducted interviews with intellectual property managers and executives from several U.S. semiconductor firms—both traditional manufacturers and the newer, specialized design firms, most of whom entered the industry during the period associated with stronger patent rights. Second, they performed a quantitative econometric analysis of a much larger sample of such firms, including the compilation of a detailed database of their patent portfolios from the period 1975 to 1998.

Like Kortum and Lerner, Hall and Ham-Ziedonis found that much of the increase in patenting was due to managerial improvements. But whereas Kortum and Lerner concluded that the patent surge was caused by managerial change in the research and development process, Hall and Ham-Ziedonis found that the change was far more focused on managing the patenting process itself. The large-scale manufacturers they talked to spoke of "ramping up" their patent portfolios and "harvesting" latent inventions to add to their stock of patents. One firm they interviewed had gone from owning a total of 30 patents in 1990 to filing over 300 patents in one year, with an internal goal in place to "own 1000 patents by the year 2000." Many firms had established "patent advocacy committees" that work with the company's engineers, making sure they identified more of the patentable inventions and getting those inventions to the patent office, while minimizing the amount of time it took for engineers to be involved in the patent process.

Not all patenting, however, could be traced to managerial improvements. Two events, both indirectly related to the more favourable judicial treatment of U.S. patent rights—the "friendly court"—were frequently mentioned as having played a pivotal role in reshaping the patent strategies of the firms they interviewed. First and foremost, interviewees emphasized the important "demonstration effect" of the huge damages award in the *Polaroid v. Kodak* case, and the realization

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59 *Id.* at 11.

60 The authors note that Kortum and Lerner's use of aggregate (international vs. domestic), rather than firm-level, data may have led them to dismiss the effects of the "pro-patent" ("friendly-court") shift too quickly, at least in the context of the semiconductor industry where the surge in patenting was most dramatic. *Id.* at 9.
that courts were willing to take an aggressive stance against infringement by halting—either temporarily or permanently—production that used infringed technologies. For a high-volume fabrication facility costing billions of dollars, a preliminary injunction is prohibitively expensive, perhaps costing millions of dollars per week in lost revenue.

A second widely-cited reason was referred to as the “TI” effect. During mid-1980s, Texas Instruments had successfully asserted various patents on integrated circuits and manufacturing methods and was thereafter able to charge higher royalty rates for their patents. Other companies such as AT&T, IBM and Motorola quickly followed suit, and now most large-scale firms use their patent portfolios as assets with which to generate significant revenues. Revenues from patent licenses in the United States soared from about $15 billion in 1990 to more than $100 billion in 1998.\footnote{James Gleick, “Patently Absurd” \textit{N.Y. Times} (12 March 2000) at 6-44.} IBM alone took in well over $1 billion from licensing in 1999, and received a record 2,756 new patents.\footnote{Id.}

Citing these effects, interviewees at the manufacturing firms noted that patents had become far more important as bargaining chips in negotiations with other firms. Because of the “systems” nature of semiconductor technology, it is virtually impossible to make products that do not incorporate the technology of other firms, and so everyone needs cross-licensing arrangements, both to gain entry into the market and to avoid infringement suits. One industry executive estimated that without a patent portfolio with which to bargain, a new manufacturer would need to spend $100 to $200 million just to license what are now considered basic manufacturing principles.\footnote{Id. at 13—citing Michael Rostoker, former vice president of strategic alliances at LSI Logic.} Although such agreements had always been fairly common in the industry,\footnote{In 1981, Intel Chief Counsel Roger S. Borovoy was quoted as saying, “In the electronics industry, patents are of no value whatsoever in spurring research and development. We use them because we have to. You can’t be the only holdout against the angry hordes or else you pay everyone.” See “The Patent is Expiring as a Spur to Innovation”} the strengthening of patent protection in the 1980s brought new attention to the value of patent portfolios.
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Even where cross-licensing agreements were not in place beforehand, it appears that firms look at their portfolios as a kind of *post facto* protection from infringement suits. James Rose, former in-house counsel at both Sun Microsystems and programmable logic-chip maker Altera, tells the story of getting a phone call from an engineer asking, “You know, I would like to use this circuit or technology, but I think some other company has a patent on it. What should we do?” Surprisingly, most of the time Mr. Rose would answer, “Don’t worry about it.”

Though this may seem like an irresponsible response from a patent counsel, his stance seems justified. The fact that in the semiconductor field there are literally tens of thousands of patents and that “any given product probably infringes 10, 20, 30, maybe more of those patents. If a company were to spend all of its time trying to figure out and design around patents, they would never get a product out the door.” The other factor, explained Mr. Rose, was that “because we were filing and protecting our own innovations [but] also filing in areas that were outside of our scope of technology ... the hope or the expectation was, if this particular company did find out about the infringement, we would hopefully be able to go to our own portfolio” and find a patent that the other company is infringing. That, he said, “gave us the freedom to design the best product and not necessarily worry about other companies’ patents.” To that end, he spoke of the quest by semiconductor firms to build patent portfolios as a “frenzy to file” or an “arms race” with a “mutually-assured destruction (MAD) mentality.”

The story was quite different for the smaller firms in the study, however. Hall and Ham-Ziedonis found that the period of increased patenting coincided with a time of significant entry by new firms into the industry, many of which were so-called “fab-less” manufacturers who design computer

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*Business Week* (11 May 1981) at 44E. Apparently the ineffectiveness of patents as recouping returns on investment was a commonplace phenomenon even then.


66 *Id.*
Part III. Concerning the Effects on Innovation

For such companies, patents also play a critical role in attracting capital, specifically venture capital. A number of design firms said that in order to secure funding, venture capitalists demanded that they protect their inventions with strong patent rights that would stand up in court. James Rose also underscored the importance of patents to VCs, saying that patents are particularly necessary in Silicon Valley, where there is so much start-up activity. Venture capitalists almost always look to see if a new company has patent applications, and frequently hire patent attorneys to determine if they are likely to issue. Investment decisions can often be based almost entirely on the strength of a start-up's intellectual property.

D. Software Patenting

The software industry shares many of the problems found in semiconductors. Martin Konopken, in-house counsel at the software firm Autodesk, Inc., the fourth largest PC software company in the world, echoes the comments of James Rose when he lays out what he sees as the main problem with software patents. The typical software program has thousands of functions and hundreds of important features. With over 100,000 software patents now issued, Konopken estimates that large products, such as Autodesk's AutoCAD program, may infringe up to ten thousand of those. Searching all of them, he says, is impossible, especially since software patents are notoriously difficult to interpret, often requiring patent counsel to examine their prosecution histories. Add to that the typical 18-

\[67\] Id.
month product cycle and the pressure to get a product out the door as soon as possible, and the rule for software companies, says Mr. Konopken, “is not to search, because you simply can’t.”

And so the end result is what he calls a game of “gotcha”—in which certain companies use patent litigation as a way to make money. They have a patent, and they look around for someone in the software industry who has inadvertently infringed it. Once a product is on the market, it’s very hard to modify, since customers get used to certain features and don’t want them changed. So most software companies fight the infringement suit. “If you don’t either slam dunk the other side, or settle, then you go to court,” says Konopken, “where a patent case costs $2 million to fight, plus your engineers’ time. It is really a game of extortion in many cases.” For Mr. Konopken and others, the advent of software patenting has not been a good thing: “I speak with my fellow in-house counsel in the software industry frequently. There is an amazing degree of unanimity about software patents. We all hate them.”

Unlike semiconductors, however, software has not always been patentable. Yet while the twenty-five year-long debate over software patentability is finally over, the effects of that controversy still linger. By focusing everyone’s attention on the subject-matter issue, and giving lip service to the idea that software per se was unpatentable well into the 1990s, a climate was created in which the actual patenting of software was largely ignored. This has had a number of important consequences unique to the software industry.

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69 Id.

70 As discussed above, though the Supreme Court’s decision in Diehr opened the door to software patenting, somewhat creative drafting was required to ensure that the software in question operated in the context of an "otherwise statutory" industrial process—see supra note 15.
First, while volumes have been written about whether software should or should not be patentable, there has been a very limited discussion of other validity issues such as obviousness, enablement, or best mode. In addition to being novel, useful and nonobvious under sections 102 and 103, a valid patent must meet the disclosure requirements of the first paragraph of section 112:

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, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

As suggested by the emphasis, the above paragraph is generally interpreted as calling for three separate requirements: (1) the description requirement; (2) the enablement requirement; and (3) the best mode requirement. The description requirement requires all of the claims in a patent to be supported by an adequate description of the claimed invention in the patent's specification. The enablement requirement places an obligation on the patent applicant to provide a sufficiently clear explanation of the invention that would enable a person having ordinary skill in the art to make and use the invention.

71 Bookshelves verily groan under the weight. One commentator estimates that from 1970-79, over 200 academic articles were devoted to the patenting of computer programs; from 1980-89, there were over 500; and from 1990-2000, well over 1,000 articles were written. See James P. Chandler, "Patent Protection of Computer Programs" (2000) 1 Minn. Intell. Prop. Rev. 2 at 4 n.15. For some of the more influential of these, see Pamela A. Samuelson, "Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer-Related Inventions" (1990) 39 Emory L.J. 1025; Richard H. Stern, "Tales from the Algorithm War: Benson to Iwahashi, It's Deja Vu All Over Again" (1991) 18 AIPLA Q.J. 371; Jur Strobos, "Stalking the Elusive Patentable Software: Are there still Diehr or was it just a Flook?" (1993) 6 Harv. J. of Law & Tech. 36; Maximilian R. Peterson, "Now You See It, Now You Don't: Was It a Patentable Machine or an Unpatentable 'Algorithm'? On Principle and Expediency in Current Patent Law Doctrines Relating to Computer-Implemented Inventions" (1995) 64 Geo. Wash. L. Rev. 90.

Discussion came only after the Federal Circuit began deciding such issues. See, e.g., *Lockwood v. American Airlines*, 107 F.3d 1565 (Fed. Cir. 1997); *In re Zurko*, 11 F.3d 887 (Fed. Cir. 1997); *Fonar v. General Electric Co.*, 107 F.3d 1543 (Fed. Cir. 1997); *In re Dossel*, 115 F.3d 942 (Fed. Cir. 1997).

72 Discussion came only after the Federal Circuit began deciding such issues. See, e.g., *Lockwood v. American Airlines*, 107 F.3d 1565 (Fed. Cir. 1997); *In re Zurko*, 11 F.3d 887 (Fed. Cir. 1997); *Fonar v. General Electric Co.*, 107 F.3d 1543 (Fed. Cir. 1997); *In re Dossel*, 115 F.3d 942 (Fed. Cir. 1997).

73 35 U.S.C. § 112 (1994). The second paragraph of 112 requires that "the specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." *Id.* This imposes a requirement of definiteness for each claim in the patent—a claim will be considered definite if it reasonably describes the claimed invention to those skilled in the art and if it serves to distinguish the claim over the prior art. See *Andrew Corp. v. Gabriel Elecs., Inc.*, 847 F.2d 819 at 821 (Fed. Cir. 1988).

74 In re *Wertheim*, 541 F.2d 257 at 262 (CCPA 1976). The description requirement usually becomes an issue when a claim is added by the patent applicant at some time after the original filing date of the application.
without undue experimentation. The disclosure of section 112 is complete when the inventor reveals the “best mode” he or she knows for practicing the invention.

Disclosure, in a sense, is the price an inventor pays for patent protection. In exchange for its grant of monopoly, the government demands that an inventor reveal the inner workings of his invention so that others can understand it and possibly improve on it. Thus the patent system’s classic quid pro quo—disclosure is the quo for which the inventor receives his quid, the monopoly grant. Unfortunately, however, it seems that the level of disclosure in software patents is severely lacking. As Pamela Samuelson, Professor of Law and Information Management at the University of California, Berkeley, has said, “we are getting lots of quid but no quo.” Despite years of contact with people in the software industry, she claims that she has “never talked to anybody who, in the process of development, actually reads patents in order to get informed.”

Other problems are more critical. Since software was not officially patentable until the mid-90s, the Patent Office only recently began to hire patent examiners qualified in computer software or related fields. During the 1980s and early part of the 90s, the lion’s share of software patent applications were handled by examiners operating outside their areas of expertise. For similar reasons, the PTO’s classification system has been ill-equipped to handle software patents. In the past, patents have tended to be classified according to the field in which the software would ultimately be used—for example, making pizzas or curing rubber—rather than the nature of the software invention itself. This

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75 The enablement requirement will be met even if some experimentation is required, so long as that experimentation is not undue. In re Barker, 559 F.2d 588 at 591 (C.C.P.A 1977)

76 The analysis of the best mode requirement involves two questions: (1) did the inventor know of a better mode of carrying out the claimed invention than that disclosed in the specification? and (2) did the inventor conceal that better mode? Chemcast Corp. v. Arco Indus. Corp., 913 F.2d 923 at 927 (Fed. Cir. 1990).


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has made it much harder for examiners to find what prior art exists for a certain invention, and thus to determine whether it is novel.

Under section 102 of the U.S. Patent Act, an inventor may not receive a patent if the invention already exists in the “prior art”—that is, if the invention is patented or described in a printed or online publication anywhere in the world before the date on which the inventor files his or her patent application. In practically every field that the Patent Office covers, examiners determine whether an invention is new by searching two kinds of computerized databases: the PTO’s own Automated Patent System, which tracks the more than six million patents issued since 1790, and the so-called Electronic Information Center, which includes nearly every commercially-available database of scientific literature.

For most technologies, this works fine. But unlike more established engineering fields such as semiconductors and even biotechnology, most software inventions are not described in industry publications. Instead, computer science academics commonly save up their best work for big textbook projects, and few publishers have allowed the full text of their books to be incorporated into online databases. And a lot of software prior art might not be written down at all. As the ex-commissioner of patents and trademarks, Bruce Lehman, once admitted, “We search the patent database, both U.S. and foreign, and search every commercial database. But there are many concepts that have been done which are what I call folklore. They are out there, and people know about them, but we can’t find any written documentation. The examination process requires that we have written documentation which we can point to which states a particular fact. Too often we can’t find the documentation. Then when the patent is issued, some people say, ‘Well, this is well-known, it has been in the industry for years.’”

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79 35 U.S.C. § 102 (1994). See also 37 C.F.R. 1.104(a) (1997), requiring the patent examiner to “make a thorough investigation of the available prior art relating to the subject matter of the claimed invention.”

This is a main criticism of software patents—that the Patent Office has issued (and is issuing) patents which are far from novel. Examples of such patents are commonly pointed out by Gregory Aharonian, a vocal critic of software patents for the past ten years via his Internet Patent News Service. He cites U.S. Patent No. 5,865,827, describing a “device and method to provide a gateway for the transfer of information between financial markets and customers.” It was issued on 26 January 1996, despite the fact that a speaker at a computing conference in 1985 had presented a paper on the exact same thing. Likewise, on 6 July 1993, the Patent Office issued a patent for an “Automated Health Benefit Processing System” whereby the system asks patients a few questions and enters the answers into their records, despite the fact that throughout the 1980s there were yearly conferences with lengthy proceedings on the very same topic.

Other patents seem far too broad. Take U.S. Patent No. 5,173,051, issued to Optical Data Corporation of Warren, New Jersey on 22 December 1992, describing a system for “curriculum planning and publishing” using a computer and a videodisc player. If enforced, such a patent would make out millions of teachers to be infringers. Or consider Patent No. 5,105,184, the so-called “Energizer Bunny Patent,” issued in 1992 to Software Advertising Corp. It covers “displaying and integrating commercial advertisements with computer software”—in other words, any advertisement integrated into a screen saver.

Another common criticism is that the companies getting all of the patents are not the ones doing the innovating. According to Aharonian, in 1998, IBM held 1200 software patents, far more than the runners-up, Motorola (with 360), Fujitsu (with 330), and Canon (330). None of these companies is considered an innovative software maker. Microsoft is next on Aharonian’s list (with

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82 Id.
310) but only because they've been playing some serious catch-up—in 1992, they held only 13 patents.\textsuperscript{84} The companies that collectively constituted the microcomputer revolution, companies such as Borland, Novell, Adobe, Lotus, NeXT, Intel, Apple, Sun, and SGI, have all had relatively weak software patent portfolios.

IBM, critics claim, has a very strong patent portfolio only because it has "patented every single trivial idea every employee ever comes up with, rather than having any great propensity to be truly innovative."\textsuperscript{85} Indeed, IBM even has a patent, number 5,247,661, on a software application to permit employees to automatically document ideas for later patenting.\textsuperscript{86} And in 1999, nearly 30 years after the production of the IBM 370, a minicomputer with rotary switches on the front for selecting applications and data entry functionality, IBM got a patent for sticking a rotary switch on the front of a PC—for choosing functions such as Program Manager, Notepad, Calculator, Paintbrush, Solitaire, or Minesweeper.\textsuperscript{87}

\textbf{E. Business Method Patenting}

Lately, however, the concerns of the semiconductor and software industries have been overshadowed by the controversy surrounding business method patenting. As mentioned, in the 1998 case of \textit{State}

\begin{footnotesize}
\begin{itemize}
\item[\textsuperscript{84}] Gordon Irlam & Ross Williams, "Negative Correlation of Innovation and Software Patents" (January 1994) Revised version of Appendix D of the League for Programming Freedom's submission to the U.S. Patent Office, available on-line at http://www.base.com/software-patents/scoreboard.html. Apparently, Microsoft hasn't slowed its pace—a 27 November 2001 search of the PTO Web site for patents assigned to Microsoft revealed 1,785 patents (though a portion of those are for hardware inventions).
\item[\textsuperscript{85}] \textit{Id.}
\item[\textsuperscript{86}] \textit{Id.}
\item[\textsuperscript{87}] Aharonian, supra note 81. U.S. Patent Number 5,973,666, "Method and Means for Controlling the Concurrent Execution of a Plurality of Programs on a Computer System." The first page of the patent actually shows a dial with 16 settings, from Program Manager (0) to MS-DOS Window (12)—positions 13 to 15 are left blank, presumably for additional applications.
\end{itemize}
\end{footnotesize}
Street Bank v. Signature Financial Group, the Federal Circuit had not only eliminated what was left of the software debate, it had endorsed the patenting of so-called methods of doing business.88

Signature Financial Group held the patent disputed in that case.89 Directed to a “Data Processing System for Hub and Spoke Financial Services Configuration,” it described a data processing system for implementing an investment structure known as a “Hub and Spoke” system. This system allowed individual mutual funds (spokes) to pool their assets in an investment portfolio (hub) organized as a partnership. According to the patent, such an investment regime provided the advantageous combination of economies of scale in administering investments coupled with the tax advantages of a partnership.90

Following issuance of the patent, Signature entered into licensing negotiations with a competitor, State Street Bank, that ultimately proved unsuccessful. State Street then brought a declaratory judgment action against Signature, seeking the invalidity of the patent. The district court granted summary judgment in favor of State Street under two alternative grounds.91

The first was based on what the district court termed as the “mathematical algorithm/physical transformation test,” or the Freeman-Walter-Abele test.92 The district court found that Signature’s patent claim failed this test because there was no physical transformation or reduction taking place, concluding that:

90 Id.
92 The test had been developed by the Federal Circuit’s predecessor, the Court of Customs and Patent Appeals, following the Supreme Court judgment in Diamond v. Diehr. See supra note 13; In re Abele, 684 F.2d 902 (CCPA 1982); In re Walter, 618 F.2d 758 (CCPA 1980); In re Freeman, 573 F.2d 1237 (CCPA 1978). Under the first part of the test, a patent must recite, either directly or indirectly, a mathematical algorithm. Under the “physical transformation” part of the test, the court then must determine whether the claimed invention is applied to or limited by physical elements or process steps, or, in the words of the district court, “regardless of whether the invention performs mathematical operations, if it transforms or reduces subject matter to a different state or thing, it is statutory under 101.” State Street, 927 F. Supp. at 513.
At bottom, the invention is an accounting system for a certain type of financial investment vehicle claimed as means for performing a series of mathematical functions. Quite simply, it involves no further physical transformation or reduction than inputting numbers, calculating numbers, outputting numbers, and storing numbers. The same functions could be performed, albeit less efficiently, by an accountant armed with pencil, paper, calculator, and a filing system.\textsuperscript{93}

The district court then buttressed its holding by turning to "the long-established principle that business 'plans' and 'systems' are not patentable."\textsuperscript{94} After reviewing the case law and treatises supporting this "business methods exception,"\textsuperscript{95} the court reasoned that to allow the patent in question would, in effect, grant Signature a monopoly on the idea of a multi-tiered portfolio-investment structure.\textsuperscript{96}

The Federal Circuit reversed the district court on both the mathematical algorithm exception and the business method exception as to unpatentable subject matter. Writing for a three-judge panel, Judge Giles Rich first addressed the mathematical algorithm exception, finding that the district court erred in applying the inconsistent Freeman-Walter-Abele analysis, explaining that "after Diehr and Chakrabarty; the Freeman-Walter-Abele test has little, if any, applicability to determining the presence of statutory subject matter."\textsuperscript{97} Rather, the court asserted that "whether a claim encompasses statutory

\textsuperscript{93} Id. at 515.

\textsuperscript{94} Id.

\textsuperscript{95} Id. at 515-16. See Loew’s Drive-In Theatres, Inc. v. Park-In Theatres, Inc., 174 F.2d 547 at 552 (1st Cir. 1949); Hotel Sec. Checking Co. v. Lorraine Co., 160 F. 467 at 469 (2d Cir. 1908) ("A system of transacting business disconnected from the means of carrying out the system is not, within the most liberal interpretation of the term, an art."); E.B. Lipscomb, Lipscomb’s Walker on Patents 2:17 (3d ed. 1984) at 171. The business methods exception developed as an extension of the prescription on patenting abstract principles. As early as 1868, the Patent Commissioner sensed that "it is contrary to the spirit of the law ... to grant patents for methods of bookkeeping": Ex parte Abraham, 1868 Dec. Comm’r Pat. 59. Nineteenth century courts also opined that “a method of transacting common business” and “a mere contract” were unpatentable: United States Credit Sys. Co. v. American Credit Indemnity Co., 53 F. 818 at 819 (C.C.S.D.N.Y. 1893); In re Moescr, 27 App. D.C. 307 at 310 (1906)

\textsuperscript{96} The court judged that "patenting an accounting system necessary to carry on a certain type of business is tantamount to a patent on the business itself. Because such abstract ideas are not patentable, either as methods of doing business or as mathematical algorithms," the patent was held invalid. Id. at 516.

\textsuperscript{97} State Street Bank, supra note 88. Though Judge Rich was reputedly the principal drafter of the 1952 Patent Act and the longest-sitting federal judge at the time, this statement shows little sense of history—Diehr was decided in 1981
subject matter should not focus on which of the four categories of subject matter a claim is directed to ... but rather, on the essential characteristics of the subject matter, in particular, its practical utility.\textsuperscript{98}

Significantly, the Federal Circuit held that the transformation of data could constitute a practical application of an algorithm to qualify for a patent, and explained, "today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete and tangible result'.\textsuperscript{99} Signature's "Hub and Spoke" software satisfied the test under section 101 because it produced a final share price, momentarily fixed for recording and reporting purposes, and that final share price was considered a "useful, concrete, and tangible result."\textsuperscript{100} Despite the presence of a mathematical algorithm, the usefulness of the software rendered it patentable under the Patent Act, reasoned the court, even though the useful result was "expressed in numbers, such as price, profit, percentage, cost, or loss."\textsuperscript{101} Accordingly, in order for an invention employing an algorithm to be patentable, it is not necessary that the transformation be limited to physical matter.

Overruling the district court's holding as to the business method exception, Judge Rich embraced "the opportunity to lay this ill-conceived exception to rest," asserting that "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."\textsuperscript{102} Moreover, neither the Federal Circuit nor its predecessor court, the CCPA, had ever invoked the business method exception to deem an

\textsuperscript{98} Id.
\textsuperscript{99} Id. at 1373.
\textsuperscript{100} Id. at 1375.
\textsuperscript{101} Id.
\textsuperscript{102} Id.
invention unpatentable.\textsuperscript{103} When this exception has been applied, said the court, it had been after a “ruling based on some clearer concept of Title 35 or ... on finding a mathematical algorithm.”

The Federal Circuit found additional support in the PTO’s position on the business method exception. It contrasted the 1994 Examination Guidelines, which instructed that “though seemingly within the category of process or method, a method of doing business can be rejected as not being within the statutory classes,” with the 1996 Guidelines, which omitted this exclusionary language and stated that methods of doing business should be treated like any other process claims.\textsuperscript{104} The court endorsed this interpretation, concluding that “whether the claims are directed to subject matter within [section] 101 should not turn on whether the claimed subject matter does ‘business’ instead of something else.”\textsuperscript{105}

While a limited amount of business method patents had been issued before,\textsuperscript{106} the PTO experienced a veritable boom in patent applications after State Street, especially for business methods performed over the Internet—so-called “e-commerce” patents.\textsuperscript{107} The then-Commissioner of Patents and Trademarks, Q. Todd Dickinson, confirmed that the Patent Office received 2,600 “business model” patent applications and granted 583 of these patents in the 12-month period between October

\textsuperscript{103} Id. at 1375-76. The court also pointed out that the Second Circuit in Hotel Security Checking v. Lorraine Co. did not rely on the business method exception to invalidate the patent at issue in that case, but invalidated the patent because the invention lacked the requisite “novelty.”

\textsuperscript{104} Id. at 1376-77, citing MPEP 706.03(a) (1994); Examination Guidelines, 61 Fed. Reg. 7478 at 7479 (1996).

\textsuperscript{105} Id.


\textsuperscript{107} See Tony V. Pezzano, “State Street Court Case Opens News World for Tech Patents” American Banker (18 January 1999) at 2. State Street’s ringing endorsement of software patents caused a boom in computer-related patents generally—during 1999 it was reported that there had been a 45% increase in approvals for data processing and computer related inventions, and numerous sources report a drastic increase in the number of applications: John T. Acquino, “Patently Permissive: PTO Filings Up After Ruling Expands Protection for Business and Net Software” (1999) 85 A.B.A.J. 30.
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1998 and September 1999. The most notorious of these was U.S. Patent No. 5,794,207, entitled "Method and Apparatus for a Cryptographically Assisted Commercial Network System Designed to Facilitate Buyer-Driven Purchase Offers." Issued less than one month after State Street to Priceline.com, the patent protects that company's on-line reverse-auction bidding system, whereby you can "name your own price" on airline tickets, home mortgages, hotel rooms, and automobiles.

Upon receiving the patent, the Priceline's Chairman and Chief Executive Officer, Jay Walker, trumpeted that e-commerce patents are

a tremendously positive next step for all U.S. companies involved in creating Internet-based applications. ... Traditionally, patents have been the bedrock on which inventors built long-term, thriving businesses. E-commerce is no-exception. The PTO's actions support our nation's policy that cyberspace innovators should be encouraged and rewarded for advancing America's lead in Internet-based applications.

Others, including a reader of Forbes magazine, were less enthusiastic: "Cool! Jay Walker has apparently patented the 'business method' known as a Dutch auction—a method by which the U.S. Treasury sells hundreds of billions of dollars' worth of securities each year." This comment highlights the main criticism of business method patents—that the use of a computer to implement well known business practices on the Internet is obvious and should not result in a patent grant.

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109 Peter H. Lewis, "Web Concern Gets Patent for its Model of Business" N. Y. Times (11 August 1998) at D1. Two other patents protecting Internet technology received attention at about the same time: CyberGold, for its method of paying consumers to look at advertisements on the Internet, and NetDelivery, for its electronic delivery management ("EDM") technology. Id.


111 Byron L. Winn, "Readers Say" Forbes (31 May 1999) at 18.

Rather than fostering innovation, claimed critics, business model patents stifle creativity and represent an improper grant of a monopoly within the open framework of the Internet.

Even more troubling, companies were litigating these patents very aggressively. In October 1999, Priceline sued Microsoft for using a reverse-auction method on its Expedia travel site, asserting that it turned over confidential and technical data to Microsoft during an eight-month period when the companies were negotiating a strategic partnership. Under a January 2000 settlement, Expedia was allowed to continue its price-matching service if it agreed to pay a royalty to Priceline.

Amazon.com also made headlines in October 1999 with its patent infringement suit against Barnes & Noble. On September 28, Amazon.com founder and CEO Jeff Bezos had received a patent for Amazon's "1-Click" ordering system, whereby a customer who has already given his or her pertinent ordering information (i.e., name, address, and credit card number) is able to purchase an item over the Internet with a single "click" of the mouse button. As the Christmas shopping season approached, Barnesandnoble.com, the website for Barnes & Noble, began offering an "Express Lane" one-click ordering service much like Amazon's. A suit was filed, and after a five-day hearing the Federal District Court for the Western District of Washington issued an injunction barring Barnesandnoble.com from

\[113\] Priceline asked the court to award both actual and punitive damages as well as a permanent injunction based on patent infringement and state unfair practice claims. Del Jones, "Businesses Battle over Intellectual Property: Courts Choked with Lawsuits to Protect Ideas—And Profits" USA Today (2 August 2000) at 1B. According to Jay Walker, when the deal fell through, Microsoft Chairman Bill Gates said that "many companies were suing Microsoft for patent infringement and that Microsoft had no intention of allowing patent rights to stand in its way," and that "Priceline could, in effect, get in line." For its part, Microsoft denied receiving any confidential information and publicly reiterated its strong belief in information protection. Id.

\[114\] See Smith, supra note 108.

\[115\] U.S. Patent No. 5,960,411, "Method and System for Placing a Purchase Order Via a Communications Network." According to Bezos, who was voted Time's Man of the Year for 1999, the invention was designed to facilitate online purchasing by overcoming a customer's tendency to abandon "shopping carts" prior to checkout. See Noel D. Humphreys, "Patent Protection: Encouraging or Discouraging Innovation?" (2000) 22 Pennsylvania Lawyer 54.

This author submits, however, that such a one-click system probably surprises shoppers into inadvertent purchases. Amazon won another controversial method patent in February of 2000, Patent No. 6,029,141, which protects its "affiliate" system that lets websites collect a cut of sales when they refer a customer to another site. Id.
offering the one-click feature pending outcome of the suit. In her decision, Judge Pechman invoked a variety of the traditional justifications for intellectual property rights:

The public is served by innovation on the Internet and in electronic commerce, particularly now while it is still developing rapidly. Competition to provide unique, effective and enjoyable consumer experiences will lead to innovation and diversity in on-line commerce. On the other hand, innovation will be discouraged if competitors are permitted a free ride on each other's patented inventions. Protection of intellectual property rights in innovations will foster greater competition and innovation. ... The public has a strong interest in the enforcement of intellectual property rights. The purpose of the patent system is to reward inventors and provide incentives for further innovation by preventing others from exploiting their work. Encouraging Amazon.com to continue to innovate—and forcing competitors to come up with their own new ideas—unquestionably best serves the public interest.

With only weeks until Christmas, Barnesandnoble.com was forced to design around Amazon.com's patent by creating a “double-click” ordering system in which two clicks of the mouse were required instead of one.

The case caused a firestorm of controversy, fanned in large part by maverick Internet entrepreneur Tim O'Reilly, president of computer book publisher O'Reilly & Associates, Inc. O'Reilly was joined in his cause by MacArthur “genius” grant winner Richard Stallman, an ardent foe of software patents and founder of the Boston-based Free Software Foundation. Stallman was so disgusted with Amazon.com that he called for a boycott of the Internet bookseller. Although O'Reilly stopped short of supporting the boycott, he did encourage each visitor to his Web site to contact Jeff

117 Id. at 1248-49.
118 "The free-wheeling development environment that has given us both the Internet and open source tools ... has demonstrated convincingly that there is enormous power in an open, shared platform where ideas are given away as the foundation for further innovations," O'Reilly said. "So far, entrepreneurs, stock market investors, and computer users have all benefited enormously from the open, non-proprietary approach historically used for developing Internet technologies." Bleys W. Rose, “Patent debate hot topic on web” The Press Democrat [Santa Rosa, CA] (10 March 2000) at E1.
Bezos with concerns about the Amazon patent. Within a day or two, more than 10,000 had responded.\textsuperscript{119}

Surprisingly, after participating in an online conversation with O'Reilly, Bezos started criticizing the patent system himself. In a three-page reform proposal posted on the Amazon.com website, Bezos agreed that "meaningful (perhaps radical) patent reform" was needed. "I now believe," he said, that "it's possible that the current rules governing business method and software patents could end up harming all of us."\textsuperscript{120} Among his suggestions for restructuring the patent system was a reduction of the patent term—now 20 years from the time of application—to three to five years for software and business-method patents, and the introduction of a one-month public comment period before a patent could issue.\textsuperscript{121}

Despite all this, the "1-Click" litigation led to an array of new lawsuits and encouraged hundreds of U.S. companies to apply to patent their Web site features. In a move that caused another uproar from the tech community, British Telecom announced in June 2000 that it would consider enforcing its patent for "hyperlinking," the method by which certain words or phrases can be cross-referenced with the click of a button.\textsuperscript{122} On August 9, Mercata announced that it had been issued a patent for its group-buying technology, and that it was going "to probe for possible infringements by competitors."\textsuperscript{123} Similarly, on August 28, DE Technologies announced that it was about to be issued a broad patent covering "a process for carrying out an international transaction ... using computer-to-

\textsuperscript{119} Victoria Slind-Flor, "Bar reacts to Bezos patent reform plan: Adopting his changes would upset good system, they say" \textit{The National Law Journal} (27 March 2000).

\textsuperscript{120} R. Scott MacKendrick, "Amazon 1-Click decision—relief or invitation to litigate?" \textit{The Lawyer's Weekly} (13 April 2001).

\textsuperscript{121} Slind-Flor, \textit{supra} note 119. Bezos even suggested that the shorter term for business-method patents be applied retroactively, to his own patents as well. I'll discuss the merits of this reform in Section V.B.2, \textit{infra}.


\textsuperscript{123} See "Mercata Wins Patent on Buying Technology" \textit{N.Y. Times} (9 August 2000). Such a broad business method patent conceivably could prevent any company from offering a group-buying Internet service.
computer communication” and that it was embarking on a program of enforcement against any company conducting international trade transactions over the Internet.\textsuperscript{124}

Other, less-publicized patents were also causing a stir. After State Street, it seemed that you could get a patent on a method of doing practically anything, no matter how trivial. Inventor Edward Pechter of Valencia, Calif., for example, was granted a patent for a “method of bra size determination by direct measurement of the breast.”\textsuperscript{125} In pertinent part, Pechter’s pectoral procedure gauges cup size “by directly measuring with the tape the circumference of each unclothed breast from the beginning of the breast mound at one side laterally to the parasternal area medially.” On 30 November 1999, Kevin and George Repper were granted patent number 5,993,336 for a method of swinging a tennis racquet. As described in the abstract, their technique consists of wearing kneepads and swatting the ball “either while the covered knee is on the tennis court surface or just prior to the knee contacting the tennis court surface.” This “innovation,” the patent claim concludes, “enables a player to successfully return balls that otherwise are out of effective stroking reach.”

Even before State Street, though, the PTO was issuing very curious patents. In 1995, for example, after finding that “cats are not characteristically disposed toward voluntary aerobic exercise,” Kevin Amiss and Martin Abbot of Virginia patented a “method for inducing cats to exercise [by flashing a laser beam] onto the floor or wall or other opaque surface in the vicinity of the cat, then moving the laser so as to cause the bright pattern of light to move in an irregular way fascinating to cats and to any other animal with a chase instinct.”\textsuperscript{126} Since April Fools’ Day 1997, Dale D. Miller has had the rights to Patent No. 5,616,089, covering a “putting method in which the golfer controls the speed of the putt


\textsuperscript{125} U.S. Patent No. 5,965,809 (12 October 1999).

\textsuperscript{126} U.S. Patent No. 5,443,036 (22 August 1995).
and the direction of the putt primarily with the golfer's dominant throwing hand, yet uses the golfer's nondominant hand to maintain the blade of the putter stable." And consider the following claim:

A method for remodeling an existing building, said method comprising: cataloging design ideas that utilize predetermined building products; presenting the design ideas to a client; allowing the client to select a design idea...; [and] preparing a visual image ... representing the building remodeled with the design idea selected by the client.\textsuperscript{127}

Wholly divorced from particular artifacts, it broadly appropriates an architectural services technique.\textsuperscript{128}

Or consider Patent No. 5,761,857, which was recently issued to two architects for their configuration of residential housing. In place of a traditional hallway connecting the several rooms and apartments, the patentees came up with the ground-breaking idea of applying staircases external to the structure.\textsuperscript{129}

Other patents are troubling for different reasons. Patent No. 6,025,810, issued in February 2000, is for an antenna that sends signals faster than the speed of light—an impossible feat, if you believe decades of science based on Einstein's theory of relativity.\textsuperscript{130} Similarly impossible is Patent No. 5,533,051, issued in 1996, which covers a technique that purports to compress any data set by at least one bit without loss of information—a process that, if done recursively, could shrink the Encyclopedia Britannica to a single word from which the original could be flawlessly reconstructed.\textsuperscript{131}

More worrisome than the issuance of such trivial and ridiculous patents is the effect that the new patents will have on the business environment in general. As pointed out by Leo Raskind, Professor of Law at Brooklyn University, business method patents were "thrust into a vibrant, established process of competitive commercial rivalry, a process that has traditionally been governed by emulation and by customary practices. An added perverse result of this intrusion is the incentive for

\textsuperscript{127} U.S. Patent No. 5,668,736 (16 September 1997).
\textsuperscript{128} Thomas, supra note 97, at 30-31.
\textsuperscript{130} See Philip E. Ross, "Patently Absurd Technology and gamesmanship has overwhelmed the U.S. Patent Office. How to fix it?" \textit{Forbes} (29 May 2000) at 180.
\textsuperscript{131} \textit{Id.}
some entrepreneurs to become collectors of patent royalties, rather than to continue as active participants in the marketplace. If the boom in business method patents continues at its accelerating pace, the so-called superhighway of electronic commerce could be partially converted into a toll road.”

IV. IDENTIFYING THE ISSUES

We've looked at the evidence from the various industries of the new economy, but it would be useful to now organize the problems along issue lines. What exactly are the issues facing the patent system, and in what areas are the problems most critical? Before we do that, however, we should step back and review the theory behind the patent system, and how it is intended to foster innovation.

A. Patent Theory

The origin of the United States patent system dates back to birth of the nation itself. Drafted in 1787, Article I, Section 8, Clause 8 of the U.S. Constitution authorizes the creation of both the patent system and the copyright system:

The Congress shall have Power ... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.\(^{133}\)

The language of the clause hints at the two main philosophical justifications for granting patent and copyright monopolies—natural rights theory and utilitarianism. Generally attributable to the writings of John Locke, the theory of natural rights holds that individuals have an inherent right to the fruits of

\(^{133}\) Art. I, § 8, cl. 8. While contained in a single clause, the Patent and Copyright Clause of the U.S. Constitution is commonly treated as two distinct provisions, each with a distinct grant of authority and distinct subject matter:

(a) For Patents: "The Congress shall have Power ... To promote the Progress of ... useful Arts, by securing for limited Times to ... Inventors the exclusive Right to their ... Discoveries."

(b) For Copyrights: "The Congress shall have Power ... To promote the Progress of Science..., by securing for limited Times to Authors ... the exclusive Right to their ... Writings."

See also Donald S. Chisum, *Chisum on Patents* (1998) at GI-23: "'Useful Arts' is synonymous with the contemporary concept of technological arts and is contrasted with 'Science' the promotion of which is the object of the copyright system."
their labour. Like other systems of property rights, an intellectual property system should protect individual rights to inventions so that others cannot appropriate them. Utilitarianism, on the other hand, proposes that the main justification for the grant of monopoly is a matter of public welfare. By promoting scientific progress, intellectual property systems serve all of society.

In analyzing exactly how the patent system fosters innovation, traditional economic theory has emphasized the incentive function of patents. It usually costs more, in terms of effort and money, to discover something new than it does to duplicate someone else's discovery. Inventors may work on their discoveries for a variety of reasons, but so long as one of the motivations is the prospect of financial reward, inventors will be concerned about the possibility that others will imitate their discoveries. If an invention can be imitated quickly, the inventor will soon be forced to compete with those who did not incur the development costs that he did. This competition will reduce, or even eliminate, the profits an inventor can earn from his discovery, and so he may decide not to pursue it. By providing a temporary monopoly under which an inventor can recoup his initial expenditures, patents therefore provide an important incentive to engage in innovative activity.

134 John Locke, Second Treatise of Government (1698). Adam Smith also strongly asserted the property right of an individual to his labour: "The property which every man has in his own labour, as it is the original foundation of all other property, so it is the most sacred and inviolable." Adam Smith, An Inquiry into the Nature and Causes of the Wealth of Nations, Book 1, Chapter 1 (1776).

135 While the two theories seem inherently opposed, the Framers of the Constitution saw little conflict. In the one comment regarding the intellectual property clause, James Madison appears to reconcile both justifications: "The utility of this power will scarcely be questioned. The copyright of authors have been solemnly adjudged in Great Britain to be a right of common law. The right to useful inventions seems with equal reason to belong to the inventors. The public good fully coincides in both cases with the claims of individuals." The Federalist No. 43 (Clinton Rossiter ed., 1961) at 271-72. See also John Shepard Wiley, Jr., "Copyright at the School of Patent" (1991) 58 U. Chi. L. Rev. 119 at 140—contending that the labour-desert theory and utilitarian perspective "tend to converge as a practical matter, because law governing innovation policy usually must treat creators fairly in order to give them the incentives to act in ways that benefit consumers." Nevertheless, the tension between the rights of the individual and the public good has animated the copyright and patent debates ever since.

Thus, in the words of the U.S. Supreme Court, the patent laws were enacted to promote innovation by offering a limited right of exclusion "as an incentive to inventors to risk the often enormous costs in terms of time, research and development."\textsuperscript{137} Congress intended that "the productive effort thereby fostered [would] have a positive effect on society through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens."\textsuperscript{138}

Economists have identified three main ways in which society benefits from the grant of patent rights.\textsuperscript{139} First, patent ownership enables a successful inventor to recoup sunk research costs, thereby providing incentives for the initial investment in discovering the invention. Second, by allowing the owner of a new invention to exclude the "free-riders" who did not bear the costs of invention, patents encourage the inventor to develop that invention commercially. Finally, by requiring that an inventor publicly disclose the inner workings of his invention, patents foster the diffusion of new technology, and may lead to other inventions from competitors attempting to invent around the patent.\textsuperscript{140}

Yet while it provides substantial benefits, the patent system also creates significant costs. Foremost among these are the output restrictions and correspondingly higher prices associated with monopolization. Since patent holders have a monopoly over the patented technology, they can charge a higher price than they could in a competitive market. In most cases, there will be some consumers

\textsuperscript{137} \textit{Kewanee Oil Co. v. Bicron Corp.}, 416 U.S. 470 at 480 (1974).
\textsuperscript{138} \textit{Id.}
\textsuperscript{139} See Scherer, supra note 136, at 380: "Governments have elected to grant exclusive patent rights on inventions for three main reasons: to promote invention, to encourage the development and commercial utilization of inventions, and to encourage inventors to disclose their inventions to the public." The three different benefits have been called the "incentive to invent" theory, the "incentive to innovate" theory (innovation being the development of an invention into commercial form), and the "incentive to disclosure" theory. See Rebecca S. Eisenberg, "Patents and the Progress of Science: Exclusive Rights and Experimental Use" (1989) 56 U. Chi. L. Rev. 1017.
\textsuperscript{140} Again, in the words of the Supreme Court, "such additions to the general store of knowledge are of such importance to the public weal that the Federal Government is willing to pay the high price of seventeen years of exclusive use for its disclosure, which disclosure, it is assumed, will stimulate ideas and the eventual development of further significant advances." \textit{Kewanee Oil, supra} note 137, at 481. Not only does disclosure promote greater knowledge, it eliminates secrecy which might lead to wasteful duplicative research. See Martin J. Adelman, "Property Rights Theory and Patent Antitrust: The Role of Compulsory Licensing" (1977) 52 N.Y.U. L. Rev. 977.
willing to buy the product at the competitive price, but unwilling to pay the higher price charged by the patent holder.\textsuperscript{141}

Other inefficiencies may result from distortions of economic activity. Patents may force competitors to waste time and effort finding redundant solutions to a problem that has already been solved.\textsuperscript{142} Competing firms hoping to make patentable inventions ahead of their rivals may spend too much money trying to develop inventions quickly, when the same result could be achieved at lower social cost through a less accelerated research effort.\textsuperscript{143} Companies may also divert resources from research in fields where patent protection is weak or unavailable to research in areas that are more likely to yield profitable patent monopolies.\textsuperscript{144}

Thus, under the traditional incentive theory—also called the “reward theory”—patents are viewed as a classic tradeoff between the benefits of greater innovation and the costs of monopoly power. Later economic theory, however, has proposed that monopolies are actually conducive to innovation, and look at the patent model slightly differently.

In the 1930s, Joseph Schumpeter argued that in a dynamic model of the capitalist system, monopoly conditions may promote innovation and growth more effectively than competition.\textsuperscript{145} He reasoned that in the rapidly-changing conditions of a capitalist economy, investment in innovation

\textsuperscript{141} The negative impact of monopoly power was forefront in the mind of the author of the original Patent Act. Thomas Jefferson, like other Americans, had an instinctive aversion to monopolies. After all, it was a monopoly on tea that sparked the Revolution and Jefferson did not favor an equivalent form of monopoly under the new government. His abhorrence of monopoly extended initially to patents as well. From France, he wrote to James Madison in July 1788 urging a Bill of Rights provision restricting monopoly, and against the argument that limited monopoly might serve to incite “ingenuity,” he argued forcefully that “the benefit even of limited monopolies is too doubtful to be opposed to that of their general suppression.” He subsequently modified his position, authored the Patent Act of 1793, and directed the patent board for several years. See Thomas P. Burke, “Software Patent Protection: Debugging the Current System” (1994) 69 Notre Dame L. Rev. 1115 at 1130.


Part IV. Identifying the Issues

requires some sort of hedge against losses. Protection from competition also allows firms “to gain the time and space for further developments.”\(^{146}\) Finally, and perhaps most important, the prospect of earning more than an ordinary return permits innovators to secure the financial backing of capitalists and to bid productive resources away from their current uses.\(^{147}\) A monopoly position secured through patent protection thus may increase rather than restrict the use of known technologies by facilitating the commercial introduction of such technologies by innovating firms.

In the 1970s, Edmund Kitch built on Schumpeter's work to develop what he called the “prospect theory” of patent protection.\(^{148}\) Kitch argued that granting broad patent rights in the early stages of innovation promotes efficiency in the further development of promising technological prospects, much like the award of exclusive mineral claims promotes efficiency in the exploration of natural resources. In his view, a new process or apparatus would more likely be commercialized by the inventor who had broad patent protection by insulating such patentee from competitive rivalry during the early stages of the commercial development of new technology. It would also allow the inventor to better coordinate its activities with those of potential imitators to reduce inefficient duplication of inventive effort. Broadest scope, said Kitch, should be afforded to “pioneer patents”—those patents which represented important advances and offered the greatest prospect of generating significant ancillary technology.

Though many economists were skeptical of Kitch's prospect theory of patents,\(^{149}\) it appears to have influenced the policy debate at the time, lending credence to Congress' new mandate to better

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\(^{146}\) Id. at 89.


\(^{149}\) See Scherer, supra note 54, at 9-10; F.M. Scherer, Industrial Market Structure and Economic Performance (Rand McNally, 2d ed. 1980) at 447 n.30—stating that Kitch's views seem “little influenced by any concern for reality.” Kitch's views depend at least in part on an empirical assumption that many inventors acquire patent protection far in advance of the appearance of any commercial product. Empirical evidence contradicts Kitch on this point,
exploit the fruits of basic research, and giving additional support for the strengthening the patent rights that occurred in the 1980s. In particular, it has been suggested that a tacit endorsement of the prospect theory of patents by the Federal Circuit led to its reduction of patentability standards and elevation of patent validity—making patents stronger and easier to get.\textsuperscript{150}

\textbf{B. Patent Scope}

Patent scope is the basic measurement of the value of the patent right. At the most general level, patent scope—sometimes also referred to a patent breadth—can be described as the region of technology space from which a patentee may exclude others from operating. Clearly, the broader the patent is, the more valuable it is. It seems logical, therefore, that a patent system which confers broader scope makes inventions more valuable, and thereby provides greater innovation incentives. The problem, of course, is that a researcher has to worry about producing an invention that will be judged to infringe someone else's patent. A system which allows broader patents makes this more likely, and therefore makes research riskier and less valuable.\textsuperscript{151}

Due to this tension, analysis of the consequences of patent scope involves more than just the classic tradeoff between the objective of encouraging innovation at the cost of creating monopoly power. The rate of innovation does not necessarily increase as patent scope increases, because of the constraints that possible infringement places on an inventor's expectation of return.


\textsuperscript{151} The infringing inventor may still be able to practice his invention by securing a license from the holder of the so-called "blocking patent"—but that, of course, increases costs.
1. **Theoretical Analyses of Patent Scope**

It is useful to distinguish between three types of patent scope issues, based on the relationship between a patented invention and others which might infringe it. The first situation is where the potentially infringing invention is developed independently of the patented invention. The second situation is that of "cumulative invention," in which the potentially infringing invention builds upon the patented invention. The third situation is that of inventions which are research tools, used primarily for the specific purpose of developing other inventions.

In the traditional context of independent, non-cumulative inventions, the issue of patent scope is viewed in terms of the tradeoff between providing monopoly profits to the inventor to stimulate innovation versus the losses in market efficiency resulting from that monopoly power.\(^{152}\) This tradeoff is similar to the one associated with granting a certain duration of patent protection, and thus the problem is to choose a combination of breadth and duration that minimizes welfare loss while still providing an adequate level of innovation incentive.\(^{153}\) Within this framework, a generalized increase in patent breadth or scope, although it may result in decreased efficiencies due to increased monopoly power, unambiguously increases the rate of innovation because it does not affect the incentives of subsequent, potentially infringing inventors—inventions are completely independent.

The case of non-independent, cumulative invention—in which subsequent inventors stand metaphorically on the shoulders of the giants who came before them—has received considerable theoretical attention as of late.\(^{154}\) Edmund Kitch viewed this as a problem of optimal coordination

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among different researchers working on related technologies. In the absence of coordination, there will be a wasteful duplication of effort, and possibly over-investment of research and development resources, as firms seek to beat each other to important results. As discussed above, Kitch proposed to grant broad patent rights to a pioneering inventor early in the development of a line of technology would ensure a more orderly development of that technology. To the extent that other inventors have ideas or capabilities that contribute to the advancement of the technology, the pioneering inventor would have an incentive to include them in the development, via cross-licensing or other contractual arrangements.

Later work on cumulative invention incorporated the incentives of the potential follow-on inventors into the economic models. For researchers such as O’Donoghue, Scotchmer and Green, the question of scope can be characterized in terms of the magnitude of the improvement that an invention must represent before it will be granted a patent of its own, and/or held to infringe the patent of a previous inventor. Their line of research accorded with Kitch’s view that broad patent protection should be afforded to the initial invention in a cumulative development line. Scotchmer even proposes that “second-generation” products should not be patentable at all. If the first and second innovators, she argues, can negotiate the terms of a licensing agreement before the second inventor sinks any of its research investments, the first inventor will have the incentive to license its technology to the second whenever it is optimal to do so, under terms that do not prevent the development of the second invention. Her approach, however, presumes that the trajectory of innovation is known in advance.


155 Kitch, supra note 148.
156 O’Donoghue, supra note 154; Scotchmer & Green, supra note 154.
As emphasized by evolutionary economics,\(^\text{158}\) it is more often the case—particularly early in the development of a new line of technology—that no one knows which directions of improvement are desirable, or even possible, and therefore such *ex ante* licensing would be unlikely.\(^\text{159}\)

More recently, Hopenhayn and Mitchell explored the implications of the fact that inventions differ in the extent to which they spawn “fertile” lines of subsequent inventions.\(^\text{160}\) Ignoring the kinds of *ex ante* agreements that Scotchmer uses to ensure that infringing second-generation products will still be developed, they show that broad patent scope is more costly for inventions that are more fertile, because it may inhibit subsequent developments. On the other hand, it is important to provide good incentives to develop such fertile inventions to begin with, because they are socially very valuable. Hopenhayn and Mitchell show that overall innovation incentives can be improved by offering patentees a “menu” of combinations of patent duration and patent scope. Optimal construction of this menu induces patentees to reveal their private knowledge regarding fertility of their inventions, and thereby achieves a better balance between the incentives of the initial and subsequent inventors than can be achieved with uniform patent scope. The authors suggest that a mechanism with properties such as theirs could be implemented by allowing patentees to choose different types of patents with different durations and legal rights.\(^\text{161}\)

The third patent scope situation, that of patented research tools, can be thought of as a special case of cumulative invention in which the initial invention in the sequence has no value except as a


\(^{159}\) In their historical review of U.S. industry, Merges and Nelson also show that *ex ante* licensing is unlikely and/or ineffective—see *infra*, notes 169-177 and accompanying text.


\(^{161}\) As an example, they suggest that patentees might be required to accept shorter patent durations in order to receive protection against patent infringement under the doctrine of equivalents. *Id.* This approach presents difficulties, however—see *infra*, Section V.B.2.
platform for future innovation. Unlike the cumulative invention, the research tool does not typically compete in the marketplace with the products developed using it, and therefore development of the downstream product does not reduce the profit stream of the research tool inventor. Indeed, if the patented tool has no direct commercial market, its owner can profit only to the extent it is used in the development of other inventions. This would seem to make the situation in some sense easier than that of cumulative invention, because the incentives of the research tool inventor and the research tool user are more in line with one another—they both want the downstream product to be manufactured and sold; the only question is how much the inventor should receive in royalties.

Schankerman and Scotchmer recently investigated the enforcement of patents for research tools from the perspective of maximizing the incentives to develop such tools. They considered whether it is necessary to grant the patentee the right to an injunction preventing the sale of products developed with the tool, or whether the availability of damages for patent infringement is sufficient. They showed that the current legal treatment of patent damages as a "reasonable royalty" is logically flawed, so that maximizing the incentive to develop research tools requires either that injunctions be available, or that the damages rule be changed to award to the research tool patentee the profits earned by the infringer.

2. **Empirical Studies of Patent Scope**

There has been relatively little empirical analysis of the effects of different degrees of patent scope, primarily because it is very difficult to measure patent scope in a systematic way across large numbers

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164 I'll discuss research tools in more detail in Section V.D, *infra.*
of patents, and because there are few natural experiments in which different degrees of patent scope can be observed.

Josh Lerner has examined whether patents that appear to have relatively broad scope are more valuable to patentees than narrower ones. Looking at biotechnology firms, whose values are closely tied to their intellectual property, he found that firms whose patents span more International Patent Classes (IPCs) are valued more highly by venture capitalists. While his finding does not directly address the question of patent scope expansion, it provides threshold support for the underlying idea that broader scope increases value and therefore increases innovation incentives. A more recent German study by Harhoff, Scherer and Vopel, however, failed to find that the number of IPCs is related to patent value, as measured in survey responses by patent owners.

One of the few natural experiments on patent scope occurred in the late 1980s in Japan. Prior to 1988, the Japanese patent system essentially allowed only one claim per patent. A complex invention, or one with many distinct applications, had to be covered by many separate patents, all of which had to non-overlapping—a patentee would not be granted a patent whose claim covered any of the material of another patent, even if it was his own. In 1988, Japan converted to a system much like the U.S. system, in which a single patent can have multiple, overlapping claims. In their study of the Japanese reforms, Sakakibara and Branstetter argue, based on discussions with Japanese companies and patent experts, that in many cases it is not possible to protect a complicated invention using a series of independent claims. Even the most complete set of independent claims leaves “holes” in technology space that can only be covered with overlapping claims. Therefore, the change to a multi-claim system effectively increased patent scope by permitting more effective protection of these inventions.

Sakakibara and Branstetter hypothesize, based on the standard innovation incentive model, that such an increase in patent scope would increase the return to inventive activity, an effect which should be observable in two ways. First, research and development spending by Japanese firms should have risen. Second, Japanese firms should have produced more inventions, and since the incentives created by the U.S. patent system did not change in 1988, this should have lead to an increase in patenting by Japanese firms in the U.S.

The data, however, shows that neither of these occurred. Although the late 1980s were a period in which both Japanese R&D and Japanese patenting in the U.S. were rising, there was no measurable increase in their rates of growth around the time the policy change occurred. It is possible that despite the impression of the managers interviewed for the study, the ability to file overlapping claims does not result in a significant increase in patent scope, or that there was an effect, but that it was too difficult to see in data series that are changing rapidly for other reasons. Otherwise, their results suggest that changes in patent scope do not have significant effects on research incentives.

The role of patent scope in fostering innovation in the United States has been examined in detail by Robert Merges and Richard Nelson. Their evidence is not statistical, but rather an investigation of the development of several historically-important technologies, and whether, as asserted by Kitch, affording broad patent protection to the "pioneer" innovators is in fact desirable.

In the case of the electric lighting industry, Merges and Nelson found that Edison’s dominant patent on the carbon filament as a light source did not result in rapid commercial development, and conclude that "the validation of Edison’s broad patent slowed the pace of improvements considerably." They also point out that the acquisition of Edison’s patent enabled General Electric to

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168 Sakakibara and Branstetter did find, however, an increase in Japanese R&D spending in the early 1980s. *Id.*

Thus, just as in the United States, the increase in R&D spending preceded rather than followed the change in patent policy, and therefore cannot be considered a result of the policy change. See *supra* note 49 and accompanying text.


170 *Id.* at 886.
obtain injunctions shutting down competitors, thereby increasing its market share from 40 to 75 percent. General Electric then used its market dominance to limit entry into the industry, while making just minimal improvements to the light bulb. Merges and Nelson contrast the rate of technological improvement in electric lamps with the more rapid rate of development in other sectors of the electric industry, such as power generation and arc-lighting, where they found a causal relation between the absence of broad patent protection and the rapid entry of competing firms and accelerated product improvement.\footnote{Id. at 887.}

The authors then turn to the automobile and airplane industries, which, like electric lighting, were also marked by dominant patents at their inception. The Selden patent on the light-weight internal combustion engine and the Wright patent on the steering and stabilization system of aircraft contained broadly drawn claims covering a variety of embodiments. Again, Merges and Nelson found that these industries did not conform to the theoretical prediction that the dominant patentee would consider broad patent protection as an incentive to develop the subject matter.

To the contrary, rather than commercializing his patent, Selden sought only to license the technology and collect royalties. The automobile industry then developed through the efforts of manufacturers who paid royalties to his licensing entity. The Wrights, on the other hand, did undertake to produce airplanes and to improve their design, but they refused to license others whose design ideas were at odds with theirs. Even worse, both parties further impeded technological process by engaging in extensive litigation against companies that did not recognize their patents.\footnote{Id. at 887.}

The problems caused by the Selden and Wright patents were compounded when different companies finally managed to patent improvements on their designs. The existence of additional broad patents on complementary technologies meant that different companies could block each other from using key components. In fact, the situation in the aeronautics industry during World War I was so
serious that the Secretary of the Navy had to intervene with the establishment of an automatic cross-licensing arrangement.\textsuperscript{173}

Merges and Nelson cite the radio industry as a further example of the potential for gridlock in the development of a technology. In that industry, Marconi had acquired the patent rights to the basic two-element vacuum tube, or diode, while AT&T had acquired the fundamental patents on the triode vacuum tube. But because Marconi’s diode patent was held to dominate AT&T’s triode, and neither party would license the other, no one could commercialize the admittedly revolutionary triode. The conflict was ultimately resolved by the formation of a single entity, the Radio Corporation of America (RCA), which took in the owners of all of the potentially blocking patents as major shareholders in the corporation.\textsuperscript{174}

The development of the semiconductor and computer industries might have been similarly impeded but for a fortunate sequence of circumstances. The first involved AT&T’s initial patent rights on the transistor. Although they were also broad enough to have given their holder control over a large “prospect,” AT&T was barred by an antitrust decree from enforcing them. The second instance involved the parallel inventions of the integrated circuit (by Texas Instruments) and the Planar process for producing them cheaply (by Fairchild Instruments). Both of these companies obtained patents on their own inventions, which meant that each had to license the other to produce integrated circuits effectively. Fortunately, the Department of Defense was the principle purchaser of semiconductors at the time and had a strong interest in seeing these important technologies become broadly available throughout the industry. As a result, the government quickly stepped in to impose a cross-licensing arrangement on the companies.\textsuperscript{175}

\textsuperscript{172} Id. at 888-89.
\textsuperscript{173} Id. at 891.
\textsuperscript{174} Several other companies had important patent positions in radio, including General Electric and Westinghouse. Id. at 892.
\textsuperscript{175} Id. at 894.
Computer technology also benefited from the lack of broad initial patents. Although pioneering inventors Eckert and Mauchley did file for and receive a patent on their ENIAC computer design, the patent was ruled invalid because of a judgment that the prior art included much of what they claimed. Since this ruling, Merges and Nelson find, patents have played only a very minor role in the computer industry, and where patents are concerned, cross licensing is common. As a result, the pace of technical change has been rapid.\textsuperscript{176}

Based on their review of these and other industries, including chemical and biotechnological, the authors state their conclusion as to the effects of broad patent protection as follows:

Our general conclusion is that multiple and competitive sources of invention are socially preferable to a structure where there is only one or a few sources. Public policy, including patent law, ought to encourage inventive rivalry, and not hinder it. ... [A] rivalrous structure surely has its inefficiencies. But such a structure does tend to generate rapid technological progress and seems a better social bet than a regime where only one or a few organizations control the development of a given technology.\textsuperscript{177}

Thus, the findings of Merges and Nelson, while not definitive, seriously question the conclusion of Kitch—and implicitly, the later work of Scotchmer, Green, O'Donoghue and others—that strong property rights for pioneering inventors maximize innovation. They also raise significant doubts about the assumption underlying that conclusion—that different inventors will license their technologies to each other if it is efficient to do so. As Merges and Nelson suspected, uncertainty and disagreement among competitors often make licensing agreements and other coordination mechanisms unlikely and/or ineffective.

\textsuperscript{176} Id. at 894.

\textsuperscript{177} Id. at 908.
As discussed above, a lot of patents are being issued that are neither novel nor nonobvious, or even useful. Inevitably, much of the blame for the lack of patent quality can be traced to the sheer volume of patent applications. Intuitively, as the number of patent applications skyrockets, and the number of patent examiners stays relatively constant, the amount of review given to each patent goes down—and bad patents slip through.

Let’s look again at the surge in patents over the last twenty years. As illustrated in Figure 3, patent applications and issuances have nearly tripled in that time. The PTO examined over 315,000 patent applications in 2001, granting nearly 176,000 patents. Growth has been especially fast in software, where the number of grants has gone from hundreds to tens of thousands in just the last ten years.
As shown in Table 2, for the subset of Internet and business method patents, the trend is even more dramatic.

Table 2: Internet and Business Method Patents Granted

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<th>Year</th>
<th>Internet</th>
<th>Business Methods</th>
<th>Internet-Related Business Methods</th>
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<td>1995</td>
<td>163</td>
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<tr>
<td>2000</td>
<td>5745</td>
<td>1054</td>
<td>527</td>
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Unfortunately, the patent bureaucracy’s budget hasn’t kept pace with the exploding workload. From fiscal 1998 to 1999, patent applications rose 11%, but the PTO endured a 16% decline in how much fee revenue it was allowed to spend on operations. Part of this reduction was due to the fact that PTO revenues can be diverted to other government programs. In 1999, over $214 million was siphoned off, and in 2001, the federal budget is scheduled to divert $268 million, or nearly one quarter, from the anticipated PTO income of $1.152 billion. And the PTO’s hands are tied. While a private business could just raise prices to increase its budget, the PTO may not do so without the consent of Congress.

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178 Sources: USPTO, Internet Patent News Service (Software numbers from 1990 through 1995 are actual, while 1996 through 1999 are estimates; they include the subset Internet and Internet-related business method patents of Table 2).


A lack of funding means a lack of examiners. In 1999, 3,200 examiners awarded 161,000 patents, or 50 apiece. In software, some 375 examiners pored over 29,000 applications and anointed 13,900 new patents. One software reviewer reportedly approved two hundred patents, an average of four new awards per week, a frequency that defies doing exhaustive research of prior art to weigh a claim’s uniqueness. “We would have liked to hire another 750 examiners this year and next,” said Brigid Quinn, the Patent Office’s spokeswoman at the time, “but budget constraints will probably preclude that.”

Even if they had the money, the pay given to PTO examiners is hardly lucrative, ranging from $35,000 to $55,000 a year. After 10 or 15 years, an examiner who has reached “Primary Examiner” status may earn $70,000 to $80,000. In contrast, the average salary for entry-level chemical engineers was $49,150 in 1998, and for management-level engineers, between $95,000 and $120,000. Such discrepancies make it extremely difficult for the PTO to attract and retain the skilled technical minds that it needs to examine patents properly. As admitted by the Commissioner himself, most examiners don’t see the PTO as a career but rather as a stepping stone to private practice after 3 or 4 years.

Lack of training is also a problem—junior examiners often complain that they receive very little effective training. This is primarily because the most effective trainers—the senior examiners—do not have any incentive to spend any time training. The patent compensation system, a combination

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183 Ross, supra note 180.
184 Id.
185 Id.
188 Agnes Shanley, “You and Your Job: Shifting Career Gears Can Open New Door” Chemical Engineering (December 1998) at 141.
of base salary and bonuses, directs their efforts heavily towards their own examining activities. There are no bonus points for training younger examiners.

But as Brian Kahin, Director of the Center for Information Policy in Washington, D.C., points out, there may be more important institutional problems with the PTO. Although the agency is charged merely with the administration of the patent and trademark systems, he submits that it has been taking a much more active role, and now sees itself as a kind of crusader for stronger and more widely available patent protection. Consider the goals laid out in its Corporate Plan — 2000:

**Strategic Goal:** Play a leadership role in intellectual property rights policy …

**Performance Goal:** Help protect, promote and expand intellectual property systems throughout the United States and abroad.¹⁹⁰

Not only does such a position conflict with the PTO’s role as administrator of the patent system, it seriously undermines its job of advising the executive branch on intellectual property rights policy—especially since that policy strives for a utilitarian balancing of interests between public and private good.

Also troublesome is the PTO’s mission statement with respect to its Patent Business: “The primary mission of the Patent Business in to help customers get patents.”¹⁹¹ This contrasts dramatically with the mission statement of the Trademark Business, which states: “Our primary mission is to apply the provisions of the Trademark Act of 1946 in the examination and registration of trademarks.”¹⁹² In the *PTO Today*, an internal circular, the agency even offers testimonials from its customers:

“I am pleased with the customer approach to processing patent applications as opposed to the previous, sometimes adversarial approach.”

¹⁹¹ *Id.* at 20.
¹⁹² *Id.* at 38.
"Examiners seem flexible and interested in working with applicants to allow patentable subject matter to grant."

Even more disconcerting is the fact that the PTO budget is directly tied to application and maintenance fees. Lower standards for granting patents induce more applications, which generates more fees. And more grants result in more maintenance fees. With this professed self-dedication to its fee-paying customers and expressed expansionist philosophy, asks Kahin, can the PTO be expected to examine patent applications energetically and even-handedly?

Kahin also argues that the ex parte nature of the patent application process results in marked information asymmetries which further limit the quality of issued patents. A patent examiner deals only with the applicant, who has the motivation and resources to convince the examiner to issue the patent. And because of the nature of the prosecution procedure, the examiner is motivated to allow the patent, unless there is unequivocal prior art. A large part of an examiner’s pay comes from bonus points, which are accumulated only for “dispositions”—i.e., final allowances or rejections of patents. “Final” rejections, however, do not always result in the end of the examination—post-“final” action amendments and the like are often permitted—and so the only way for an examiner to earn bonus points with confidence is to allow a patent application.

The nature of the patent system means that patents are, in effect, rules drafted by the applicant, approved by the PTO, and then privately enforced. The private applicant is allowed considerably more leeway in formulating and expressing the rules (patent claims) than would a public body, so that vocabulary and terminology may vary substantially from patent to patent, especially in the case of non-technical subject matter. Even worse, the primary motivation of the patent applicant is

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not to make the information accessible and clear but to maximize tactical options in making use of the rules.

Greg Aharonian of the Internet Patent News Service points out one of these tactical moves, what he calls one of the “games patent lawyers play.”197 They will send in some patent claims, he says, knowing that the examiner is going to reject them at the first office action, using up the limited art that is sent in. They will then rewrite their claims to get around the first office action, often adding additional claims. The examiner doesn’t have any more time to find more prior art or to analyze the new claims, since the PTO’s production system discourages continued searches—there is strong encouragement to either issue or make a final rejection. Without more time to find new art and make a rejection, the examiner’s hands are tied, and they are pretty much forced to issue the claims at the second office action.198

Unfortunately, the PTO has little incentive to worry about these issues. Although it does makes perfunctory attempts at quality control, the basic fact is that once a patent is granted, the PTO rarely sees it again. Any bad patents it issues are then a problem for the private sector and the courts to resolve—often via litigation.

D. Patent Litigation

By all accounts, patent litigation is on the rise. During the period 1978 to 1999, the number of patent suits rose by almost tenfold, with much of the increase occurring during the 1990s, and concentrated in the areas of pharmaceutical, biotechnology, computers, and electronics.199 Judges in the District of


198 Id.

Delaware, the district in which most U.S. companies are incorporated, recently conducted a study of trends in civil litigation and found that 13.5% of all new civil cases filed in their district are patent litigation suits.\(^{200}\)

The costs of litigation are not insubstantial. The American Intellectual Property Lawyers Association recently estimated that the average cost to litigate a patent in 1999 (for each side) was $2.1 million.\(^{201}\) Nor is patent litigation quickly resolved. Estimates suggest that the average District Court patent case lasts 31 months.\(^{202}\) If you add prosecution time and appeals, it now takes approximately 12.3 years from the filing of a patent application to the final resolution of the lawsuits associated with it.\(^{203}\)

All of this has raised fears that patent litigation, or the threat of it, is impeding the ability of firms to conduct research and development effectively. A 1995 study by Josh Lerner showed that small firms avoid R&D areas where the threat of litigation from larger firms is high.\(^{204}\) Likewise, in a forthcoming study, Lerner and Jean Lanjouw of Yale University and the Brookings Institute argue that the use of preliminary injunctions by large firms can discourage R&D by small firms.\(^{205}\) Even if parties can settle their patent disputes without resorting to suits, they posit, the effective threat of litigation will influence settlement terms and, ultimately, the incentives to undertake R&D.

\(^{203}\) Allison & Lemley, supra note 42. Prosecution time itself takes between 2 and 3 years. \textit{Id.}
\(^{204}\) Josh Lerner, "Patenting in the Shadow of Competitors" (1995) 38 J. L. & Econ. 463. His study also raised serious questions about the ratio of litigation costs to R&D expenditures: "The patent litigation within USPTO and the federal courts begun in 1991 will lead to total legal expenditures (in 1991 dollars) of about $1 billion, a substantial amount relative to the $3.7 billion spent by U.S. firms on basic research in 1991." \textit{Id.} at 470
In October 2001, Lerner and Lanjouw completed the most comprehensive study of patent litigation ever undertaken. Using the LitAlert database provided by Derwent, a private vendor, they found that 13,625 patent cases were filed during the period 1978-1999. Using only the “main” patent identified by each suit, and accounting for the fact that one patent could be involved in more than one suit, their data set included 9,345 patents. Using the PTO’s patent classification system, these patents were separated into eight broad technology groups: Chemical, Mechanical, Electronics (excluding computers), Computers (including hardware and software), Biotechnology, Pharmaceutical, Other Health, and Miscellaneous. They then matched the patent data with information from the U.S. court database organized by the Federal Judicial Center (FJC) indicating the progress or resolution of suits—i.e., whether the case is settled and at which stage of the proceedings this occurs, whether the case proceeds to trial, and the outcome of the trial.

Looking at the data, Lanjouw and Lerner found that, because of the sharp increase in patent activity, filing rates for patent suits have been roughly constant over the last two decades—i.e., the growth in litigation has been comparable to the growth in patenting itself. The authors found that the total number of patent applications grew by 71% over the period, with patenting nearly tripling in Drugs, Biotechnology, and Medical Instruments, and quadrupling in Computers. Table 3, on the next page, shows the filing rates (in cases per thousand) for the various groups, broken down into three sub-periods: 1978-84, 1985-90, and 1991-95. Notice that the filing rates are much lower for Chemical, Mechanical, and Electronics, and much higher for Computers, Biotechnology, and Other Health.

206 Lanjouw & Lerner, supra note 199.
207 The authors set included all cases coded 830 by the FJC. However, since some patent-related cases may have been coded under other categories by the court (e.g., because the patent issue was part of a broader contractual dispute), the authors admit that a small percentage of cases identified in Derwent are not in the FJC database. In addition, the database runs only through the end of 1997. Id.
208 Id.
### Table 3: Patent Filing Rates, by Technology Field and Time Period

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<tbody>
<tr>
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<td>11.6</td>
<td>10.9</td>
<td>13.0</td>
<td>11.8</td>
</tr>
<tr>
<td>Mechanical</td>
<td>17.7</td>
<td>14.5</td>
<td>18.7</td>
<td>16.9</td>
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<tr>
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<td>13.1</td>
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<tr>
<td>Computers</td>
<td>32.6</td>
<td>21.2</td>
<td>25.9</td>
<td>25.6</td>
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<tr>
<td>Biotechnology</td>
<td>33.3</td>
<td>27.6</td>
<td>25.5</td>
<td>27.9</td>
</tr>
<tr>
<td>Pharmaceutical</td>
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<td>22.2</td>
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<tr>
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<tr>
<td>Miscellaneous</td>
<td>32.4</td>
<td>28.9</td>
<td>40.7</td>
<td>34.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19.3</td>
<td>16.6</td>
<td>21.1</td>
<td>19.0</td>
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</table>

Lanjouw and Lerner then looked at the number of claims and the number of citations per claim for the patents in their data set, and compared them to a control set of randomly selected patents. They found that the litigated patents had far more claims than the control set, and also more forward citations per claim (i.e., more patents cite them than cite the control group) and fewer backward cites per claim (i.e., they cite less patents on average than the control group, an indication that the technology area is not well-developed and innovation is less likely to be derivative). Both of these findings indicate that valuable patents are more likely to be involved in litigation.

The authors then perform a detailed analysis of three primary litigation metrics—the probability of filing a suit, the probability of settlement after a suit is filed (including the timing of such settlements), and the plaintiff win probability for cases at trial—as related to the type of the firm involved. They found that publicly-listed (i.e., large) companies are far less likely to file suits on their patents—their mean filing rate was 10.4 suits per thousand patents, as compared to about 45 suits for

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209 Source: Id. The authors note that these filing rates may be understated, however, since they were calculated using only the main patents in each suit, when in fact there may be several patents per suit, especially in areas like biotechnology.

210 For each litigated patent, a “matched” patent having the same application year and primary patent classification code was chosen from at random from the set of all U.S. patents (both litigated and unlitigated).
unlisted companies and individuals. Moreover, filing rates for foreign patentees (mostly unlisted firms) were much lower than for their domestic counterparts.

Lanjouw and Lerner explain this difference in filing rates by looking to the firm’s size, and hypothesizing that size presents two advantages. First, firms with large patent portfolios may be better able to settle disputes through trading (i.e., cross-licensing) intellectual property, without resorting to suits. Second, assuming that smaller firms are less able to finance expensive patent litigation, relatively large firms may be better able to settle because they pose greater litigation threats when confronting smaller firms. And when large firms have disputes with each other, they are likely to have many points of interaction other than trading intellectual property, especially through competition in product markets, and this interaction in other dimensions should promote settlement.

The data confirmed these hypotheses. For a small (unlisted) company with a small portfolio of 100 patents (cumulative over a 10-year period), the average probability of litigating a given patent is 7.8 percent. For a similar company but with a moderate portfolio of 500 patents, the figure drops to only 2.0%. The authors found that the marginal effect of patent portfolio size is stronger for smaller companies (as measured by employment), which indicates that for smaller firms, having a portfolio of patents to trade is likely to be the key mechanism for avoiding litigation.

Lanjouw and Lerner’s most important finding, however, was that the post-suit outcomes—the probability of settlement and the plaintiff win rates at trial—are almost completely independent of firm or portfolio size. From a policy perspective, this is good news because it means that enforcement of patent rights depends on the effective threat of court action more than on extensive, post-suit legal proceedings which consume court resources. This conclusion was reinforced by the two additional findings: first, that about 80 percent of all patent suits filed are settled by the parties before trial; and

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211 Id. The authors assume that the listed companies are generally bigger than the unlisted ones. They also measure size more directly by looking to how many people the companies employ.

212 Id.
second, that most settlement occurs soon after the suit is filed, often before the pre-trial hearing is held.213 The bad news, of course, is that individuals and small firms, as we saw, are much more likely to be involved in suits—and no more likely to resolve those disputes quickly in post-suit settlements.

In the end, it seems that patent litigation only tells a small part of the story of how the patent system works as a whole. As we saw in Table 3, only 19 out of every 1,000 patents are ever involved in litigation, or about 2 percent. Of those 19, only about 4 ever go to court—80% are settled beforehand. That means that out of the 175,983 patents granted last year, only about 670 will ever see court time. Mark Lemley, Professor of Law at the University of California, Berkeley, calls the other 99.6% of patents the “missing patents.”214 The overwhelming number of patentees are spending the money to get patents—a sum he estimates to be almost $5 billion a year—and then not enforcing them.215

Of course, a number of phenomena we’ve already looked at go a long way to explaining most of the so-called missing patents. As observed by Lanjouw and Lerner, one of the primary “new uses” for patents is cross-licensing between firms. Although such patents are not enforced in the traditional sense, they do end up being extremely valuable for firms which might otherwise be forced to litigate instead. Another related use for the missing patents is simply defensive. The threat of litigation can quickly be negated if a firm has a patent portfolio with which to threaten back. A third main use, one which is more valuable to smaller firms lacking significant patent portfolios, is that of financing tool. Although venture capitalists may not like the risks associated with the actual use of patents in litigation, they love patents as a concrete indicator of the value of a start-up company. Another recent study by Kortum and Lerner found that there is a strong positive relationship between venture capital financing

213 Id.
214 See Lemley, supra note 200.
215 He estimates that at a prosecution cost of $25,000 per patent, $5 billion per year is paid to patent lawyers and the PTO. Id. at 138. He refines these numbers in his next essay—see infra note 387 and accompanying text.
and patenting—that is, the amount of venture capital activity in an industry significantly increases its rate of patenting.\(^{216}\)

In addition, inventors may choose to prosecute patents for other reasons. Some companies patent just so they have a registry of their ideas. After inventing something, they patent it, in the same way that scientists might, in other fields, publish it. The company then has an official government record saying that they invented this thing on this date. Similarly, particularly in academic settings, patents may be used as internal yardsticks for progress in research and development, with companies or research labs measuring how innovative they are by how many patents they have. In this sense, a patent may be an end to itself for a scientist who will be rewarded for getting it or just wants to put it on his résumé.

We've seen the emergence of licensing shops, like Walker Digital, whose sole business purpose is not to create innovative products, but merely to accumulate and license patents. Other individuals may just be "paper patenting"—inventing something, but rather than building it themselves, licensing out the technology, or even worse, suing others who try to build it. Or there may be companies at the end of their useful technological life; so to speak, whose major asset is not new technology, but patents they acquired ten or fifteen years ago when they were a more productive entity.

It also seems that patents are to be used simply as indicators of product differentiation or branding, or to enhance the image of the patenting entity with an aura of creativity and technological proficiency.\(^{217}\) Consider the 1999 release of the Oral-B CrossAction toothbrush. In a television commercial announcing its entry into the market, a baritone-voiced narrator touted its uniqueness and high-tech nature and advised viewers that there had been three years of development, three hundred

scientific studies, and over twenty-three patents filed in relation to its innovative tooth brushing properties.\textsuperscript{218} The discovery that 339 patents have been issued in the past 25 years relating to hairbrushes—heated, flocked, vented, bendable, extendable, foldable, and self-cleaning hairbrushes, brushes for straightening, curling, colouring and cutting hair, at least one combination brush and shoehorn, and a birth-control pill dispenser in the form of a hairbrush—begs the question as to how much money was spent securing those patents, what returns were generated, and how they could possibly enable monopoly hairbrush profits that were not attainable through effective marketing and efficient distribution.\textsuperscript{219}

All in all, much of the focus of academic inquiry, especially among legal scholars, needs to be aimed away from the small number of cases that turn up in court toward the large number of patents revealed in these broader uses. Attention should be paid to the new players, as well—the venture capitalists, the company researchers, the university scientists, and those who patent just because they can.

\textbf{E. The Disconnect}

Starting in 1980, there began a series of radical changes to patent policy and practice in the United States that have had the generally-perceived effect of strengthening the protection that patents provide and extending the applicability of that protection both institutionally and technologically. Roughly coincident in time with these changes, there was an unprecedented surge in both patenting and R&D spending. Despite the significance of the policy changes and wide availability of detailed patent data, however, robust conclusions as to their effect on technological innovation are disappointingly few.


\textsuperscript{218} Id. at 3.

\textsuperscript{219} Id. at 4.
Indeed, it appears that the increases in patenting and R&D spending are mostly unrelated to the changes in the patent system.

For some, this isn't much of a surprise. Economists have known for some time that patents are not the most important mechanism for preserving incentives for innovation. Likewise, they've always been unsure as to what impact patents actually have on innovation. In a 1958 study commissioned by the U.S. Congress, economist Fritz Machlup came to the remarkable conclusion that if we didn't have a patent system, it would be irresponsible to create one, but since we have one, it would be irresponsible to eliminate it—hardly a ringing endorsement of the patent model of innovation.\(^{220}\) Prominent Yale economist George Priest, meanwhile, has been quoted as saying that economic analysis of the patent system, is "one of the least productive lines of inquiry in all of economic thought."\(^{221}\)

It seems that there now exists a major disconnect between patenting and innovation. The lack of economic evidence that strengthening the patent system led to increased innovation highlights this disconnect. As do the uses for the "missing patents" discussed above. Another reason is that the economy that existed in 1790, and the original patent model devised at the time—the individual innovator toiling away in his basement on some new-fangled mechanical marvel—are enormously at odds with the current reality. Today, the inventor named on a patent is more often than not a company, not an individual. In 1885, only 12 percent of patents were issued to corporations; now, only 12 percent of patents are issued to independent inventors.\(^{222}\) The individual scientist at a company or a university doesn't go about his research with the immediate goal of obtaining patents for his work, since he is almost never directly rewarded by the patent—the company is. Most employee agreements explicitly relinquish all rights to any inventions developed during the course of a researcher's employment. Patenting may be the furthest thing from his mind.

\(^{220}\) Mark Lemley, "Reconceiving Patents in the Age of Venture Capital" (2000) 4 J. Small & Emerging Bus. L. 137 at 139.

\(^{221}\) Id.

\(^{222}\) Merges, supra note 37, at 2215.
Through two centuries of economic upheaval, the basic tenets of the patent system remain virtually unchanged, especially the insistence to remain subject-matter neutral. The U.S. patent system now reigns over vast new industries never conceived of by its original founders: computers, computer software, biotechnology, and even the methods of doing business themselves. Is it realistic to expect a system devised over 200 years ago to function smoothly today? With somewhat of a tenuous link to begin with, it's no surprise that the patent system has lost touch with its old friend innovation.

So the question is, what do we do? How do we reestablish the link between innovation and the patent system? Or at least minimize the problems? In the next section, I'll examine the fixes that have been implemented so far, and look at a number of solutions which have so far remained proposals.
V. **FORMULATING THE SOLUTIONS**

A number of solutions to the problems with the U.S. patent system have been proposed over the last two to three years. Some, like those contained in the American Inventors Protection Act of 1999, have been implemented. Others, like shorter terms or special standards for business methods, have not. Other proposals aimed at fine-tuning patent administration or reinforcing the various scope-limiting doctrines look promising, and may soon find support among the various policy players.

A. **Reform To Date**

The problems presented by business method patenting have not gone unnoticed by American lawmakers. On 29 November 1999, President Clinton signed into law a bill containing the American Inventors Protection Act of 1999 (AIPA).\(^{223}\) The AIPA is actually a collection of seven different acts aimed at: (1) establishing a “first inventor” defense against business method patent infringement actions; (2) allowing pre-grant publication of patent applications; (3) establishing an *inter partes* patent reexamination procedure; (4) extending patent terms to remedy delays in the patent registration process; (5) creating a legal claim against fraudulent invention promoters; (6) reorganizing the Patent and Trademark Office; and (7) lowering various patent and trademark registration fees.

1. **FIRST INVENTOR DEFENSE**

One of the main concerns in the wake of the *State Street* decision was the possibility that latecomers to the e-commerce field would suddenly start to assert newly-obtained business method patents against...

those who had previously been conducting their businesses using the now-patented methods. The AIPA made an attempt to address such concerns with the First Inventor Defense Act of 1999, under which a party can establish a defense to a patent infringement suit by proving, by clear and convincing evidence, that the party, acting in good faith, actually reduced the subject matter of the asserted patent claim(s) to practice at least one year before the effective filing date of the application that led to the issuance of the patent-in-suit, and that the party commercially used, either in public or in secret, the subject matter of the claim(s) before the effective filing date of the application—i.e., was the first to invent the disputed invention (though not the first to patent it).

The first inventor defense applies only to patents for "methods of doing or conducting business" and thus appears to be intended to address the types of business method inventions that had generally been considered unpatentable prior to State Street. It should be noted, however, that the AIPA provides no definition for the phrase "methods of doing or conducting business," and thus it is conceivable that courts may ultimately construe the defense to be more broadly applicable to other types of methods used in the course of business.

The prior user defense is personal to the party who actually made the prior use, but may be asserted by one who purchases a "useful end product" produced by the patented method. The defense is not transferable except as part of the transfer of the entire business of the original owner of the defense. While the original owner may expand the use of the patented method both as to quantity

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225 "Commercial use" is defined as "use of a method in the United States, so long as such use is in connection with an internal commercial use or an actual arm’s length sale or other arm’s length commercial transfer of a useful end result, whether or not the subject matter at issue is accessible to or otherwise known to the public." Id. § 4302, 113 Stat. 1501 at 1501A-555, codified at 35 U.S.C. § 273(a)(1).


227 Indeed, State Street was specifically mentioned as the rationale for the defense’s inclusion. See Brenda Sandburg, "Patent Reform Redux" Intell. Prop. Mag. (July 1999).

of usage and the number of "sites" at which it is used without losing the defense, a transferee may use the method only at "sites" at which it had been used prior to the later of the transfer or the effective filing date of the patent. How the term "site" is to be construed in the world of e-commerce will be an interesting question for the courts to resolve.

The First Inventor Defense Act was quickly criticized as an ineffective fix to the problem of business method patents. In order to prevent the first inventor from competing away all patent profits, the defense can be asserted only by the party who can establish the defense and it can only be used with respect to the specific subject matter claimed.\textsuperscript{229} Furthermore, it can create effective competition only when there is someone who was positioned, before the application was filed, to enter the patentee’s business.\textsuperscript{230} Even more troublesome for those who want the business method exception reinstated is that fact that by creating the defense, Congress may be viewed as having implicitly endorsed the patenting of methods of doing business.\textsuperscript{231}

2. **NEW PUBLICATION RULES**

Contrary to practice in most foreign countries, including Europe and Japan, patent applications in the United States were not published until after a patent was issued. This practice was intended to protect the inventor while the PTO reviews the application, a process which generally takes eighteen to twenty months or longer. With the Domestic Publication of Foreign Filed Patent Applications Act of 1999,\textsuperscript{232}

\textsuperscript{231} For additional criticisms, see Frederic M. Meeker & Gary D. Fedorochkof, “How strong is first inventor defense?” The National Law Journal (24 July 2000) at C13.
the AIPA moved U.S. law closer toward that of other major countries by mandating the worldwide publication of pending patent applications eighteen months after they are filed.\textsuperscript{233}

In addition to harmonization, one of the main purposes of the Act was to prevent the scurrilous practice of "submarine patents," whereby an unscrupulous "inventor" files a large, vaguely-worded patent, then delays its issuance by filing numerous continuations and amendments, hoping that an industry will develop while the application is secret so that he may later "surface" the patent and extract royalties from those who innocently adopted the technology.\textsuperscript{234}

The change wrought by the Domestic Publication of Foreign Filed Patent Applications Act is not as drastic as it first appears, however, because publication can be avoided if the applicant certifies when filing the application that the invention disclosed in the application has not and will not be the subject of any application filed in any foreign country that requires publication of applications 18 months after filing.\textsuperscript{235} Thus, only applications that would have been published abroad anyway will be subject to publication.

\textsuperscript{233} See \textit{id.} § 4502, 113 Stat. at 1501A-561, codified at 35 U.S.C. § 122(b)(1)(A). The new publication provisions apply to any application filed on or after 29 November 2000. While the Act gives discretion to the Patent Office Director to determine what, if any, information concerning published patent applications will be made available to the public, the Patent Office has given some indications that the entire application file will generally be laid open when an application is published. See Gosnell, \textit{et al.}, \textit{supra} note 228.

\textsuperscript{234} See Steve Blount, "The Use of Delaying Tactics to Obtain Submarine Patents and Amend Around a Patent that a Competitor Has Designed Around" (1999) 81 J. Pat. & Trademark Off. Soc'y 11. Although vehemently denied, those in favor of the pre-issue publication legislation alleged that many of the "small independent inventors' groups" opposing patent reform are actually submariners funded by the Jerome Lemelson Foundation, set up in 1997 after the death of the titular inventor who made hundreds of millions suing companies for patent infringement of his bar code patents. See Cyndia Zwahlen, "Big Firms, Independents at Odds on Patent Plan" \textit{L.A. Times} (13 October 1999) at C12.

3. **INTER PARTES REEXAMINATION**

Under the law prior to the AIPA, a third party only had two basic options for contesting the validity of an issued patent—raise a claim of invalidity as a defense to an infringement allegation in court, or file a request in the Patent Office for an reexamination of the patent. Reexamination is far less expensive than litigation, but because the entire reexamination proceeding was closed to participation by the third party, it was rarely used.

The Optional Inter Partes Reexamination Procedure Act of 1999 established a new PTO reexamination proceeding with the participation of both the patent applicant and third-party initiators. This new inter partes procedure supplements the existing ex parte reexamination system and applies to any patent issuing from an application filed on or after 29 November 1999. Similar to ex parte reexamination, an inter partes reexamination is initiated by a third party filing a request in the Patent Office, typically citing some prior art that had not been previously considered by the Patent Office in the original prosecution of the patent. If the Patent Office determines that there is a “substantial new question of patentability” raised by the request, an inter partes reexamination is initiated.

The standards for conducting the new inter partes proceedings are similar to those used for the ex parte proceedings, but unlike ex parte reexamination, the third-party requester can participate

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236 It costs $2,520 to file for reexamination (37 C.F.R. § 1.20(c)), and practitioners estimate the average costs of the procedure at $10,000 to $100,000, depending on the complexity of the matter. Litigation, on the other hand, costs between $1 million and $3 million. See Graham, et al., supra note 202, at 8.

237 See “IP Subcommittee Chairman Coble Explains Recent Changes To Patent Reform Bill” (19 August 1999) 58 Pat., Trademark & Copyright J. 486. It was therefore called an ex parte procedure—the third party could only start the process and provide some initial information; the rest of the procedure involved only the patentee.


beyond the initial filing by challenging any Office Action taken by the PTO, or any patentee response to an Office Action.\footnote{See \textit{id.} § 4604, 113 Stat. at 1501A-568 to -569, codified at 35 U.S.C. § 314(b)(3).} Only written submissions will be allowed, however; the Patent Office has indicated an intention not to permit either party to conduct interviews with the examiner during the reexamination.

The adoption of the \textit{inter partes} proceeding was widely heralded as a reinvigoration of the reexamination procedure. As enacted, however, the law was saddled with so much extra baggage detrimental to the third party’s rights that it is doubtful that the new proceedings will be used much either.

First, the new law severely restricts the third party’s rights to appeal an adverse determination. The third party can appeal a decision of the Patent Office upholding the patentability of a patent claim only to the Board of Patent Appeals and Interferences, and then to the Federal Circuit; there is no right to appeal to U.S. district court.\footnote{See \textit{id.} § 4604, 113 Stat. at 1501A-569, codified at 35 U.S.C. § 315(a)-(b).} Likewise, if the Patent Office decides adversely to the patent owner, it must first appeal to the Board, and can appeal the Board’s decision only to the Federal Circuit. This limitation on the patent owner’s appeal rights also now applies to \textit{ex parte} reexamination.\footnote{See Gosnell, et al., supra note 228.}

Second, drastic estoppel effects arise for the requester in an \textit{inter partes} reexamination. The third party is estopped, in any later civil action, from asserting the invalidity of any claim on any ground that it raised or could have raised in the reexamination.\footnote{See \textit{id.} § 4604, 113 Stat. at 1501A-569, codified at 35 U.S.C. § 315(c).} The third party is also estopped from challenging any fact determined during the reexamination, unless the determination is later proved to be erroneous based on information that was unavailable at the time of the reexamination.\footnote{See \textit{id.} § 4607, 113 Stat. at 1501A-571. It is unclear what will be considered “unavailable,” given that all prior art, by definition, is publicly available.} Few
Part V. Formulating the Solutions

patent lawyers will be willing to risk a reexamination request for a client knowing that the client will be precluded from arguing the same factual issues in litigation.

Another limitation of reexamination is that it may only be used to call attention to prior patents or printed publications and not to bring forward less conspicuous categories of prior art—such as prior knowledge or use by others—that are more likely to have escaped the attention of the examiner. In addition, reexamination is generally conducted by the patent examiner who conducted the original examination, who may be difficult to persuade that his own prior decision to award the patent was wrong.

There is also the concern that third-party participation could be used as an effective delaying tactic for well-heeled companies trying to subvert smaller competitors' patents. "That's a killer," warns Robert W. Fletcher, president of Intellectual Property Insurance Services, a private firm that manages IP policies for major insurers. "The concept of a third party being able to initiate reexamination and continue to participate in the process, even to the point of appealing an unsuccessful endeavor to defeat a patent, goes far beyond the means of a small inventor and, thus, essentially puts him in peril," he says. "He'll be forced to first litigate the merits of his invention before he has the opportunity to sue for damages, where he'll again be called upon to litigate validity and infringement issues."  

4. OTHER AIPA CHANGES

Prior to the implementing legislation that came about as a result of the 1994 Uruguay Round Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), United States patents


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had a term of seventeen years from the date of issue. In order to harmonize U.S. patent terms with the rest of the world, the 17-year term was changed to a 20-year term, but running from the filing date of the application, not the date of issue.\footnote{See 35 U.S.C. § 154(a)(2) (1994).}

Since that time, however, there has been concern that because of delays in the prosecution process, some patents may be receiving effective terms substantially shorter than the seventeen years once granted. The AIPA’s Patent Term Guarantee Act of 1999 attempts to guarantee that Patent Office delay will not result in less than a 17-year term by extending a patent’s term to the extent that processing delays effectively shortened the term.\footnote{Patent Term Guarantee Act of 1999, Pub. L. No. 106-113, § 4402, 113 Stat. 1501A-557 to -559, codified at 35 U.S.C. § 154(b)(1).} In other words, the patent term of an invention is extended by one day for each day the PTO failed to meet statutory deadlines, and for each day the patent application was delayed due to interferences, secrecy orders, or appeals.\footnote{See id. § 4402, 113 Stat. at 1501A-557 to -559, codified at 35 U.S.C. § 154(b)(1)(A), (C).} The new law also guarantees no more than a three-year application process, with each day over the three-year deadline being added to the granted patent term.\footnote{See id. § 4402, 113 Stat. at 1501A-558, codified at 35 U.S.C. § 154(b)(1)(B).} The applicant, however, must “engage in reasonable efforts to conclude the prosecution of the application” or else the patent term extension may be shortened.\footnote{Every inventor better have some, because once he gets involved in the application process, God knows how much it will cost him to get through re-examination.”}

The AIPA also makes an attempt to deter fraudulent “invention promoters”—those organizations and agents advertised in the back of trade publications and on late-night television—from taking advantage of unsuspecting inventors. It has been estimated that such promoters annually milk more than $100 million from first-time inventors seeking assistance in the marketing and protection of their inventions. The Inventors’ Rights Act imposes upon invention promoters a duty to disclose: (1) how many inventions they evaluated in the past five years; (2) how many customers contracted with them in the past five years; (3) how many customers “received net financial profits” or license
agreements as a result of the invention promoter's services; and (4) "the names and addresses of all
previous invention promotion companies with which the promoter [was] affiliated in the past ten
years."254 If the invention promoter makes a fraudulent representation, a material omission of fact, or
violates his or her duty to disclose, an injured customer can bring a civil action to recover actual
damages, reasonable costs, and attorneys' fees.255 In cases of intentional misconduct by the promoter,
the Act provides for treble damages.256

The two other AIPA acts are aimed at the operation of the Patent Office. The Patent and
Trademark Office Efficiency Act reorganizes the PTO and establishes it as a Department of Commerce
agency.257 The new PTO ultimately retains most of its independence, although the Secretary of
Commerce determines the PTO's policy directions.258 The presidentially-appointed head of the PTO
is considered both the Under-Secretary of Commerce for Intellectual Property and the Director of the
PTO.259 In addition, the new law creates a Patent Public Advisory Committee and a Trademark Public
Advisory Committee to advise the PTO with respect to its "policies, goals, performance, budget, and
user fees."260 Each committee is comprised of nine members, each of whom are appointed by the

35 U.S.C. § 297. An "invention promoter" is "any person, firm, partnership, corporation, or other entity who
offers to perform or performs invention promotion services for, or on behalf of, a customer." Id. § 4102, 113 Stat.
at 1501A-553, codified at 35 U.S.C. § 297(c)(3). An invention promotion service is "the procurement or
attempted procurement for a customer of a firm, corporation, or other entity to develop and market products or
services that include the invention of a customer." Id. § 4102, 113 Stat. at 1501A-554, codified at 35 U.S.C.
§ 297(c)(4).
can elect to recover statutory damages of up to $5,000 any time before final judgment in lieu of actual damages—
to -581, codified in scattered sections of Title 35.
Secretary of Commerce to “represent interests of diverse users ... representing small and large entity applicants.”

Finally, the Patent and Trademark Fee Fairness Act of 1999 reduces PTO patent fees by approximately ten percent. It also provides for a study of alternative fee structures aimed at maximizing inventor participation.

5. **The PTO “Action Plan”**

Not all reform has been congressionally driven. On 29 March 2000, the Patent and Trademark Office announced an “Action Plan” to address the onslaught of business method patents. The Plan consists of two parts: “Industry Outreach” and “Quality.” Under the Industry Outreach component, the Patent Office plans to establish a so-called Customer Partnership with the software, Internet and e-commerce industry. Customer “partners” will meet with PTO representatives on a quarterly basis to identify problems and discuss solutions for the examination of business method patents. The PTO also intends to convene a Roundtable Forum on business method patents and to initiate a program to obtain industry feedback on prior art resources.

The Quality portion of the plan includes a pledge by the Patent Office to enhance technical training of examiners, to revise the *Examination Guidelines for Computer-related Inventions* and to expand current prior art search activities conducted by examiners during the review of such applications. In the event that the examination of a business method patent application results in an

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263 See *id.* § 4104, 113 Stat. at 1501A-555.


265 *Id.*
initial decision of allowable subject matter, the Patent Office will initiate a new second-level review of
the allowed application to insure compliance with search requirements and to evaluate the scope of the
allowed patent claims. The Plan also vows to substantially increase the number of business method
patents selected for an independent quality review prior to issuance.266

B. Business Method Reform

Other reform has been suggested but not implemented, most of it aimed either at business method
patenting or the Patent Office itself. Proposed business method reform has included a revisiting of the
business method exception, shorter terms for business method and software patents, and the
introduction of a new bill aimed at improving the quality of business method patents.

1. Revisiting the Business Method Exception

Considering the difficulties that business method patents have presented to the U.S. patent system,
a number of prominent commentators, including Rochelle Cooper Dreyfuss, Professor of Law at the
New York University School of Law and Director of the Engelberg Center on Innovation Law and
Policy, have called for the business method exception to be reinstated. "Given the problem of business
method patents, a strong argument can be made that State Street should be reversed, either judicially
or legislatively."267

Notwithstanding issues of patent quality and overbreadth, she even questions the value of valid
business method patents: "I believe that they adversely affect innovation, and worse, the economy."268

Why? First, she claims, they lack justification. Without any specific thought given to the need for

267 Dreyfuss, supra note 230, at 277.
protection, business methods have come under the aegis of intellectual property simply because they have value, she says. Neither the free-rider problem nor the disclosure rationale justifies business method patents—businesses are largely practiced in public, and due to their dependence on compensation schemes, lines of reporting, supervising policies and other business factors, business methods are hard to take a free ride on. While business innovations are certainly desirable, it is not at all clear that patents are needed in order to spur people to create them. Traditional business mechanisms such lock-in, network effects, lead time, and good old-fashioned loyalty already go a long way to assuring returns adequate to recoup costs and earn substantial profit.

Furthermore, the patenting of business methods inflicts unacceptable costs, primarily because what is being patented is too close to the conceptual level, too far from specific application. Just as sports moves should not be patentable, contends Professor Dreyfuss, neither should business methods. Like in sports, "winning and losing in business is supposed to depend on execution, not on exclusive rights to the moves that need to be executed. We want the best book store to dominate the market, not the store that makes it easiest to check out." 269

It is unlikely, however, that the Federal Circuit will repudiate or seriously limit the State Street decision. In April 1999, in AT&T v. Excel Communications, a different Federal Circuit panel went out of its way to approve the reasoning of State Street and repudiate earlier opinions inconsistent with it. 270 And later that year, in WMS Gaming Inc. v. International Game Technology, the court again rejected the business method exception. 271 It is even more unlikely that the Supreme Court will

\[\text{Id. at 274.}\]

\[\text{Id. at 276.}\]

\[\text{Id. at 276. She continues, "Or, just as sporting events identify the best athlete and team, market competition is what this society relies on to determine the best uses for particular resources. If that mechanism is distorted, then Adam Smith's unseen hand is crippled."}\]

\[\text{AT&T Corp. v. Excel Communications, supra note 20.}\]

\[\text{184 F. 3d 1339 (Fed. Cir. 1999).}\]
enter the fray. It denied *certiorari* in *State Street and AT&T v. Excel*, and showed no real interest in addressing the matter when it did so.\(^{272}\)

A legislated prohibition is slightly more conceivable,\(^{273}\) but due to the inertia now behind business method patenting, also very remote. As Pamela Samuelson says, such a ban is “politically unlikely since the most organized [lobby] group on this issue is the patent lawyers.”\(^{274}\) And since business method patents mean more business for the patent bar, they would never go along with such a drastic reform.

Indeed, in 1999, the Intellectual Property Law Section of the American Bar Association passed a resolution supporting the patentability of “computer-implemented inventions encompassing business methods, user interfaces, algorithms, performance enhancements, data structures, usability enhancements or other inventions which have a beneficial result or other practical application.”\(^{275}\) In a recent ABA Journal article, past IPL section chair Gregory J. Maier asserted that critics highlight “a few inane patents” to portray the entire system “as a dysfunctional national disaster.”\(^{276}\) The argument that patents have escaped the tangible, nuts-and-bolts world is simply nonsense, he said. Section chair-elect Charles P. Baker of New York City toed the same line, citing the section’s formal opposition, expressed in another resolution passed in late 2000, to “any amendment or interpretation [of section 101] that excludes business methods from the class of statutory subject matter.”\(^{277}\)

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\(^{272}\) 119 S.Ct. 851 (1999); 120 S.Ct. 368 (1999).

\(^{273}\) It was done with medical and surgical procedures—in 1996, out of concern that such patents limited patients’ access to medical procedures, affected doctors’ ability to practice their profession responsibly, and imposed undue costs on consumers, Congress amended 35 U.S.C. 287 to eliminate the remedies available to owners of medical procedure patents. See 35 U.S.C. 287(c) (Supp. 1998); Pub. L. No. 104-208, 616, 104 Stat. 3009-67 (1996). The law did not eliminate the ability to obtain such patents, but the inability to enforce them essentially produced the same result. See Thomas, *supra* note 97, at 47-50.

\(^{274}\) Smith, *supra* note 108.

\(^{275}\) *Id.*

\(^{276}\) *Id.*

\(^{277}\) *Id.*
2. SHORTER TERMS

As mentioned above, on 9 March 2000, Amazon founder and CEO Jeff Bezos leaped into the business method debate by posting a three-page reform proposal on his Web site suggesting that the patent terms for software and business method patents be limited to three to five years. \(^{278}\) Such a duration, he said, would be enough to grant a head start in the market, but without stifling competition for years to come.

The Patent Office issued a terse one-paragraph response to the Bezos letter: “We believe the existing patent law works very well for all technologies.” \(^{279}\) Other critics were more verbose. Herbert Schwartz, a patent litigation partner at New York’s Fish & Neave, warned of a slippery slope.: Changes of the magnitude Mr. Bezos proposes “could be the unraveling of the patent system,” he warned. Special consideration sought by Internet and software companies today could lead to similar accommodations made to other industries. “I am troubled by the broader notion that Mr. Bezos and his industry are entitled to special protection,” he said. \(^{280}\) Furthermore, as a practical matter, a switch to shorter terms would require a costly restructuring of innumerable complex licensing and other contractual relations based on the traditional twenty-year term for software patents.

Regardless of these concerns, however, one problem seems to trump the idea of shorter terms, at least for software patents. As pointed out by Michael Kirk, director of the American Intellectual Property Law Association (AIPLA), such a move would violate Article 27 of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement, which says that all patents must run twenty years, regardless of the nature of the technology. \(^{281}\) But while this may rule out shorter terms for software

\(^{278}\) See supra note 121 and accompanying text.

\(^{279}\) Slind-Flor, supra note 119.

\(^{280}\) Id.

\(^{281}\) Id. See Agreement on Trade-Related Aspects of Intellectual Property Rights, General Agreement on Tariffs and Trade, Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, 15 April 1994, Annex 1C, 33 I.L.M. 1197—stating that in all signatory countries, “patents shall be available and patent rights enjoyable without discrimination as to ... the field of technology.”
patents, precluding shorter terms for business methods depends on whether they are considered "technology" within the meaning of TRIPS. Although such a determination that has yet to be definitely resolved,\(^282\) Professor Jay Thomas of George Washington University Law School makes a good case for their exclusion: "At the time the United States entered into the TRIPS agreement, patents on business methods were not widely sought, and the common understanding among the patent bar was that the patentability of such methods was at best dubious. With the two other leading patent-granting powers, Europe and Japan, declining to award patents on methods of doing business, the more plausible reasoning is that business methods, like databases, lie without the TRIPS agreement.\(^283\)

3. **The Business Method Patent Improvement Act**

It didn’t take long for the business method debate to find its way to Capitol Hill. On 2 October 2000, Representatives Howard Berman (D-Calif.) and Frederick Boucher (D-Va.) introduced H.R. 5364, The Business Method Patent Improvement Act of 2000.\(^284\) Citing the Amazon and Priceline patents and their subsequent litigation, Rep. Boucher stated that their bill was meant to start a dialogue over patent law reform, and called on his colleagues to "repair the system before the PTO awards more monopoly power to people doing the patently obvious."\(^285\)

The first major provision of the proposed legislation laid out definitions for business methods and business method inventions. A business method was defined by the bill as administering, managing or otherwise operating an enterprise or organization, including techniques used in: (1) doing or conducting business; (2) processing financial data; (3) athletics; (4) instruction or personal skills; and


\(^{284}\) See Frackman & Stern, *supra* note 122.
any computer-assisted implementations thereof. A business method invention was defined as any
invention that is a business method, including software or other apparatuses, and it appears the
definition required the business method to be covered by one or more claims. The proposed
legislation also provided that the PTO would make a determination of whether an application discloses
and claims a business method invention within 12 months after the earliest filing date of the
application, from which an applicant would have 60 days to respond to the determination by amending
or withdrawing the application.286

Another key provision would have required all patent applications disclosing and claiming
business method inventions to be published within 18 months from the earliest filing date. This would
afford challengers the opportunity to mount pre-grant opposition to proposed patents, by either:
(1) submitting prior art to the PTO, including evidence of knowledge or use, public use or sale;
(2) filing a protest; or (3) petitioning the PTO to conduct a public use/on sale proceeding or consider
whether the claimed invention is obvious under section 103.287

This separate opposition procedure would be similar to reexamination in that any remarks
and/or amendments submitted by the patent owner would entitle the third-party requestor to file, and
have considered in the proceeding, their reply to the patent owner’s statement. Moreover, under the
proposed legislation, the opposition proceedings would be conducted as in court, including observing
the Federal Rules of Evidence and allowing direct or cross-examination during the proceeding or in a
deposition, affidavit or other documentary form, whether voluntary or compelled.

The legislation also provided that claims could be amended at any time during the opposition
proceeding, except that the scope of the claims could not be expanded. Further, the PTO would be
required to render a decision as to the patentability of the subject matter of the patent within

285 Smith, supra note 108.
286 See Frackman & Stern, supra note 122.
287 Id.
18 months from the filing of the opposition request. Decisions resulting from opposition proceedings would be appealable to the Board of Patent Appeals and Interferences or to the applicable court, and either a patent owner or the third-party requestor could be a party to any such appeal taken. Upon termination of the opposition proceeding or expiration of the time for appeal, a certification confirming patentable and/or unpatentable claims, and any claims that were canceled or added during the opposition proceeding, would be issued and published. To implement the opposition procedure, the Congressmen proposed establishing a separate administrative opposition panel.\textsuperscript{288}

Another significant provision of the proposed legislation was a modification of the burden of proof requirement for proving a business method application or patent invalid or otherwise ineligible. Congressmen Boucher and Berman proposed lowering the burden of proof required by a challenger to a "preponderance of the evidence" standard in a reexamination, interference, opposition, or other legal challenge to an application or patent.\textsuperscript{289}

Perhaps the most controversial of the Congressmen's proposals was an amendment to the nonobvious standard of section 103, establishing a rebuttable presumption that a business method invention is obvious—i.e., the burden would fall upon applicants to establish by a preponderance of the evidence that a business method invention was not obvious. This amendment would only apply, however, to the fields of business methods and computer implementations, and thus would effectively empower the patent examiners to reject, as obvious, applications which merely employ computer technology to carry out existing business methods.\textsuperscript{290}

The proposed legislation also attempted to address the inherent difficulties in locating relevant prior art for business methods. It would have required the disclosure of any prior art searches

\textsuperscript{288} Id.

\textsuperscript{289} Id.

\textsuperscript{290} This proposal was reintroduced in the Business Methods Improvement Act of 2000—see infra note 321 and text.
conducted by business method patent applicants, and called for the PTO to establish appropriate
applications for failing to comply with this requirement.

The Berman bill received a cool reception by many, if not most, of the U.S. patent bar. Of particular concern to many was the notion that the legislation would create a different process for approving one particular type of patent, thereby affording a great amount of special treatment to a body of subject matter that is not so unlike most other subject matter to be deserving of such treatment.\[291\] Even if enacted, most patent practitioners would likely take preventive steps during the patent application drafting process in an attempt to avoid falling within the definition of business method invention, and the enhanced scrutiny that came with being so labeled.\[292\]

Others criticized some of the provisions found in the proposed legislation as based upon misguided assumptions. First, by narrowly targeting those patent applications in which the inventor merely adapted a well-known business activity to the Internet environment, the bill overlooks those applications outside the Internet realm—i.e., business methods implemented without the aid or use of a computer or other technology. Furthermore, it appears that Congressman Berman misunderstood the legal concept of nonobviousness under section 103. He repeatedly stated that an invention is unpatentable under that section if it would have been obvious to an expert in the field,\[293\] though the proper standard for nonobviousness is whether it would have been obvious to one having ordinary skill in the art.

Congressmen Berman and Boucher also encountered resistance from the legal community with regard to their proposal for lowering the burden of proof required to prove that a business method

\[291\] Like shorter terms for business methods, this proposal was also (wrongly) criticized as running afoul of Article 27 of the TRIPS agreement—see supra.

\[292\] This could be done by craftily drafting misleading invention descriptions set forth in the “Field Of The Invention” heading typically found in U.S. patent applications, which the USPTO relies upon, in addition to the claims, when selecting the U.S. Class in which the application should be classified. See Tim L. Brackett, Jr. & John Campa, “Legislating Patents on Business Methods” New York Law Journal (16 January 2001) at 55.

\[293\] See 146 Cong. Rec. E 1659-60.
application or patent is invalid or otherwise ineligible. Lowering the burden of proof standard would have contravened the judicially-forged "clear and convincing evidence" standard for proving a patent invalid. In addition, this would have provided a defendant in an infringement suit another way to attack a patent-in-suit by alleging that the patent should have been determined to be a business method during the PTO's examination and therefore subject to the lower standard. Finally, other critics have charged that as a practical matter, the limited resources of the PTO would be insufficient to effectively implement and support the infrastructure required to carry out the proposed legislation.294

C. Administrative Reform

While much of the proposed reform has been directed primarily at business method patents, a good portion of the debate has been focused on ways to improve patent quality generally. As discussed above, the social costs of improvidently-granted patents are numerous. Competitors may be forced to design around bad patents, or simply abandon their research activities, for fear of infringement; others may resolve to pay license fees instead of resorting to protracted litigation. Consumers may be required to pay supra-competitive prices in the absence of non-infringing product substitutes. Those who finance innovation may choose to invest in start-up companies based on bad patents, thereby taking away resources from genuine entrepreneurs. Other parties may face duplicative, deal-killing transaction costs when forced to revisit the work of the Patent Office in order to assess the validity of issued patents.

294 See Brackett & Campa, supra note 292. The Business Methods Improvement Act of 2000 was introduced so late in the last session of Congress that it died there, although a new version was apparently introduced earlier this year as the Business Methods Improvement Act of 2002, H.R. 1332. See Thomas, supra note 283, at 24. A search of Lexis-Nexis on 18 April 2002 turned up no other reference to the new bill, however, so I can't comment on any similarities or dissimilarities—though Thomas seems to suggest that it is substantially the same as H.R. 5364, and still has a slim chance of becoming law. Id.
This March, the Berkeley Technology Law Journal and the Berkeley Center for Law & Technology held yet another conference on patent reform. At this one, simply titled *Patent System Reform*, some simple yet compelling solutions to the problem of bad patents were put forward by Professor Jay Kesan of the University of Illinois College of Law and Professor Jay Thomas of the George Washington University Law School.

1. **NEW PRIOR ART DISCLOSURE SYSTEM**

The root cause of bad patents, it seems, is that the PTO cannot accurately determine the scope of the prior art when examining patent applications, especially in areas such as computer software where the relevant prior art is hard to categorize or even find, and especially when the entire time spent by the Patent Office from initial examination to patent issuance is a mere 18 hours.\(^{295}\)

In the first strategy outlined by Professor Kesan, he suggests that we change our current prior art disclosure rules to create an option for applicants who wish to present an expanded information disclosure statement. Those applicants who disclose all relevant prior art, plus an analysis of how the claims, as filed, are patentable over that prior art would be granted a specific presumption of validity with respect to the disclosed prior art, while those opting for regular disclosure would be denied any presumption of validity.

Currently, a patentee has no duty to conduct an affirmative prior art search prior to filing a patent application—he need only disclose whatever prior art is in his possession.\(^{296}\) Furthermore, the list of prior art is submitted without any discussion of what the most important references in that list might be or how the claims are patentable over that prior art, and so the patent examiner has the


\(^{296}\) See 37 C.F.R. § 1.56: “Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section.”
unenviable task of discerning what relevant knowledge is buried in those references before she can assess the novelty or nonobviousness of the patent application.

Despite the lack of information garnered from the patentee, however, the patent system grants a general presumption of validity to any issued patent, and requires a challenger to produce "clear and convincing" evidence of invalidity to overcome this presumption. This is a Faustian bargain, argues Kesan, because the public is essentially trading away its future right to invalidate a patent without receiving much knowledge in return. Under his proposed system, the public would only relinquish its residual invalidation rights upon receiving an expanded disclosure of the prior art which includes a discussion of how the claims, as filed, are patentable over it. Furthermore, the presumption of validity granted would be specific, not general—i.e., it would attach only to the disclosed prior art. For those patent applicants choosing not to provide the enhanced prior art disclosure, says Kesan, the public would retain all residual rights to invalidate the patent in post-issuance litigation and not grant any presumption of validity.

Such a system, he says, would benefit both the public and the patentee. The public gains because the PTO has better information with which to determine patent validity, thereby reducing the number of bad patents issued. The patentee's position is improved because he is granted a patent that

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297 See 35 U.S.C. § 282: “A patent shall be presumed valid. Each claim of a patent ... shall be presumed valid independently of the validity of other claims...”

298 Prior to 1982, in some circumstances a party could overcome the presumption of validity with a mere preponderance of the evidence, but in Connell v. Sears, 722 F.2d at 1549 (1983), the Federal Circuit ruled that "clear and convincing evidence" of invalidity must be put forth by the patent challenger before the court finds the PTO's decision of validity erroneous. In American Hoist & Derrick v. Sowa & Sons, 725 F.2d at 1359-60 (1984), the court held that patents granted by the PTO are born valid and that the PTO's determination should be presumed to have been correct. In numerous cases since then, the court has continued to recite the clear and convincing evidence standard—see, e.g., Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc., 98 F.3d 1563 at 1569 (Fed. Cir. 1996); U.S. Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554 at 1564 (Fed. Cir. 1997).

is less likely to be vulnerable in post-issuance litigation, thereby increasing its value to potential
investors, shareholders, licensees and the like. And since the market will value these superior patent
rights over those issued to applicants choosing the old disclosure system, there will be strong incentives
to move to the new system.

Kesan’s proposals find support in a recent paper by Mark Lemley, who also participated in the
Berkeley conference. “At a bare minimum,” he says, “the presumption of validity should be pared back
so that it covers only prior art references and arguments actually considered by the examiner. There is
simply no reason to defer to the examiner’s purported decision on an issue the examiner did not even
address.” Indeed, Lemley goes even further, suggesting that we eliminate the clear and convincing
evidence requirement altogether, making the presumption that a patent is rebuttable by a
preponderance of the evidence. “Based on what we know of patent examinations,” he says, “deference
is not appropriate.”

2. **NEW FEE SHIFTING REGIME**

One of Professor Kesan’s other proposals is to expand fee shifting in patent cases. Unlike the United
Kingdom and Canada, which operate under a two-way, loser-pays system, the United States, with a
few exceptions, employs a pay-your-own-way legal system. Section 285 of the U.S. patent statute
does allow a court in exceptional patent cases to grant reasonable attorney fees to the prevailing party,
but in practice, the requirement of an “exceptional case” is extremely difficult to establish.

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301 *Id.* at 1529.
302 Professor Kesan also suggests a third-party pre-grant opposition system and the use of representational languages in
the specification of computer software patents—see *supra* note 299 at 16-31.
303 The exceptions include the state courts of Alaska, Oklahoma, and Oregon, as well as plaintiffs winning federal civil
In addition, by proving "willful infringement," patentees are far more likely to be awarded attorney's fees than accused infringers, whereas accused infringers won't usually get attorney's fees unless they can prove that the suit was filed in bad faith.\footnote{See Great N. Corp. v. Davis Core & Pad Co., Inc., 782 F.2d 159 (Fed. Cir. 1986) (holding that willful infringement alone can make a case "exceptional" and therefore justify a fee award); Cambridge Prods., Ltd. v. Penn Nutrients, Inc., 962 F.2d 1048 at 1050-51 (Fed. Cir. 1992) ("In the case of awards to prevailing accused infringers ... exceptional cases are normally those of bad faith litigation or those involving fraud or inequitable conduct by the patentee in procuring the patent.")}

After discussing the merits of both American and British systems, Kesan proposes a one-way, pro-defendant fee shifting regime in which plaintiff patentees who have their patents invalidated or revoked in a litigation or opposition proceeding by prior art that they should have discovered during a reasonable prior art search would have to pay all or part of the defendant's legal fees. Such a system, he says, should be effective at discouraging certain kinds of opportunistic conduct by increasing the costs for plaintiffs who choose to assert frivolous or invalid patents. In addition, it would encourage patentees to conduct a thorough prior art search, both prior to filing for a patent and prior to enforcing a patent in court. For defendants, it would create incentives to not settle prematurely and instead continue with the litigation, especially if they believe their invalidation case is strong.

This proposal also finds support from Lemley, who points out that in copyright law, the standards for prevailing parties seeking a fee award are identical whether the party is a plaintiff or a defendant. In the 1994 copyright case of \textit{Fogerty v. Fantasy, Inc.},\footnote{510 U.S. 517 at 527 (1994).} the Supreme Court identified the important public policy interests in defending against unfounded copyright claims, and the result has been a dramatic rise in the number of fee awards in copyright cases. A similar rule in patent law, says Lemley, might help shift some of the burden in determining validity away from accused infringers.\footnote{Lemley, \textit{supra} note 295, at 1531.}
3. **OFFICIAL NOTICE**

In his paper, "The Responsibility of the Rulemaker: Comparative Approaches to Patent Administration Reform," Professor Jay Thomas reviews the recent initiatives undertaken by the European Patent Office (EPO) and the Japanese Patent Office (JPO) and outlines several avenues for future reform of the U.S. Patent Office. First and foremost, he suggests that to relieve the burden on the PTO, examination burdens should continue to be shifted to patent applicants. He discusses two ways that this can be done cost effectively: the Patent Office should continue to make use of official notice where necessary, and it should mandate that drafters employ Jepson claims wherever possible.

Like the concept of judicial notice, official notice substitutes for the usual process of proof via formal presentation of evidence. Under Federal Rule of Evidence 201, judicial notice may be taken of any adjudicative fact that is not subject to reasonable dispute because "it is capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned." The preferred language is similar in patent procurement—PTO examiners may take official notice of such facts that "are capable of such instant and unquestionable demonstration as to defy dispute."

Although a fairly robust body of case law exists on the use of official notice, examiners have tended not to employ it very frequently. Under standard PTO policy, if an applicant contests the noticed fact, the examiner must then supply a reference demonstrating the fact, or else withdraw the rejection. Thus, official notice has been little more than a delaying tactic that has detracted from the general policy of timely prosecution.

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308 Thomas, *supra* note 283.
309 F.R.E. 201(b).
Professor Thomas points to accounts, however, that Class 705, that portion of the Patent Office responsible for reviewing business method applications, has begun to rely more heavily upon official notice. Furthermore, Class 705 examiners are apparently less willing to withdraw rejections founded upon official notice, even when applicants challenge the taking of notice.

Thomas suggests that two cases from the Court of Customs and Patent Appeals (CCPA), the precursor to the Court of Appeals for the Federal Circuit, may underlie this recent phenomenon. The first one, In re Howard, involved a patent application on an early version of bar coding—items were marked with a code that could be used to supply retail prices at check-out via an “electrical comparison.” On appeal, the CCPA used official notice to affirm the PTO’s rejection of Howard’s claims: “It is a matter of common practice of wide notoriety, well within the ambit of judicial cognizance, for retail outlets to list by code or otherwise various items stocked for sale, together with the price assigned to each item, so as to enable the clerk or sales person to ascertain the charge to the customer. ... [T]o electrically compare the code markings is without patentable significance.” According to Judge Almond, “patentability may not be predicated on the recitation of an electrical comparison.”

The CCPA took official notice one step further in In re Boon. There, Boon had appealed from the PTO’s rejection of his application claiming a pneumatic conveyor system. Observing that the PTO Board had in part relied on official notice in affirming the examiner’s rejection, Boon argued that he had not been given the chance to rebut the notice taking. The court rejected that argument, observing that Boon had either failed to challenge the notice taking at all, or had offered little more than an unsupported statement doing so. The court then took the opportunity to stipulate that a

313 See supra note 32.
314 394 F.2d 869 at 870 (CCPA 1968).
315 Id. at 870-871.
316 Id.
317 439 F.2d 724 (CCPA 1971).
challenge to PTO notice must contain "adequate information of argument so that on its face it creates a reasonable doubt regarding the circumstances justifying the judicial notice." \( ^{318} \)

Taken together, Howard and Boon suggest not only the lenient use of official notice in business method patent cases, but a substantial staying power for rejections founded upon official notice. Thus, the combination appears to provide the PTO with powerful tools for addressing applications claiming methods of doing business. And, says Thomas, it appears that examiners are using them. Seemingly cognizant of the criticisms surrounding business methods—in particular, the poor documentation of prior art, the lack of scientific knowledge sharing, and the paucity of academic literature—the PTO "appears to have stealthily provided itself with a means to address applications in disciplines where documentation is elusive." \( ^{319} \)

Importantly, this tactic effectively preempts the approach taken by the Business Method Improvement Act of 2002, which, like its failed predecessor, \( ^{320} \) would create the presumption that a claimed invention would have been obvious "if the only significant difference between the combined teachings of the prior art and the claimed invention is that the claimed invention is appropriate for use with a computer technology." \( ^{321} \) In effect, official notice achieves the same goal—placing upon applicants the burden of proving that a computer-based business method presents an inventive advance over the prior art—but without running afoul of Article 27 of the TRIPS agreement, which arguably commands that business methods must be subject to the same standard of nonobviousness as all other technologies. \( ^{322} \)

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\( ^{318} \) Id. at 728.

\( ^{319} \) Thomas, supra note 283, at 24.

\( ^{320} \) The Business Method Improvement Act of 2002, H.R. 1332, is the reintroduction of the Business Method Improvement Act of 2000, H.R. 5364, which died in the last session of Congress. See supra note 294.

\( ^{321} \) Id., Section 5.

\( ^{322} \) As discussed above, it is questionable whether treating business methods differently would indeed violate the TRIPS agreement—but it is still unresolved. See supra notes 282-283 and accompanying text.
Indeed, the heavily publicized Business Method Patent Initiative\textsuperscript{323} already shows that the PTO treats business method patent applications differently from others, but as Thomas points out, it can plausibly show that the distinctions it makes, under both that program and its use of official notice, are based upon the difficulty of examination rather than the discipline from which the claimed invention arises. In support, the PTO could point to the WTO Dispute Settlement Body opinion in \textit{Canada – Patent Protection of Pharmaceutical Products},\textsuperscript{324} whereby the WTO panel upheld the Canadian version of the Hatch-Waxman Act, despite its seemingly different treatment of pharmaceuticals. The express terms of the Canadian statute applied to all regulated products, said the panel, so just because its effects were most keenly felt in the area of pharmaceuticals could not give rise to a finding of impermissible discrimination.\textsuperscript{325}

Thus, despite the TRIPS Agreement, administrators retain considerable discretion to address particular points of stress within the patent system, regardless of area of technology, so long as the point of distinction is not one strictly based on a classification of that technology. The use of official notice provides a powerful tool for exercising that discretion, one that could efficiently shift examination burdens from patent offices to the private sector.

4. \textbf{Jepson Claims}

Another way that foreign patent offices have eased their examination tasks is by encouraging the use of so-called "Jepson claims." A Jepson claim defines an invention in two parts. First, the preamble recites the subject matter of the invention and the technical features necessary to define the claimed subject, but that lie within the prior art. The second, or characterizing, portion of the claim states the technical

\textsuperscript{323} See supra, Section V.A.5.

\textsuperscript{324} WT/DS114/R (17 March 2000).

\textsuperscript{325} \textit{Ibid.} at para. 7.104.
features that the patent adds to the prior art.\textsuperscript{326} Both the EPO and the national patent offices of Europe strongly encourage the use of the Jepson claim format,\textsuperscript{327} and Patent Cooperation Treaty rules provide that claims should be written in this style whenever possible.\textsuperscript{328}

In the United States, however, the patent bar has long derided the Jepson claim, primarily because the preamble of a Jepson claim constitutes an admission that the recited subject matter constitutes prior art. In addition, the Jepson claiming style tends to portray an invention as a limited improvement, rather than an elegant combination of diverse elements which together produce an inventive advance. Yet while U.S. practitioners go to great lengths to avoid them, even redrafting Jepson claims that they receive from their colleagues overseas, U.S. patent examiners generally prefer to receive such claims because they are far more readily parsed and compared to the prior art than other claim formats.

Due to this advantage, Thomas suggests that the U.S. Patent Office should use its regulatory authority to compel applicants to use the Jepson claiming style wherever possible. For support, he points to the fact that the PTO has already required that claims be no more than one sentence long,\textsuperscript{329} and has barred the use of omnibus claims.\textsuperscript{330} Such a change would provide another important advantage—by conforming U.S. claiming practice with European and International trends, U.S. inventors would be in a better position for filing foreign patent applications.

\textsuperscript{326} Thomas, supra note 283, at 25.
\textsuperscript{327} See Arthur L. Plevy, "Some Important Differences Between Patent Practice in Europe and the United States" (June 2001) 209 N.J. Law 40 at 41-42.
\textsuperscript{328} PCT Rule 6.3.
5. **MORE RESPONSIBILITIES FOR THE HEAVIEST USERS**

In addition to shifting examination burdens to the private sector generally, via the use of official notice and Jepson claims, Professor Thomas suggests that we also increase the responsibilities of the heaviest users. It is no secret that a small number of companies dominate the U.S. patent system. Fourteen enterprises were awarded over one thousand patents in 2000, while an additional 151 companies obtained at least 100 patents.\(^{331}\) Those 165 enterprises received a total of 56,105 patents—about 35.6% of the 157,497 utility patents granted that year. This “Century Club” of patent recipients has contributed significantly to the PTO’s mounting workload, and holds disproportionate power with respect to it. Each member is in constant contact with the Patent Office, and enjoys a greater voice before the patent-oriented associations, such as the American Intellectual Property Association, the American Bar Association, and the Intellectual Property Owners, to which PTO management most closely listens. Surely the Patent Office could justly turn to its heaviest users to address current shortfalls:

Thomas points out that other patent offices have successfully imposed upon their frequently fliers before. Through its so-called “Action Plan for 80%” in 1992, the Japanese Patent Office made its best customers devote more time to the preparation of patent applications.\(^{332}\) The approach taken by the European Patent Office was less subtle—abandoning certain PCT commitments with regard to biotechnology, business method and telecommunications applications of U.S. origin—but was, nevertheless, a successful attempt at managing its workload by shutting its doors to the heaviest users.\(^{333}\)

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\(^{332}\) In an effort to ease the task of examiners by presenting them with more applications that were already positioned for allowance, the JPO requested that large, domestic applicants endeavor to increase their individual allowance rate from approximately 60% to 80%. Among the steps applicants could take to reach the 80% plateau were conducting augmented prior art searches, requesting that few filed applications be examined, and, of course, making more selective filing decisions in the first place. See Thomas, *supra* note 283, at 17.

\(^{333}\) *Id.* at 28.
Of course, varying applicant responsibilities based on their abilities is not a new idea in the United States either. The PTO fee schedule already allows for individual inventors, universities and small businesses to pay half the fees charged to their larger colleagues. This approach, however, merely subsidizes the patent expenses of smaller entities, without providing any real benefits to the Patent Office. The PTO should instead seize upon this concept as way of making its heaviest users assume additional patent examination responsibilities.

Thomas suggests three ways that the PTO could make better use of its largest users. First, members of the “Century Club” should be compelled to perform initial prior art classifications and prior art searches with respect to their own applications, on behalf of the PTO and under its supervision. Second, they should be expected to bring prosecution to a close promptly, with the PTO conducting periodic reviews of the status of each of their applications, with special attention paid to lingering applications from the pre-TRIPS era. Finally, the PTO could mimic the Japanese Patent Office’s Action Plan for 80%, asking Century Club members to place their applications in a better position for timely examiner review.

**D. Doctrinal Reform**

Let’s now turn from the world of patent administration to the domain of judicial doctrine. As we’ve seen, the recent trend has been to bring more and more items within the scope of intellectual property protection, but without simultaneously re-assessing whether the doctrinal line between the protected and unprotected remains appropriately situated. Historically, the patent system has assumed that market incentives will, more often than not, lead patentees to exploit their innovations efficiently, often by licensing them to others in the field. Licensing helps to realize patent law’s goals both by increasing the probability that the public will benefit from the invention before the patent’s expiration, and by encouraging follow-on innovation by licensees and others who purchase the patented product.
While market defects may have at times frustrated the conclusion of socially-beneficial agreements, until recently, the system has functioned in a reasonably efficient manner. Patentees were unlikely to suppress their innovations by refusing to license them, or to use their patents to leverage whatever market power they possessed into secondary markets.

In today’s world, however, these traditional assumptions have proven incorrect. In the market for operating systems software, strong patent protection has created insurmountable barriers to entry and allowed a few patentees to direct innovation toward applications running on the dominant system. In other industries, the rapid issuance of patents has resulted in an “anti-commons,” where rights are held by so many different patentees that the costs for any one to accumulate all the required licenses is prohibitive.

In existing law, a number of doctrines act to limit the scope of the patent right and ameliorate these problems: the experimental use doctrine, the reverse doctrine of equivalents, and the doctrines of patent misuse, exhaustion, and implied license. Given the current problems with the patent system, a number of commentators have called for these to be expanded or modified, or for some new doctrines to be added. A failure to do so, warns one, would be regrettable: “The risk is that, in the absence of a doctrine that permits some privilege of unlicensed use while at the same time protecting patentees’ incentives, the patent system may function to thwart the very innovation it is intended to foster.”

1. Experimental Use

In her groundbreaking 1987 paper, University of Michigan Law Professor Rebecca Eisenberg examined the effect of strengthened intellectual property rights on scientific research, particularly in the

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emerging field of biotechnology. Arguing that the enforcement of exclusive rights against subsequent researchers can sometimes interfere with further progress in the field of the invention, she called for an expansion of the experimental use defense to patent infringement.

The experimental use defense first appeared in dictum in the 1813 case of *Whittemore v. Cutter*. In his decision, Justice Story observed that “it could never have been the intention of the legislature to punish a man, who constructed a [patented] machine merely for philosophical experiments, or for the purpose of ascertaining the sufficiency of the machine to produce its described effects.” Although subsequent courts have consistently recognized the existence of an experimental use defense in theory, the defense has almost never succeeded in practice, mostly because the courts have held that it does not apply to the facts of the particular cases before them.

Modern case law suggests that the experimental use defense is available only for “pure” research with no commercial implications. In *Roche Products v. Bolar Pharmaceutical Co.*, the Federal Circuit rejected the argument of a drug manufacturer that the defense applied to its use of the plaintiff’s patented drug in performing clinical tests, the purpose of which was to gather data necessary to obtain FDA approval so that the defendant could market a generic version of the drug as soon as the patent expired. Characterizing the experimental use defense as “truly narrow,” the court noted that

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335 Rebecca S. Eisenberg, “Patents and the Progress of Science: Exclusive Rights and Experimental Use” (1989) 56 U. Chi. L. Rev. 1017.
336 29 F. Cas. 1120 (C.C.D. Mass. 1813).
337 Id. at 1121.
338 Northill Co. v. Danforth, 51 F. Supp. 928 at 929 (N.D. Cal. 1942) (“Defendant’s experiments were evidently not made for philosophical or amusement purposes but were made in connection with his business as a manufacturer and salesman of anchors”); Sprout, Waldron & Co. v. Bauer Bros. Co., 26 F. Supp. 162 at 169 (S.D. Ohio 1938) (“The defendant cannot escape on the ground of experimental use where the machines were used to operate upon customers’ products in the ordinary course of business”); R.C.A. v. Andrea, 15 F. Supp. 685 at 687 (E.D. N.Y. 1936), mod’d on other grounds, 90 F.2d 612 (2d Cir. 1937) (assembling parts of patented combination to test them was infringement where assembly was “not a scientific research or an engineering inquiry” but rather “a step which the defendants apparently deemed necessary in the manufacture and sale of their product”).
339 733 F.2d 858 (Fed. Cir. 1984).
the defendant's use of the drug was "no dilettante affair such as Justice Story envisioned." The court held that the defense does not permit "unlicensed experiments conducted with a view to the adoption of the patented invention to the experimentor's business," as opposed to experiments conducted "for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry.

In her paper, Eisenberg asserts that this formulation of the experimental use defense is indeed too narrow, and should be expanded to cover certain circumstances. First, use of a patented invention for the purpose of verifying the adequacy of the specification and the validity of the patentee's claims should be exempt from infringement liability. Such access would serve both the interests of science and the policies underlying the patent system itself, namely, that the patentee make an enabling disclosure. Justice Story highlighted the importance of this interest in introducing the experimental use doctrine in *Whittemore v. Cutter*, noting that it should not constitute patent infringement to construct a patented machine "for the purpose of ascertaining the sufficiency of the machine to produce the desired effects." It is not at all clear that such a use would not constitute infringement today under the standard laid down by the Federal Circuit in *Roche*.

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340 *Id.* at 863.

341 *Id.* Congress has since abrogated the rule of *Roche* insofar as it pertains to generic drug manufacturers, but left the experimental use aspect of the decision intact. 35 U.S.C. § 271(e).

342 29 F. Cas. at 1121. See also *Sawin v. Guild*, 21 F. Cas. 554 at 555 (C.C.D. Mass. 1813) (noting that the making of a patented machine "to ascertain the verity and exactness of the specification" should not constitute infringement).

343 Other intellectual property statutes provide broader experimental use exemptions. See, e.g., Plant Variety Protection Act of 1970, 7 U.S.C. § 2544 (1982) ("The use and reproduction of a protected variety for plant breeding or other bona fide research shall not constitute an infringement of the protection provided under this chapter"); Semiconductor Chip Protection Act of 1984, 17 U.S.C. § 906(a) (Supp. 1986) (exempting from infringement liability the reproduction of a protected work "solely for the purpose of teaching, analyzing, or evaluating the concepts or techniques" embodied therein or the creation of an original work incorporating the results of such analysis or evaluation). The patent laws of many other countries, including Japan and most members of the European Economic Community, recognize an experimental use exemption that is not limited to specific fields of technology. See Stephen A. Bent, et al., *Intellectual Property Rights in Biotechnology Worldwide* 342-45, citing European Community Patent Convention, Art. 31(b) (which provides that patent protection shall not extend to "acts done for experimental purposes relating to the subject-matter of the patented invention"). See also Japanese Patent Law of 1978, Art. 69(1).
More importantly, proposes Eisenberg, an expanded experimental use defense could provide a solution to those situations where a failure to license patented technologies may be blocking scientific progress. As is especially true with cutting-edge technologies, it is often in the best interests of a patentee to seek injunctions against subsequent research in the same field, especially if the research threatens to render the patented invention obsolete. Even if the parties can agree to negotiate, a number of things may prevent them from concluding a license.\textsuperscript{344} First, uncertainty or disagreement as to the value of the patented invention, the likely outcome of the research project, and the validity and scope of the patent claims might make it difficult for the parties to agree on a price for a license. It might be possible to work around some of these problems through a license agreement which conditions royalty obligations on detailed contingencies, but negotiating the terms of such a license could be costly and burdensome; for research projects requiring access to many different patented inventions, such transaction costs could become insurmountable. Second, if the subsequent researcher and the patent holder are research rivals, the subsequent researcher might be reluctant to disclose valuable research plans to the patent holder in the course of negotiations for fear that the patent holder will pursue the research plans itself rather than extend a license to the researcher. In either situation, if the research is to proceed at all, it would have to be without the patentee's permission, and thus under the threat of injunction.

Eisenberg argues, therefore, the experimental use defense be used to prevent the granting of injunctions against subsequent research use of a patented invention—that is, a patentee would be prevented from enjoining research which could potentially lead to improvements in the patented technology or the development of alternative means of achieving the same purpose. Yet while a research exemption in this context may be necessary in order for valuable research to proceed, Eisenberg realizes that allowing researchers to avoid all liability to the patent holder would restrict the

\textsuperscript{344} Eisenberg, supra note 335, at 1073-74.
value of the patent monopoly and therefore reduce patent incentives, in two ways.\footnote{Id. at 1075-76.} First, it deprives the patent holder of royalties that might otherwise be collected from researchers. Second, by lowering the cost to competitors of inventing around the patent, it shortens the expected duration of the patentee's effective monopoly.

Depending on the circumstances, Eisenberg proposes a court-imposed solution to the problem in the form of an \textit{ex ante} award of damages for the research use.\footnote{Id. at 1076-77.} If, on the one hand, the subsequent researcher used the patented invention to invent around the patent, developing a new technology that may be exploited without infringing the patent claims, the patent holder has no means of extracting payment from the researcher at the commercial exploitation stage, and therefore denying a remedy for the research use would undermine the value of the patent monopoly and lead to unjust enrichment of the researcher. In this situation, suggests Eisenberg, the court would require the researcher to pay a reasonable royalty to the patent holder in order to ensure that the patent holder is adequately compensated for the use of the patented invention. On the other hand, if the original patent is broad enough in scope to cover the improved technology developed by the researcher, the court need not step in. In that situation, the interests of the patent holder will be adequately protected by traditional enforcement of the patent—i.e., the patentee can sue for royalties on the sale of the infringing product if the infringer fails to negotiate a license. Given, however, that overbroad patents and the failure to effectively license are the problems it is attempting to solve, Eisenberg's experimental use solution comes up short in such a situation. While she fails to address it, subsequent commentators have proposed more refined solutions, one of the most notable of which is Maureen O'Rourke's proposal for a fair use defense.
2. **FAIR USE**

Like the experimental use defense and reverse doctrine of equivalents in patent law, the fair use defense is a long-standing equitable doctrine that attempts to fine-tune the scope of copyright law.\(^{347}\)

In effect, a fair use defense imposes a limited royalty-free license on the copyright owner—the party asserting the defense has infringed, but the infringement is excused. Its rationale is similar to that of its patent law counterparts, namely, that market failures may sometimes justify labeling an infringing use as fair if it is socially desirable and excusing it will not substantially harm the copyright owner's incentives. In some cases, particularly those involving parody, the market failure may be the refusal of the copyright owner to grant a license at any price.\(^{348}\) In others, high transaction costs may frustrate private bargaining, as was the case when the Supreme Court refused to enjoin Sony from selling VCRs on the basis that consumers would face insurmountable transaction costs in identifying, contacting and contracting with the individual copyright owners for permission to tape their television broadcasts.\(^{349}\)

Using copyright fair use as her model, Professor O'Rourke performs a critical examination of current patent law doctrine to identify what gaps might be filled by a patent fair use defense.\(^{350}\) Under the current reverse doctrine of equivalents, infringement is justified when the infringer makes a radical improvement to the patented invention, the probability of bargaining breakdown is high, and society would bear large costs if the new invention were kept from it.\(^{351}\) This suggests, says O'Rourke, that a comprehensive fair use doctrine should consider the nature of the advance that the infringing work

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\(^{348}\) See, e.g., *Campbell v. Acufl-Rose Music*, 510 U.S. 569 at 572-73 (1994) (allowing a fair use defense where the parodist had sought permission from copyright owner to use copyrighted work and offered to pay, but copyright owner refused, stating, "I must inform you that we cannot permit the use of a parody of 'Oh, Pretty Woman'").


\(^{350}\) O'Rourke, *supra* note 334, at 1202.

\(^{351}\) See *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565 at 1581 (Fed. Cir. 1991) (suggesting that a literally infringing device may nonetheless escape liability under the reverse doctrine of equivalents because it is a radical improvement on the patented technology). The reverse doctrine of equivalents is similar to the doctrine of equivalents, except that while the former excuses infringement, the latter finds it.
Part V. Formulating the Solutions

represents, with major advances weighing in favour of the infringer. \(^{352}\) Excusing infringement under the current experimental use exception is highly unlikely to impact the patentee’s incentives because the infringer’s purpose is merely to satisfy his or her own “amusement.” This suggests that a fair use defense should consider whether the purpose of the infringement is commercial or not.\(^{353}\)

Here she highlights the shortcomings of Professor Eisenberg’s proposal for a modified experimental use defense—that it inadequately deals with the situation in which a researcher develops an improvement that is within the scope of the patented invention and is unable to negotiate a license for it.\(^{354}\) While this result, concedes O’Rourke, may generally be justified to maintain the original patentee’s incentives, there may be cases where society would benefit from allowing the infringement to continue. A fair use defense should therefore consider whether market defects exist that frustrate the licensing of improvements. It should then balance the impact on the patentee’s incentives if the infringement were excused against the increase in social welfare if the improvement were made available.\(^{355}\)

Building on work by Professor Donald Chisum regarding the patentability of algorithms and the concern that patenting such fundamental building blocks may impede further progress if no use is privileged, O’Rourke concludes that a fair use defense should also take into account the nature of the invention. \(^{356}\) All patented inventions, she reasons, are not created equal; follow-on innovators have more need to make an infringing use of some inventions than others.

Professor O’Rourke’s analysis thereby identifies five factors relevant to a finding of fair use:

1. the nature of the advance represented by the infringement;
2. the purpose of the infringing use;
3. the nature and strength of the market failure that prevents a license from being concluded;
4. the

\(^{352}\) O’Rourke, supra note 334, at 1203.

\(^{353}\) Id.

\(^{354}\) Id. at 1204.

\(^{355}\) Id.

\(^{356}\) Id. at 1205—citing Donald S. Chisum, “The Patentability of Algorithms” (1986) 47 U. Pitt. L. Rev. 959 at 1017.
impact of the use on the patentee’s incentives and overall social welfare; and (5) the nature of the patented work. Faced with a case of patent infringement, a court could use this five-part test to determine whether to excuse a use as fair. As in copyright, no one factor would be determinative and fair use would be an equitable and affirmative defense with the burden of proof on the infringer.\textsuperscript{357}

O’Rourke’s construction of a fair use framework doesn’t stop with the five-part consideration, however. She adds a final piece of flexibility in the form of a royalty determination. If the court decides that the infringement is fair, it should then consider whether or not the infringer should compensate the patentee.\textsuperscript{358} As with copyright fair use, some uses will justify a “free” fair use—namely, situations where high transaction costs prevent private bargaining or where the infringing use is socially beneficial but the infringer simply cannot pay the price. Educational and other non-profit uses like pure research would fall into this category.

After applying her fair use test to a number of concrete examples, Professor O’Rourke devotes a large part of her paper to addressing possible criticisms. Chief among these is that modifications to existing doctrines and to the workings of the PTO should be able solve the problems that the fair use defense is attempting to remedy.\textsuperscript{359} Why implement a broad new doctrine that has the potential to further complicate the administration of patent law?

She gives two persuasive reasons. First, a case-by-case adjustment of doctrine, either through statutory changes or common law adjudication, is likely to be more expensive than a fair use doctrine that would be enacted only once. Whether changes occur incrementally or through the introduction of fair use, costs will increase for a time as parties and courts struggle to understand the new rules, but a fair use approach should prove cheaper than a number of discrete changes because courts will have copyright precedent from which to draw by analogy. In addition, fair use has the flexibility to tailor

\textsuperscript{357} \textit{Id.} at 1209.
\textsuperscript{358} \textit{Id.}
\textsuperscript{359} \textit{Id.} at 1242.
rights across a broad spectrum of industries. Correcting quirks in the patent system and counteracting PTO errors would be benefits incidental to fair use's main purpose of providing a unifying yet flexible concept under which courts could address a range of market failures in a number of distinct contexts.

Furthermore, those market defects all share similar characteristics. The anti-patent motives that can frustrate competition in a network market may also lead patentees to refuse licenses to researchers seeking to verify functionality. High transaction costs, strategic bargaining, and bargaining breakdown are universal phenomena not restricted to particular technologies or non-commercial contexts, and therefore they require an integrated approach. Rather than being overbroad, fair use is a flexible approach to a common problem.

O'Rourke anticipates another more theoretical criticism. By allowing courts the discretion of imposing a fee, the patent system may start down a slippery slope that transforms the traditional right to exclude into a liability rule where all uses are fair, and the only issue is setting the appropriate royalty. At its heart, responds O'Rourke, this objection goes to judicial competence in applying the new doctrine. Applied correctly, patent fair use would excuse only those infringements that pass the five-factor test. The ability to award a fee is an insurance policy against unduly reducing the patentee's incentives, not an invitation to the judiciary to reform patent law into a liability regime.\textsuperscript{360}

That the judiciary will occasionally err and that patentees and the public will bear the costs of those errors is inevitable, but that is not a condition unique to fair use nor a sufficient reason to oppose its implementation. In fact, argues O'Rourke, because the Federal Circuit is generally the exclusive forum for hearing patent appeals, the chances for incorrect precedent are somewhat lower for patent fair use than under the already existing copyright scheme.\textsuperscript{361} Indeed, "because the defense is broadly

\textsuperscript{360} Id. at 1243.

\textsuperscript{361} Id.
applicable to market failures across a spectrum of industries, its costs of implementation should, at least as its application becomes more predictable, be offset by its benefits.\footnote{Id. at 1249.}

3. \textbf{Reverse Engineering}

In another recent paper, Julie Cohen and Mark Lemley call for a slightly different approach.\footnote{Julie Cohen & Mark Lemley, “Patent Scope and Innovation in the Software Industry” (2001) 89 Calif. L. Rev. 1.} Like Eisenberg and O’Rourke, they find that the traditional doctrines are inadequately equipped to address the problems now facing patent law, but they focus their solutions more specifically at the software industry. In particular, they advocate a limited right to “reverse engineer” patented computer programs in order to gain access to their unprotected elements.\footnote{Reverse engineering of software, also called “decompilation,” involves working backwards from object code to produce a simulacrum of the original source code. See Andrew Johnson-Laird, “Software Reverse Engineering in the Real World” (1994) 19 U. Dayton L. Rev. 843.}

Since computer software was traditionally protected by trade secret and copyright law, such reverse engineering was a commonplace occurrence. It is clearly legal under trade secret law,\footnote{See, e.g., Unif. Trade Secrets Act 1, cmt., 14 U.L.A. 438-39 (1990); Chicago Lock Co. v. Fanberg, 676 F.2d 400 (9th Cir. 1982); Restatement of Torts at 757 cmt. f (1939); Restatement (Third) Unfair Competition at 43 (1995).} and while there is no express statutory provision in copyright permitting reverse engineering, its fair use doctrine has been the basis for numerous court decisions which have allowed it.\footnote{Primarily, reverse engineering has been held lawful when used for laudable competitive purposes, such as producing new works that compete with the copyrighted original, producing products for downstream markets that are compatible with the copyrighted original, and obtaining access to uncopied ideas, facts, or other material “locked up” within a copyrighted work. See, e.g., \textit{Bateman v. Mnemonics, Inc.}, 79 F.3d 1532 (11th Cir. 1996) (endorsing the use of reverse engineering to gain access to the unprotected ideas in a program, as well as access to copyrighted expression that might be used fairly); \textit{Sega Enters. Ltd. v. Accolade, Inc.}, 977 F.2d 1510 (9th Cir. 1992) (holding that reverse engineering was lawful where necessary to make an independently created video game work with the plaintiff’s game system).}

The recent migration of computer software into the realm of patent protection, however, threatens to eliminate this important right. The patent statute includes no express provision allowing
reverse engineering, nor is there any judicially-developed exception akin to copyright's fair use doctrine that might permit it. Since reverse engineering of a patented computer program almost certainly constitutes an infringing activity under current patent law, some sort of defense must be created in order to save it.

Cohen and Lemley point to a number of important reasons why this is crucial. First, the patent system is premised on others having adequate access to patented inventions so that they can improve on them. Some inventions, such as the paper clip, are readily apparent once embodied in a product, but software inventions cannot be improved upon without having access to a much more detailed description. In theory, the disclosure requirements of section 112 are supposed to provide this, but recent Federal Circuit decisions have held that software patentees need not disclose source code, object code, or even flowcharts, but only a high-level functional description. As a result, there is often no way to figure out a piece of patented software without reverse engineering it.

Second, reverse engineering is often necessary to obtain access to unpatented components. While some software patents cover an entire computer program, the majority cover only a single part of a program, perhaps a particular algorithm or subroutine, or even a process for getting from one stage to another. If reverse engineering is illegal, then patenting even a small part of one computer program can give the patentee effective control over all the ideas contained in the program. Indeed, claim Cohen and Lemley, patentees have periodically taken advantage of this fact by patenting “lock-

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367 While owners of a particular copy of computer program may have the right to "use" it under the doctrines of exhaustion and implied license, decompilation usually involves generating a temporary copy in RAM memory—and, in certain instances, a longer-term copy in more permanent memory—and therefore likely constitutes an unauthorized “making” of the patented program. Cohen & Lemley, supra note 363, at 9.

368 Id. at 23-28.

369 See Fonar Corp. v. General Electric Co., 107 F.3d 1543 at 1549 (Fed. Cir. 1997). The Federal Circuit reasons that “the conversion of a complete thought ... into a language a machine understands is necessarily a mere clerical function to a skilled programmer.” Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931 at 941-42 (Fed. Cir. 1990)—quoting In re Sherwood, 613 F.2d 809 at 817 (1980). Indeed, the court has gone so far as to hold that patentees can satisfy the best mode requirement for inventions implemented in software even though they do not use the terms "computer" or "software" anywhere in the specification. Robotic Vision Sys., Inc. v. View Eng’g, Inc., 42 U.S.P.Q.2d 1619 (Fed. Cir. 1997).
out" devices and using the patent to try to deny access to the unpatented components of special-purpose operating systems.\textsuperscript{370}

Third, because patent, copyright, and trade secret rights can coexist simultaneously in the same piece of software, intellectual property policy for software must be made with that combination of rights in mind. If the courts conclude that patent law does not permit reverse engineering, they will have effectively nullified its allowance in copyright and trade secret law. The absurdity of such a contradiction was demonstrated vividly in a recent case involving Sony, whereby the computer maker is attempting an end-run around the Ninth Circuit decision by filing a software patent infringement suit against the same act of reverse engineering that the court held legal under copyright law.\textsuperscript{371}

Finally, and more than a little ironically, a ban on reverse engineering might make it difficult or even impossible to detect patent infringement. Since many software inventions are internal to the program and their use cannot be detected without inspecting the code, a patent owner who suspects a rival of infringing such a software patent may have no choice but to reverse engineer the rival's software in order to gain the evidence needed to file suit. If that rival has its own patents on a separate aspect of the program, however, reverse engineering as part of a pre-filing investigation will infringe its own patents. At the least, this puts a new argument in the hands of a patent defendant; at most, it may deter valid patent infringement suits from ever being filed.

Cohen and Lemley go on to survey the various defenses to patent infringement to show that none of them properly protects the right to reverse engineer software.\textsuperscript{372} Looking first to the experimental use exception, they note that Rebecca Eisenberg's proposal for a broader interpretation would protect reverse engineering, and recommend that the courts read the defense as she suggests. As currently construed, however, the experimental use defense is too narrow.

\textsuperscript{370} See, e.g., \textit{Atari Games Corp. v. Nintendo of America, Inc.}, 975 F.2d 832 at 843-44 (Fed. Cir. 1992).

\textsuperscript{371} \textit{Sony Computer Entm't, Inc. v. Connectix Corp.}, 203 F.3d 596 (9th Cir. 2000).

\textsuperscript{372} Cohen & Lemley, \textit{supra} note 363, at 29-36.
The authors then turn to the well-established principle that a patentee's right to control the use of his patented goods does not extend beyond the first sale—i.e., a consumer who buys a patented product from the patentee has the right to use and resell that product without the patentee's approval. Courts have developed two parallel doctrines in support of this principle: exhaustion and implied license.

Both doctrines have traditionally drawn a distinction between using and reselling a particular copy of a patented product, which is permissible, and making a new copy of a patented product, which is not. Software patents undermine this distinction, however, because it is impossible to use software without "making" a copy, at least temporarily, in the memory of a computer. If the exhaustion and implied license doctrines do not protect the making of such temporary copies, they will be effectively nullified in the software context, with the consequence that no use of a purchased program would be permissible without express permission from the patentee.

While Cohen and Lemley think that a reasonable court would reject such an interpretation, they raise the concern that patentees might be able to override the protection of the exhaustion and implied license doctrines by conditioning the sale or license of the patented product on an agreement not to reverse engineer it. Though such an action would likely run afoul of the patent misuse doctrine, they would rather see Congress create a specific statutory right to reverse engineer.

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373 Glass Equip. Dev. v. Besten, Inc., 50 U.S.P.Q.2d 1300 (Fed. Cir. 1999) ("The first sale doctrine stands for the proposition that, absent unusual circumstances, courts infer that a patent owner has given up the right to exclude concerning a patented article that the owner sells."); Becton, Dickinson & Co. v. Eisele & Co., 86 F.2d 267 at 270 (6th Cir. 1936) ("Once having sold patented articles, neither the patentee nor its licensee may exercise future control over them. They pass beyond the scope of the patentee’s monopoly.").

374 This has been the subject of considerable litigation in the copyright arena. Most courts now hold that a temporary copy loaded in the RAM memory of a computer is "fixed" and therefore constitutes a new copy for copyright purposes. See, e.g., MAI Sys. Corp. v. Peak Computer, Inc., 991 F.2d 511 at 518 (9th Cir. 1993). While this is almost certainly the wrong conclusion, an analogous finding in patent laws is almost assured. Because patent law has no fixation requirement at all, any reproduction of a patented program, no matter how temporary, arguably constitutes a "making" within the meaning of the statute.

375 Patent misuse is an equitable defense to patent infringement that precludes patentees from "impermissibly broadening the 'physical or temporal scope' of the patent grant with anticompetitive effect." B. Braun Med., Inc. v. Abbot Labs., 124 F.3d 1419 at 1426 (Fed. Cir. 1997)—quoting Windsurfing Int'l, Inc. v. AMF, Inc., 782 F.2d 995.
patented software, as has already been done in both the Semiconductor Chip Protection Act\textsuperscript{376} and the
Digital Millennium Copyright Act.\textsuperscript{377} Barring that, they hope that the doctrinal adjustments they have
outlined will be up to the task. "While we think that existing law, properly interpreted, can and
should protect reverse engineering for legitimate purposes, Congress could easily guarantee such a
right if the courts fail to do so."\textsuperscript{378}

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\textsuperscript{376} 17 U.S.C. § 906(a) (1994).
\textsuperscript{378} Cohen & Lemley, supra note 363, at 36.
VI. CONCLUSION

So it seems that in the complex new economy of the twenty-first century, the classic incentive theory of the patent system no longer tells the whole story. Once patently simple, the relationship between patents and innovation is now much harder to discern. A controversial annexation of foreign subject matter, an exponential growth in patent applications and issuances, and a significant relaxation of judicial constraints have stretched the system to the breaking point.

But is the patent system really in crisis? Much has changed in the nearly two years since research on this thesis began, and I've moved from critiquing the patent system from the outside to working within it. Whether this has caused me to modify, or mollify, my perspective is uncertain, but it does seem that the system is working better today, that the concerns are abating somewhat. Critics like Robert Merges seem more optimistic. One year after peppering his commentary with words like “crisis” and “breakdown,” he devotes an essay to the thesis that “intellectual property law has generally adapted quite well to each successive wave of technological innovation.”

Indeed, there is evidence that the courts have become better at assessing the novelty and nonobviousness of the new inventions. Encouraging in this regard is the AT&T v. Excel Communications decision. In the first incarnation of that case, the Federal Circuit held AT&T’s telephone billing method patentable as a business method. In a later phase, however, the patent was invalidated as obvious in light of MCI’s “Friends and Family” long-distance program. And in February of last year, in the appeal of the Amazon.com case, the Federal Circuit removed the preliminary injunction that had been granted against Barnes & Noble. The court found that because Amazon’s “1-Click” patent claims were not confined to the Internet, the relevant prior art could also not be

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379 Merges, supra note 187.
380 Merges, supra note 37, at 2190.
381 AT&T Corp. v. Excel Communications, supra note 20.
limited to Internet applications. Since Barnes & Noble had demonstrated, with reference to such prior art—in particular, a mid-1990s stock-chart system—that there was a substantial question as to the nonobviousness of Amazon's patent, the injunction was vacated. 383

Yet while the courts may be getting better at limiting the scope of bad patents, shouldn't the emphasis be on preventing them in the first place? Again, the focus comes around to the U.S. Patent & Trademark Office. Despite its best efforts, is the PTO doing a good enough job at examining patents? Do they have the resources they need? As Charles Baker, chair of the Intellectual Property Law Section of the ABA, suggests, the patent system would best be served by appropriations rather than legislation. "If Congress is truly concerned about avoiding PTO delays and ensuring good patents, they should give the PTO the money it needs. ... The office does not have as many examiners as it should have to issue quality patents in a reasonable time." 384

Baker's complaint seems to carry recent weight on Capitol Hill. This spring, the Bush administration proposed boosting Patent Office funding by 21 percent and imposing a one-time patent application surcharge of 19 percent, a move that would generate an additional $45 million for the agency and $162 million for the rest of the government. 385

But is fixing the PTO really the cure? Picking up on his "missing patents" theme, Mark Lemley suggests that because the overwhelming majority of patented inventions are not used in ways that call their validity into question, we're better off focusing on the few cases where a patent is actually licensed or litigated. The title of his recent paper, "Rational Ignorance at the Patent Office," invokes economic jargon for the proposition that the PTO should remain "rationally ignorant" of the objective

382 Amazon.com v. Barnesandnoble.com, 239 F.3d 1343 (Fed. Cir. 2001).
383 Unfortunately, it took fourteen months and the passing of two holiday shopping seasons for it to happen.
384 Smith, supra note 108.
validity of patents because the cost of acquiring the information necessary to make perfect patentability judgments far exceeds the benefits.\(^{386}\)

Estimating that about $20,000 is spent taking the average patent from initial application to issuance, and working with recent data indicating that 28.4% of the 275,000 patent applications filed in the year 2000 were continuation applications, which may only cost around $5,000, Lemley calculates that domestic patent prosecution costs a total of $4.33 billion per year.\(^{387}\)

He then calculates the total amount spent on litigation and licensing. Using an AIPLA report that the median cost of patent litigation to each side is $799,000 through the end of discovery and $1,503,000 through trial and appeal,\(^{388}\) together with data indicating that around 1,600 patent cases are filed each year, but only about one hundred of those actually make it to trial,\(^{389}\) Lemley gauges the total annual amount spent on litigation at $2.1 billion.\(^{390}\) He notes that this total is only the cost of legal fees—it does not include the costs of judgments paid, nor does it include the indirect social costs such as judicial resources or the time lost by corporate employees involved in the case.

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\(^{386}\) Lemley, supra note 295.

\(^{387}\) Id. at 1499.

\(^{388}\) These numbers are the same as reported in Section IV.D, supra. The average cost of patent litigation is likely higher (i.e., $2.1 million) because some extremely expensive cases will raise the average above the median. The AIPLA study does report that the seventy-fifth percentile of patent cases cost $1,503,000 to take through discovery and $2,510,000 through the end of the case. AIPLA Report of Economic Survey (of U.S. IP Practitioners) (1999)—cited in Craig P. Opperman, "Computer Technology Patents (With an Emphasis on Internet & E-Commerce Related Patents)" (2000) 590 PLI/Pat 1039 at 1047.

\(^{389}\) Like Lerner and Lanjouw, supra, Lemley cites the Derwent database for the number of cases filed. Lemley, supra note 295, at 1502. For the number of cases that go to trial, however, he cites Kimberly Moore, "Judges, Juries and Patent Cases: Empirical Evidence to Peek Inside the Black Box" (2000) 99 Mich. L. Rev. 365 (stating that the number of trials per year from 1988 to 1998 ranged from a low of 86 to a high of 108). These numbers don't match well with Lerner and Lanjouw's calculations that about 670 cases go to trial, but, using their assumptions, the total cost of litigation is about the same—see note 390, infra.

\(^{390}\) Lemley arrives at this number by calculating the total cost of those suits that are filed but settled beforehand ($799,000 x 1,500 cases x 2 parties = $2.4 billion) but discounting that by 25% to account for the fact that some cases will settle early in the litigation process and not incur full discovery costs. To this $1.8 billion he adds the costs of those cases which go to trial ($1,503,000 x 100 cases x 2 parties = $301 million) to arrive at $2.1 billion. Lemley, ibid. If we use Lerner and Lanjouw's finding that about 600 cases go to trial, that would add $1.8 billion instead of $301 million, but those authors found that most cases that don't go to court settle quite early on the
Lemley also calculates the cost of licensing outside of litigation, using the estimate that the total number of patents either litigated or licensed for a royalty is on the order of five percent of issued patents. Since 1.5% are litigated, that leaves 3.5% licensed, or about 5250 patents, each of which costs an estimated $100,000 to license, for a total of $525 million. Adding to that the total spent on litigation, his final total for litigation and licensing costs rises to $2.62 billion.391

What does he use all these numbers for? To test the cost effectiveness of various administrative reforms. First, he looks at the common proposal that more time should be spent examining patents, perhaps double the 18 hours spent currently. This wouldn’t double the cost of prosecution, since much of the cost is incurred in drafting the initial application, but it might mean a 50% increase in the costs of prosecution, he assumes, from an average of $20,000 per original application to $30,000. Because more time is being spent on each patent, the number of patents issued should then drop. The size of the drop is hard to estimate, Lemley admits, and will “depend on the quality of the patents that currently issue and how many of the bad patents that currently issue can be smoked out merely by adding a few more hours to an examiner’s evaluation.”392

Assuming that the total number of issued patents would drop by approximately ten percent as a result of truly final rejections of more applications, and taking into account that a more comprehensive examination process should deter some people from filing applications at all, Lemley projects that the number of applications would stop its significant upward trend and fall by about ten percent.393 Thus, the total costs of prosecution under the double-examination system would be 177,200 original applications at $30,000 ($5.2 billion), plus 70,300 continuing prosecution

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391 Id. at 1509.
392 Id.
393 To clarify, deterrence would stop the upward trend in applications, and more rejections would reduce current issuances by approximately 10%.
applications at $7,500 per patent ($530 million), for a total cost of $5.85 billion—an increase of $1.52 billion in the cost of prosecution.\footnote{\textit{Id.}}

But how much would this save out of the $2.62 billion spent on litigation and licensing? Assuming again that about ten percent of bad patents would be prevented from issuing, litigation and licensing costs should also drop by 10%, or $262 million. So we would be spending $1.52 billion to attain a benefit of $260 million—hardly an efficient use of resources.

Lemley also considers the proposal that patent applicants conduct a prior art search before filing their applications and to disclose the results of that search to the PTO. Pricing prior art searches somewhere between $5,000 and $7,000, depending on the complexity of the technology and how crowded the field is, and accounting for additional legal expenses, Lemley estimates that such a proposal would add between $8,000 and $10,000 to the cost of patent prosecution.\footnote{\textit{Id.}} If we assume the same results as for doubling examination time, the cost-benefit structure remains unchanged—an expenditure five times the benefit.

Lemley admits that his conclusion depends crucially on the fact that very few patents are ever the subject of litigation or licensing, but rejects the notion that it is dependant on the assumptions he makes. Indeed, he spends a considerable amount of time examining his estimates and assumptions, and asserts that even if his assumptions were relaxed "beyond all reasonable bounds, the fundamental fact remains that litigation of a few patents is a far more efficient way of determining validity that giving a detailed ex ante examination to all patents."\footnote{\textit{Id.} at 1514.}

So even accounting for Lemley’s estimates, it’s hard to avoid the conclusion that money is better spent on the back-end of the patent system—in litigation. But how? As mentioned above, he endorses the idea that the presumption of validity granted to issued patents should be lowered or even

\footnote{\textit{Id.}}
\footnote{\textit{Id.} at 1510.}
\footnote{\textit{Id.} at 1514.}
dropped altogether, and he also thinks that some expansion of fee shifting is a good idea. Those are good suggestions for litigation reform, but as Jay Thomas points out, we shouldn’t abandon the PTO as a focus of reform either. We just need to look to solutions that improve the quality of issued patents without incurring significant costs, such as making use of official notice, mandating the use of Jepson claims, and placing more responsibility on the heaviest users.

The proposals for doctrinal reform also hold great promise, especially Maureen O’Rourke’s suggestion that patent law adopt a fair use defense modeled on copyright. Her five-factor test with an optional royalty award is a disciplined yet flexible approach to the problem of overbroad patents and the failure to license them. In addition, it would also allow for the right to reverse engineer patented programs and devices, as proposed by Julie Cohen and Mark Lemley.397

Solutions could also come from outside the system. In November 2000, nine months after Tim O’Reilly’s open letter to Jeff Bezos,398 the pair joined other investors in launching BountyQuest, an online company that offers rewards to anyone who can find prior art on certain patents. BountyQuest has offered rewards ranging from $10,000 to $40,000 for prior art on several controversial new patents, including Priceline.com’s reverse auction, SightSound’s Digital Download technology, and Double Click’s banner advertising method, and even Amazon’s 1-Click patent. Indeed, BountyQuest went so far as to offer a reward for information undermining its own patent on “an Internet-based, broadcast reward service for finding prior art relevant to the validity of a patent.”399

In January 2001, BountyQuest announced its first four $10,000 winners, whose findings undermined the validity of a method of online music sampling, a way to control access to an event venue, and to single-chip network routers. And on 14 March 2001, it announced the results of the

397 See Cohen & Lemley, supra note 363, at 37: “Some commentators have suggested that patent law should include a general fair use right; if it did, that right would certainly encompass the limited protections for reverse engineering we suggest here.”

398 See supra note 120 and accompanying text.

399 Smith, supra note 108.
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challenge to Amazon’s 1-Click patent. BountyQuest receiving 30 submissions for the posting, and “while we didn’t have an exact-match winner, we found prior art that closely matched every claim in the patent,” said O’Reilly. 400 “These submissions clearly demonstrate the power of the Internet when it’s used as a networking tool, instead of as a traditional search engine. BountyQuest ensures that a wider community of voices are heard when patent validity is in question.”

The idea of patent bounties appears to have currency among academics. In another recent article, Professor Thomas proposes that the Patent Office usurp the role of BountyQuest, employing a class of private patent examiners who would research and disclose patent-defeating references. “Employing private citizens as partners in patent examination,” he submits, “offers a fiscally realizable solution for restoring order to our patent system and ultimately lowering its social costs.” 402

In the end, whether the patent system is considered to be in a state of crisis or not, there are enough stakeholders convinced that the current level of resources committed to the patent system is excessive, that surely there must be ways in which costs, delays, and uncertainties can be substantially reduced. Substantive change will remain difficult—especially given the failure to demonstrate many real effects of the policy program so far, and thus predict the results of any future direction—but some sort of change is inevitable. What form it will take remains to be seen, but one thing is certain: the past twenty years of patent reform will not be the last.

400 “BountyQuest Unveils Results of Challenge to Amazon.com 1-Click Patent” Business Wire (14 March 2001).
401 Id.
REFERENCES


References


Eisenberg, Rebecca S. "Patents and the Progress of Science: Exclusive Rights and Experimental Use" (1987) 56 U. Chi. L. Rev. 1017.


References


References


References


Economics Articles


References


