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Adam B. Jaffe and Josh Lerner: Innovation and Its Discontents

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Introduction



They Fixed It, and Now It's Broke

Over the course of the nineteenth and twentieth centuries, the United States evolved from a colonial backwater to become the pre-eminent economic and technological power of the world. The foundation of this evolution was the systematic exploitation and application of technology to economic problems: initially agriculture, transportation, communication, and the manufacture of goods, and then later health care, information technology, and virtually every aspect of modern life.

From the beginning of the republic, the patent system has played a key role in this evolution. It provided economic rewards as an incentive to invention, creating a somewhat protected economic environment in which innovators can nurture and develop their creations into commercially viable products. Based in the Constitution itself, and codified in roughly its modern form in 1836, the patent system was an essential aspect of the legal framework in which inventions from Edison's light bulb and the Wright brothers' airplane to the cell phone and Prozac were developed.

Beginning in 1982, the U.S. Congress made two adjustments to how the patent system operates. At the time, these changes were

described as administrative and procedural rather than substantive. In 1982, the process for judicial appeal of patent cases in the federal courts was changed, so that such appeals are now all heard by a single, specialized appeals court, rather than the twelve regional courts of appeal, as had previously been the case. And in the early 1990s, Congress changed the structure of fees and financing of the U.S. Patent and Trademark Office (PTO) itself, trying to turn it into a kind of service agency whose costs of operation are covered by fees paid by its clients (the patent applicants).

It is now apparent that these seemingly mundane procedural changes, taken together, have resulted in the most profound changes in U.S. patent policy and practice since 1836. The new court of appeals has interpreted patent law to make it easier to get patents, easier to enforce patents against others, easier to get large financial awards from such enforcement, and harder for those accused of infringing patents to challenge the patents' validity. At roughly the same time, the new orientation of the patent office has combined with the court's legal interpretations to make it much easier to get patents. However complex the origins and motivations of these two Congressional actions, it is clear that no one sat down and decided that what the U.S. economy needed was to transform patents into much more potent legal weapons, while simultaneously making them much easier to get.

An unforeseen outcome has been an alarming growth in legal wrangling over patents. More worrisome still, the risk of being sued, and demands by patent holders for royalty payments to avoid being sued, are seen increasingly as major costs of bringing new products and processes to market. Thus, the patent system—intended to foster and protect innovation—is generating waste and uncertainty that hinders and threatens the innovative process. In the chapters that follow, we will see many examples of these issues:

- Patents on inventions that are trivially obvious, such as the “Method for Swinging on a Swing,” “invented” by a five-year-old (see chapter 1).
- Patents that have become weapons for firms to harass competitors, ranging from Rambus' efforts to exploit a semiconductor industry

- standard-setting body to Smucker's steps to quash a small-time lunch caterer (see chapters 1 and 2).
- Patents that enabled companies to win huge damages awards, and even put rivals out of business, such as Polaroid's instant photography patents (see chapter 4).
 - Patents in areas new to patenting, but covering purported discoveries familiar to practitioners and academics alike, such as the patents on previously well-known option pricing formulas (see chapter 5).

We will see that a tension between rewarding some innovators while potentially inhibiting the activities of others is inherent in the patent system. As we will discuss in chapter 3, there have been previous “crises,” in which the patent system was seen to be dangerously out of control. But what is striking about the current situation is the clear connection between the system's pathologies and recent, seemingly innocent statutory changes. The impact of these shifts has been especially extreme in technologies that are believed to be key to current economic development, including electronics, software, and biotechnology. Approximately two decades after Congress began tinkering with the system, it is now urgent that we analyze what has gone wrong, and determine how to fix it.

It Is Not a Pretty Picture

A patent is a government-granted right to prevent other people or companies from making, selling, or using a product or process that you have invented. To get a patent, you have to file an application that explains your invention, and details how it differs from what others have done before. The government reviews the application, and (if things are working right) grants you the patent only if your invention is genuinely new. With patent in hand, you can stop others from using your invention, or you can allow others to pay you for the right to use it. If others use it without your permission, you can sue them in federal court, asking the court to make them stop, and to make them pay for the uses they have already made. The party you accused of “infringing” your patent will typically claim

that what they are doing is not covered by your patent, and that your patent never should have been granted in the first place because your idea was not new. Unless you reach a voluntary settlement, a jury will decide whether the patent is indeed valid, and whether it has been infringed. As you might guess, resolving patent cases in court is an expensive proposition, often involving millions of dollars in attorneys' fees and other costs. (A more thorough and precise explanation of the patent process is presented in chapter 1.)

The previous paragraph describes the patent system today, and it describes the patent system as it was before 1982. What has changed is the likelihood that the various parties will succeed at different points in the process. Today, the applicant is much more likely to have the patent granted; the patent is much more likely to be held valid if challenged in court; and the party accused of violating the patent is more likely to be found to be an infringer and forced to pay a large monetary award.

What catalyzed these shifts? The 1980s were a time of great concern about U.S. "competitiveness," as well as a general movement to shrink government and make it more efficient and responsive. Streamlining the courts would make valid patents easier to enforce. Making the PTO run more like a business would make the process easier for inventors to use, and would also save the taxpayers money because the office would be supported by application fees rather than taxes.

These intentions may be admirable, but they have spawned some highly undesirable consequences. Many people and companies have received patents for trivial or even non-existent inventions. Moreover, many awardees have exploited the enhanced legal strength of their patents by suing (or threatening to sue) the true innovators in their industries. As a result, valuable technologies have become snarled in a web of litigation and licensing negotiations. And as young firms have found themselves unable to commercialize their ideas, economic growth has suffered. Consumers therefore have less access to new products—from lifesaving drugs to productivity-enhancing software—than would be the case if innovative companies were not distracted from innovation by litigation and fear of litigation.

How did it come to pass that these administrative and legal changes—which seemed benign when enacted—exerted such surprisingly damaging effects? Most analyses of the patent system are based on an idealized conception of that system. According to this conception, Congress establishes rules regarding which discoveries qualify for a patent, and how the rights conveyed by a patent may be enforced. The patent office and the courts simply apply and enforce these statutory rules. From this perspective, it is easy to argue that streamlining the patent process and making it easier for inventors to enforce their right to protection in the courts enhances a nation's overall innovation, creativity, and economic growth.

In practice, however, life is more complicated. Patenting rules are inherently ambiguous, and so actual patent practice depends on the decisions of the patent office. Changing the way that office is organized and funded alters its incentives; with different incentives, it produces different decisions, causing patent practice to change without any Congressional action to change the law. Similarly, the court's decisions have a tremendous effect on how the laws written by Congress are interpreted, and the composition of the court affects the kind of decisions it makes. Further, the impact of patent litigation goes far beyond the cases that are actually heard by the courts. Fear of litigation, along with threats made by patent holders, prompt some firms to sharply shift their behavior, even if these companies never appear in court. The accumulation of fees paid for the use of multiple patents makes the product development process more expensive, limiting the rate at which companies can bring new products to market. And some companies, given the choice of paying royalties or facing litigation on as-yet unproven new products, may simply drop the project altogether.

Thus, in changing administrative structures and procedures, Congress fundamentally altered the nature of substantive decisions about which patents should be granted, and which ones should be successfully enforced in court. This, in turn, has changed the behavior of inventors and firms that participate in the process. Now that it is possible to get a patent on unoriginal ideas, many more dubious applications are being filed. And with success now more likely for patent holders who sue their competitors, more such suits

are filed or threatened. Increasingly, the firm with the best lawyers or the greatest capacity to withstand the risk of litigation wins the innovation wars—rather than the company with the brightest scientists or most original, valuable ideas.

Though controversies regarding particular patents have attracted the business media's attention, the fundamental changes in patent policy and their systemic implications have received little scrutiny. This book addresses that omission, systematically examining the changes in patenting since 1982 and the resulting implications for business, innovation, and society as a whole. Drawing on the experience of the past two decades, we show the changes that are needed in order to restore a healthy environment for innovation and progress.

Our approach is to analyze how the changes made by Congress have affected the incentives to all participants in the process—patent applicants, the patent office employees who review the applications, and the parties potentially involved in litigation. We show how the current system provides incentives for applicants to file frivolous patent applications, and for the patent office to grant them. It likewise encourages patent holders to sue, and those accused of patent infringement to give in and pay under threat, even if the patent at issue is of dubious validity. It does not provide good incentives for the information necessary to resolve questions about patent validity to be brought forward and analyzed appropriately. As a result, virtually all of the participants in this process, while acting in ways that make perfect sense given the incentives they face, end up collectively behaving in the pathological manner we have described.

By and large, other countries have not made the same kinds of changes in their patent systems that the United States has made. Patents in Europe and Japan remain harder to get and there is less patent litigation. But the problems that have surfaced in America are likely to be of interest far beyond the boundaries of the United States. First, dysfunction in the patent system of the world's largest economy affects innovation everywhere. Second, our basic analysis of how the rules of the patent system interact with the incentives of the people and firms involved is relevant to the improvement

of patent systems everywhere, as the same pressures for stronger protection and for reduced examination costs are being felt around the world today.

Why Patents?

Governments have long recognized the broad social value generated by new technologies, and hence have sought to reward inventors of important technologies. In some cases, they have offered prizes to those who solved important problems. In other cases, kings and parliaments have offered subsidies and rewards to those who came up with unexpected discoveries that proved important for commerce and defense.

But at least since the Tyrolean leaders recognized the manufacturers of superior mining equipment in the fourteenth century, the granting of patents has been an important tool to encourage innovation, and the economic growth and improvement in living standards that new technologies provide. The holder of a patent gets the right to exclude others from making a specified product or using a specified process for some period of time. Put another way, a patent is a “negative right”: the patent-holder can prevent others from using his or her discovery. A patent thereby creates a kind of monopoly for its owner, although the breadth and hence significance of this monopoly depends on the breadth or extent of the patent grant.

At first, there was little rhyme or reason behind who got patents, or how broad their patent rights were. In many instances, patents were granted to people who did not make any discoveries at all. For instance, among the fifty patents granted by Queen Elizabeth I of England during the sixteenth century were awards that gave their recipients the exclusive right to manufacture and sell such basic materials as salt, sulphur, and paper. Many of these grants of monopolies over entire important industries went to royal favorites. Not surprisingly, these awards triggered widespread popular resentment: in fact, a patent providing exclusive rights to sell wine led to rioting in the streets of London.

By the eighteenth century, however, two guiding principles emerged in Great Britain and elsewhere: that patents should be granted only for new and important discoveries, and that the breadth of the patent grant should be proportional to the size of the discovery made. Inventors were increasingly required to submit descriptions of the discoveries, in which they carefully delineated what was truly new about their inventions. Government officials would then decide whether the discoveries were novel and determine how generous a monopoly they should award. In 1769, for example, James Watt was awarded a patent for his “new method for lessening the consumption of steam and fuel in fire engines,” which led over the next several decades to the first industrial applications of the steam engine, thereby initiating the industrial revolution in Great Britain.

The economic logic of granting patent protection to inventors is straightforward. If there were no incentives for those who discover and develop new technology, it is likely that fewer innovations would be developed, slowing progress and the benefits it brings. Potential inventors realize that without adequate protection rivals will rapidly copy their discoveries, and that therefore innovation is at best an uncertain route to future profits. As a result, companies would be unlikely to spend significant amounts of money on the Research and Development (R&D) that is the source of new products and processes in a modern economy. They would instead choose to spend their money pursuing other activities (for example, marketing campaigns) or just pocket it as profit.

Most scholarly analyses of the economic effects of patents assume that the system “works,” meaning that the party who is the first to invent a given product or process is the party that is awarded a patent. This analytical construct is embodied in patent law within the idea that a patent cannot be granted unless the patent application is for an invention that is both “novel” and “non-obvious.” In practice, these standards depend on the patent office “examiners” who must apply them. How carefully they ensure that only true innovators are awarded patents depends on the incentives they face, the rules under which they operate, and their training and ability. As we will see, an unintended consequence of the redesign of the

Patent Office has been to gravely undermine the Office's application of these standards.

The Silent Revolution

Patents have existed for many centuries. It is surprising, then, that one of the actions that triggered the new era of patent policy was an apparently benign change in U.S. judicial procedure. Almost all formal disputes involving patents are tried in the federal judicial system. The initial litigation must be undertaken in a district court. Prior to 1982, appeals of patent cases were heard in the appellate courts of the various circuits. These differed considerably in their interpretation of patent law, with some circuits being more than twice as likely to uphold patent claims as others. These differences persisted because the Supreme Court, which normally steps in to insure national legal uniformity, rarely heard patent-related cases. The justices were reluctant to devote their time to these "banal" commercial disputes.

The result was widespread "forum shopping" in patent cases. Patent applicants would crowd the hallway in the patent office where the list of patent awards was distributed at noon on each Tuesday. Upon discovering that their patent was issued, they would rush to the pay phones to instruct their lawyers to file suit against some alleged infringer of the newly minted patent, filing the lawsuit in a patent-friendly district court, such as Kansas City. Meanwhile, representatives of firms who might be accused of infringing the issued patent would be racing to the phone bank as well, ordering their lawyers to file a lawsuit seeking to have the new patent declared invalid, but filing in a district known to be skeptical of patents—for example, San Francisco. Such dueling lawsuits would usually be combined into a single action, heard in the district court in which the earliest filing was made. Often the fate of the case—and many millions of dollars in damages—would depend on which lawyer got an earlier date-time stamp on the filing documents.

In 1982, the U.S. Congress decided to address this problem, which was perceived to be undermining the effectiveness of patent

protection and thereby threatening U.S. technological and economic strength. It established a centralized appellate court for patent cases, the Court of Appeals for the Federal Circuit (CAFC). The change was presented in the congressional hearings as a benign one, bringing consistency to the chaotic world of patent litigation, and predictability to the enforcement of valid patent rights. But it was clear from the beginning that advocates of stronger patent protection hoped that the new court would come down squarely on the side of patent holders.

And this is precisely what happened. Over the next decade, in case after case, the court significantly broadened and strengthened the rights of patent holders. One illustration is a comparison of the CAFC's rulings with those of the previous courts. The share of cases where a district court finding of patent infringement was upheld increased, as did the share of cases reversing an earlier finding that a patentee was not entitled to damages. Likewise, the CAFC greatly expanded patent-holders' rights along a number of other dimensions, including making it easier to shut down a rival's business even before a patent is proven valid (through a preliminary injunction) and to extract significantly greater damages from infringers.

The consequences of the CAFC's strengthening of the system for enforcing patents have been exacerbated by changes in the behavior of inventors and of the U.S. patent office, which have led to a dramatic increase in both the number of patent applications filed and in the fraction that are successful in producing granted patents. Decisions by the CAFC encouraged more patent applications, for three distinct reasons. First, the CAFC made it clear that the realm of patentable subject matter included technologies like software, business methods, and certain kinds of biotechnology that hitherto were believed by many to be unpatentable. Second, the new court issued rulings on the standards of "novelty" and "non-obviousness" that made it easier for applicants to qualify for a patent. Finally, the improved enforceability of granted patents encouraged patent applications by making the patent right more economically valuable. As a result, the rate of patent application filings in the United States began to increase shortly after the creation of the CAFC.

Just as the tide of patent applications began to rise, Congress intervened once again to modify the patent system. Beginning in the early 1990s, it converted the U.S. patent office from an agency funded by tax revenues, which collected nominal fees for patent applications, into one funded by the fees it collects. In-deed, the patent office has become a “profit center” for the government, collecting more in application fees than it costs to run the agency.

Again, this mere administrative change has had important consequences. Increasingly, the PTO views itself as an organization whose mission is to serve patent applicants. And, of course, what applicants want is for their applications to be granted. Furthermore, the new orientation creates strong incentives for the PTO to process applications as quickly as possible, and at the lowest possible cost. As a result, there is a widely perceived decline in the rigor with which the standards of novelty and non-obviousness are applied in reviewing patent applications. This, in turn, encourages more people to apply for dubious patents.

The Patent Explosion

Many in the patent community—patent office officials, the patent bar, and corporate patent staff—have welcomed these profound shifts in the U.S. patent system. Then again, they have much to gain from a swelling tide of patent applications.

The weakening of examination standards and the increase in patent applications have led to a dramatic increase in the number of patents granted in the United States. Figure I.1 shows that the number of patents granted in the United States, which increased at less than 1 percent per year from 1930 until 1982 (the year the CAFC was created), roughly tripled between 1983 and 2002 (from 62,000 per year to 177,000 per year, an annual rate of increase of about 5.7 percent). Applications, too, have ballooned, to the point that there are now about 350,000 per year.

If this increase in patenting reflected an explosion in U.S. inventiveness, it would be cause for celebration. But unfortunately it is

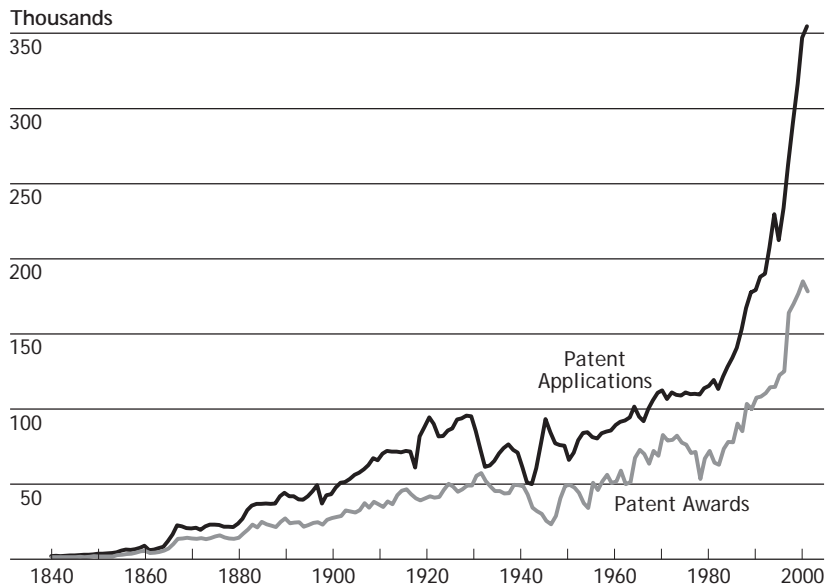


Figure I.1 Annual patent applications and awards.

clear that the rapid increase in the rate of patenting has been accompanied by a proliferation of patent awards of dubious merit. This disturbing trend is confirmed by international comparisons, which show that the number of inventions of U.S.-origin with confirmed worldwide significance grew in the 1990s at a rate less than half that of domestic U.S. patent office grants. It is also confirmed by reference to particular patents granted by the PTO for “inventions” that are not new or are trivially obvious.

Much of the problem stems from the organization of the patent office itself. Chronically strained for resources, patent office officials have struggled to find qualified examiners, particularly in the “new” areas of software, financial methods, and biotechnology where it had not previously had much expertise. As the CAFC opened the door to new kinds of patents, the limited number of examiners in these new areas were overwhelmed with applications. Examiners of financial patents, for example, often had as

little as a dozen hours to assess whether a patent application was truly novel.

Moreover, retaining the few examiners skilled in the new technologies has been difficult for the office. Companies have been eager to hire these examiners, who are valuable for their knowledge of the PTO examination procedure in the new technology. Moreover, corporations and law firms can offer examiners many times over the approximately \$40,000 starting salaries that the government offers. Needless to say, this federal compensation is far less than market rate, especially for the examiners of business method patent applications, who are typically required to have an engineering degree and an MBA, and often have a law degree as well.

The Patent Litigation Explosion

The proliferation of patents on previously existing technologies would sow confusion and legal uncertainty under the best of circumstances, but it has occurred just as the CAFC has been making it easier to enforce the rights they convey. The predictable result has been a parallel increase in the number of lawsuits fought over patents. Figure I.2 shows that the number of patent lawsuits was roughly constant throughout the 1960s and 1970s, began to rise with the increase in patent awards in the 1980s, and ballooned in the 1990s. As will be described in more detail in chapter 2, burgeoning patent litigation is increasingly making lawyers the key players in competitive struggles rather than entrepreneurs and researchers. As the patent system becomes a distraction from innovation rather than a source of incentive, the engine of technological progress and economic growth begins to labor.

The pernicious consequences of the evolving patent situation can be seen in two broad kinds of competitive and legal interactions. In one scenario, an established firm, frequently one whose competitive position and innovative activity are declining, realizes it has a valuable stockpile of issued patents. This firm then approaches rivals, demanding that they take out licenses to its patents. In many cases,

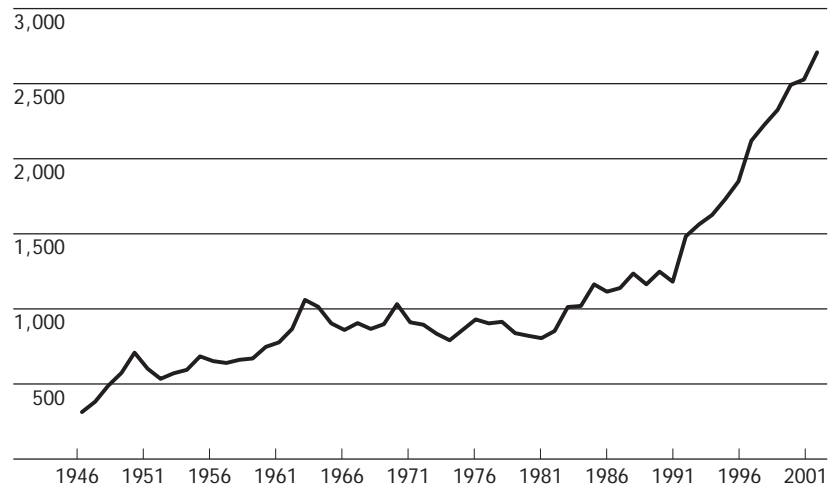


Figure I.2 Number of patent suits initiated.

they will target smaller firms, who do not have extensive financial resources to engage in protracted patent litigation.

Even if the target firm believes that it does not infringe, it may choose to settle rather than fight. The small firm may simply be unable to raise the capital needed to finance a protracted court battle or be unwilling to sacrifice investments in R&D and new facilities to finance the fight. Furthermore, there are substantial indirect costs associated with patent litigation. The pre-trial proceedings and trial are likely to require the alleged infringer to produce extensive documentation and its employees to make time-consuming depositions, and may generate unfavorable publicity. Its officers and directors may also be held individually liable, or be targeted in shareholder lawsuits if the stock price drops.

For numerous large companies—including, notoriously, Digital Equipment, IBM, Texas Instruments, and Wang Laboratories—these types of patent enforcement activities have become a line of business in their own right. These firms have established patent licensing units, which have frequently been successful in extracting license agreements and/or past royalties from smaller rivals. For instance, Texas Instruments has in recent years netted close to \$1

billion annually from patent licenses and settlements resulting from its general counsel's aggressive enforcement policy. In some years, revenue from these sources has exceeded net income from product sales.

In addition to being forced to pay royalties, small firms may reduce or alter their investment in R&D. Evidence from surveys and practitioner accounts suggests that the time and expense of intellectual property litigation is a major consideration when deciding whether to pursue an innovation, especially among smaller firms. Smaller firms tend to shy away from pursuing innovations in areas where large firms have established patent portfolios. Thus, these types of enforcement activities by large firms may have the effect of suppressing innovation by younger, more vibrant concerns.

A second worrisome development has been the emergence of individual inventors who seek to "hold up" established firms in their industries. In many cases, these individuals have received a patent of dubious validity, often with overly broad claims. Yet established players have often chosen to settle such disputes, not wishing to risk the uncertainty associated with submitting a complex piece of intellectual property to trial.

Individual inventors will employ various strategies to make the battle more one-sided and drive the large firm to settle the suit. In many cases, the individual inventor will demand a jury trial, and then present himself as engaged in a "David *vs.* Goliath" dispute. He may choose a legal jurisdiction where the residents will be highly unsympathetic to the defendant. For instance, Jerome Lemelson, an individual inventor who claimed to have invented bar-coding technology, filed suits against Japanese and Korean firms in the Southern District of Texas. Similarly, individual inventors frequently threaten corporations with the promise that they will obtain a preliminary injunction, which will stop the defendant from using the patented technology even before the trial begins. While an established business might be reluctant to ask for such a drastic measure, lest the other party seek a similar ban against itself, individual inventors often feel no such compunction. Given the uncertainty of the trial process, the defendant firm frequently decides to settle with an individual inventor rather than fight.

In short, the “reforms” of the patent system have created a substantial “innovation tax” that afflicts some of America’s most important and creative firms.

The Scale of the Problem

Companies in the United States spend over \$100 billion on R&D each year, and billions more obtaining and defending intellectual property protection for their inventions. These expenditures have been growing across almost every industry, from traditional manufacturing to services to high technology.

Indeed, in today’s skeptical investment environment, intellectual property is even more important than ever. One lesson from the “dot com” debacle is that firms without a sustainable competitive advantage—such as those nine dueling on-line pet supply retailers—are unlikely to survive. Investors are looking for real yardsticks to evaluate competitive strength. Patents, trademarks, and other forms of intellectual property represent a “currency” that is used increasingly to demonstrate to financial markets, suppliers, and customers that a firm is a strong player, and can be expected to achieve a dominant position.

Though other countries have not imitated the changes made in patent procedures in the United States, they nonetheless face a number of the same issues. Proposals to issue software patents have stirred angry debates in Europe. Programmers using Linux, an “open source” program where developers must eschew intellectual property protection, and which is increasingly challenging proprietary software for servers and devices, have led the opposition. Passionate advocates argue, “software should not have owners.” Over 20,000 Linux users protested when the European Community proposed to adopt patent protection for software.

These questions are important not just to the health of the economy, but also to the health of our citizens. For instance, advocates have questioned whether the broad coverage that Utah-based Myriad Genetics enjoys on its breast cancer gene patents is slowing research into curing this dreaded disease. Myriad had played a key role

in identifying the two genes that can trigger breast cancer, exploiting the voluminous genealogical records of the Mormon Church to find the critical genetic markers. In recognition for its efforts, Myriad received two patents on diagnostic tests and treatments involving these genes. Myriad then entered into licenses with leading medical schools, universities, and hospitals, giving them the right to research issues related to breast cancer. But these licenses are quite limited in their scope. To cite one example, the licenses are confined to laboratory research, and do not extend to clinical settings. Yet in many earlier cases, critical insights in the treatment of disease emerged from precisely the application of new technologies to the treatment of actual patients. Since the first patent was awarded in December 1997, a number of medical school researchers have been forced to abandon their research programs due to the licensing terms.

Even the normally pro-business Bush administration has raised questions about Bayer's exploitation of its patent on the Cipro antibiotic. At the time of the October 2001 anthrax attacks, advocates pointed out that Bayer was charging the government \$1.89 per pill. While this was less than the drugstore price for Cipro (more than \$4.50 a tablet), Indian companies were selling generic versions of the drug for less than 20 cents each. Ultimately, the drug company cut the price it charged the government by half—but not before the government initiated plans to license the patent to generic drug manufacturers against Bayer's wishes.

More generally, the continued advancement of commercial technology is the basis for the long-term ability of our society to promote longer and healthier lives, improve living standards for all, protect and clean up the environment, and secure our safety against terrorism and other external threats. For all its warts and periodic stumbles, our capitalist free-enterprise system has demonstrated a unique ability to generate new technology: industrialized economies have increased their economic productivity more in the last two centuries than in all the millennia of previous human history. The basis for this advance is firms' pursuit of profit, which forces them to innovate. But the profit-based incentive to innovate depends fundamentally on the institutions governing ownership of the fruits of innovation. While we have not yet killed the geese that

lay the golden eggs, we are increasingly hindering and distracting the people and firms that must breed, feed, and care for the geese. If we continue on this course, it is inevitable that their golden output will decline.

Patent Medicine

We find ourselves where we are today because the institutional changes of the last two decades have altered the incentives of inventors, firms, and the patent office in ways that encourage legal maneuvering and discourage innovation. The solution is to understand how these perverse incentives work, and to modify patent procedures and policy to restore the incentives for socially desirable behavior. That is the goal of this book.

Symptoms and Medical History

We begin in chapter 1, “Today’s Patent System at Work,” with an overview of how the patent system works, and an analysis of its effects on the incentives for innovation. Innovation in a modern economy requires large investments of time and money by private firms. But the product of this investment is not a tangible thing like a factory, and so is fraught with the risk that it will be destroyed or substantially diminished by competition. Successful innovation always calls forth imitators, making investments in innovation risky and hence potentially undesirable to investors. Patents offer a measure of protection to investments in innovation, and thereby act to foster innovation by mitigating risk. But because innovation is a competitive and cumulative process, it is frequently the case that protecting one party’s innovation will threaten another’s. Thus, although patent protection is crucial for the innovative process, it is not the case that making patents stronger or easier to get necessarily improves incentives for innovation. Creating good incentives for innovation requires balancing the need for patents to protect innovators, against the inherent risk that strong patents for some will prevent or hinder others from innovating.

Chapter 2, “The Dark Side of Patents,” describes the extent to which the current patent system has lost this balance. Patents have become so easy to get, and are enforced so ruthlessly by the courts, that the winners of the technological competition in crucial industries are sometimes those with the best lawyers, or those simply lucky enough to have been awarded a key patent they did not really deserve, rather than those that have created the best products or services. Some firms have embarked on explicit strategies to make their money by collecting patent royalties on existing technologies rather than by developing new technologies, employing, in the words of a federal judge in one important case, “a combination of blitzkrieg and Sherman-esque tactics.”

The intense pathology of the current system arises from the combination of stronger patent protection, a decline in the standards for granting patents, and the emergence of broad, apparently invalid, patents in particular industries undergoing rapid technological change. But before developing a treatment plan for the disease, it is useful to understand earlier episodes of related symptoms. Chapter 3, “The Long Debate,” reviews the evolution of patent policy over the centuries. The Dutch Parliament’s decision to abolish patent protection in 1859 provides a window into the ongoing discussion about these awards. Both within and without the legislature, the writings of economists and lawyers on the optimal degree of patent protection were intensely scrutinized. The arguments raged in the major newspapers, with advocates of patent protection arguing that strong property rights could stimulate investments in research, and skeptics pointing to the distorting effect that patent litigation and the exclusive rights associated with patents could have on innovation. This historical perspective provides valuable inoculation against any illusion that even the best-crafted reform can eliminate conflict and controversy in the patent system.

Diagnosis

With this background, we proceed to an analysis of how and why the changes made in the last two decades got us to where we are. Chapter 4, “The Silent Revolution,” shows how the newly created

CAFC has subtly and not so subtly changed the landscape of U.S. patent law. Its decisions have expanded the realm of what can be patented, lowered the standards for receiving a patent, made it more likely that a patent once granted will stand up to legal challenge, and given patent-holders more valuable legal rewards in the form of injunctions against their competitors and juicy monetary awards. The predictable result is that patent holders are more likely to sue their competitors, and the targets of such suits are more likely to capitulate to threats of such litigation.

Chapter 5, “The Slow Starvation,” analyzes the “administrative” change of the early 1990s, when Congress moved the patent office to a “pay-as-you-go” basis. Again, little thought was given to how this would affect how the patent office operated and, consequently, the quality of patent review. The office has struggled to respond to the surge of patent applications unleashed by the CAFC’s rulings, especially in high-technology industries. Because its “customers” become unhappy if the backlog of unprocessed applications begins to grow, it has set performance targets for its examiners that reward them for granting patents as quickly as possible, with little regard for the care and complexity of claims in these new technologies. To make matters worse, though the idea of increased application fees was initially that users of the office should pay for its operation, Congress has been unable to resist the temptation to view patent office fees as a general source of revenue. Patent office revenues have soared with the rising tide of applications, but year after year Congress has allocated to the patent office for its operations hundreds of millions of dollars less than the fees collected. The patent office has therefore found it difficult to attract and keep highly skilled individuals to do their important work. The result has been a torrent of poorly reviewed patents, pouring out onto a legal landscape in which even trivial patents can be wielded as potent litigation threats.

We are not the first to decry the devolution of the patent system, nor the first to suggest that changes are needed to get it back on track. Chapter 6, “The Patent Reform Quagmire,” discusses recent efforts to fix various aspects of the system, and analyzes why these efforts have met with such little success. The reform of patent policy has been exceedingly difficult for the U.S. Congress to address.

Powerful special interests with a stake in the present inefficient system have combined to defeat legislative and administrative attempts to reform patent policy. These challenges might seem no different from any other high-stakes policy issue today. But the complexity and apparent obscurity of these issues have made reform particularly difficult, even by Washington standards. On the rare occasions when legislation concerning the patent system has burst into the public eye, the public discourse has frequently been confused and misleading. For instance, in 1997 Congress proposed to publish patent applications in a bid to limit “submarine” patents that received overly long protection. The effort was abandoned after protests from talk radio commentators, such as G. Gordon Liddy, Oliver North, and Phyllis Schlafly, misleadingly claimed that the move would harm small inventors.

The Prescribed Treatment

Perhaps wise men would fear to tread where they have to take on the likes of Gordon Liddy and Oliver North, but in chapter 7, “Innovation and Its Discontents,” we rush in to propose a revamped patent system, designed to maximize the incentives for innovation. While this venture is perhaps immodest, we accept that there cannot be a perfect system, because the conflicts among different innovators are inherent, and the decisions implementing patent rules have to be made by human beings. We therefore take as predicates of a reformed patent system that there will always be patent disputes and mistakes in granting and enforcing patents. Further, in a complex and ever-changing technological world, the information necessary to make the best possible decisions lies in many different places and is expensive to collect. The keys to a better system are therefore to create incentives to maximize the amount of information that different parties bring to the process while minimizing their incentives to use patent processes disruptively. At the same time, it is important to ensure that when mistakes are inevitably made, there is a practical and balanced process for fixing them.

Implementing this broad conception requires fundamental changes in both the patent office and the legal rules for enforcing

patents. The patent office has been granting patents on old ideas because it has inadequate examination resources, and also because it is not very good at finding information about the relevant existing technologies, particularly in new, fast-moving technological fields. And when patents are granted on ideas that are not new, other firms have no practical recourse other than the risky and expensive prospect of challenging the patent in federal court. To do better, the PTO needs more resources for its examination process, and procedures revised to give outside parties having relevant information the opportunity and incentive to bring that information to the attention of the patent office. But the rules for such procedures must take into account the likelihood that outsiders will use any such process to try to erect speed bumps in the paths of competitors' valid patent applications.

The best way to conserve the PTO's resources, and bring in outside information in a way that minimizes its disruptive impact on valid applications, is to have a carefully calibrated sequence of escalating review procedures within the patent office itself. Most patents should get only a relatively cursory review, and no one will object to their issuance because they are economically unimportant. But in important cases, competitors who believe they can demonstrate that a proposed patent is not new need opportunities to make that demonstration. We propose the creation of two such opportunities, with both the intensity of scrutiny and the barriers to invoking additional review increasing at each step. This phased approach balances the need to bring in more and better information in important cases against the risk that additional layers of scrutiny will retard truly valid applications.

Procedures designed to bring in more information will reduce the number of mistakes the PTO makes. But such steps will not eliminate mistakes. The process by which such mistakes are addressed in the courts must again involve a balance. On the one hand, innovators with valid patents on truly new ideas must be able to rely on those rights to protect their investment in the new product or process. It is a principle of patent law that once the government issues a patent, the patent holder is entitled to a presumption that the patent is valid, meaning that the burden of proof lies on

other parties to demonstrate its invalidity. This principle must be maintained if patents are to play their fundamental role of mitigating the risk inherent in developing new technologies. But for parties that are threatened with legal action on the basis of patents that should not have been granted, the opportunity to demonstrate that invalidity of the patent has to be sufficiently practical to provide a basis for resisting extortion.

Under the rules as interpreted by the CAFC, a finding of invalidity can only be won by convincing a jury of non-technically trained people that there is “clear and convincing evidence” that the patented idea was not really new and significant. This is a game of chance, not an orderly decision-making process, and one in which the patent holder has the status of the casino—the odds stacked in its favor. Difficult technical issues, regarding the relationship between competing inventions, should be resolved by judges and experts appointed by judges before the ultimate issue of patent validity is put to a jury. While the outcome of patent litigation would still be uncertain, the process would at least be structured with the best chance of reaching decisions on a sound technical basis.

Patent Policy Is Too Important to Leave to the Patent Lawyers

When issues of patent policy are considered by the courts, the Congress, and the Executive branch, you can be sure that the opinions of patent lawyers and patent holders will be heard. While their arguments will often be couched in terms of the public interest, at bottom their interest is in their own profits and livelihoods, not in designing a patent system that fosters the overall rate of innovation. Even the PTO itself cannot be expected to advocate necessary reform, if such reform reduces its revenues (by discouraging bogus applications) and threatens its established mode of operation. Yet the long-term well-being of everyone depends on a robust innovation system, and patents play a crucial role in that system.

Because it has been left to the special interests, patent policy seems arcane and obscure. And there are certainly many details of

patent law that are mind-numbingly complex. But at its heart, the patent system is about three things. It is about technology—the endlessly curious and fascinating process by which new ideas for machines or drugs or computer programs are conceived and developed. It is about people—inventors who create and develop new ways of doing things; business people and lawyers who make decisions about investing in innovation, suing each other, and defending such suits; and government employees who must evaluate the competing claims of different parties and make decisions. And it is about how the rules and procedures established by Congress and the courts affect how the people interact with the underlying process of technological progress. That interaction ultimately affects us all, and so should concern us all.