

## **Exhibit 2**



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**ARTICLE:** Alice in Wonderland Meets the U.S. Patent System

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**SUMMARY:**

... Congress has clipped the FTC's policy wings so often that it's a wonder the agency can fly at all. ... It therefore should be no surprise that two of the FTC's key recommendations are to resurrect the subject-matter inquiry, with due consideration for antitrust principles, and to restore the nonobviousness criterion to at least a shadow of its former robustness with probing judgment not entirely dependent on explicit "suggestions" in the prior art. ... Only patent protection, with its potentially unlimited reward arising out of exclusive rights in successful innovation, can provide a potential reward high enough to justify this risk. ... Under the current patent system, courts thus have no legal basis for making a truly independent judgment about what the patentee actually invented and how far that invention extends. ... Before the mid-nineteenth century, American patent law used so-called "central claiming," in which the inventor described what her invention was and it was up to the courts to determine the breadth of coverage. ...

**TEXT:**

[\*299]

Among the joys of being a professor, as distinguished from practicing law, are the leisure and incentive to think and write about the big picture. Another joy is being able to say what you really think. We professors don't have to focus on attracting clients or maintaining an impression of studied understatement and moderation for judges and juries.

In this talk, I'm going to exercise both of these prerogatives. I've been thinking about the big picture in patents for over a quarter century, and I'm more worried than I've ever been.

Let me begin by making my usual (and truthful) disclaimer. I'm not one of those academics who delights in being a gadfly and finding cause for alarm in every new law and every twist and turn of legal history. I'm the author of three treatises - on intellectual property generally, n1 licensing, n2 and cyberlaw. n3 I've spent much of the last thirteen years

of my life writing and revising them. Like treatises generally, each largely describes and explains our current intellectual property system, and each finds much to like in what both recent and earlier history have wrought. More fundamentally, I strongly subscribe to the view that the robust intellectual property system of Anglo-American society is in part responsible for our society's extraordinary [\*300] economic success over the last four centuries.

But the warning signs of excess are everywhere. One need look no farther than the Federal Trade Commission's White Paper that is the subject of today's discussion. n4 Think about it. Congress has clipped the FTC's policy wings so often that it's a wonder the agency can fly at all. Moreover, for the first time in decades, the executive and legislative branches of our government are controlled by Republicans, who have not generally been zealous advocates for aggressive antitrust enforcement and "pruning" the IP laws. Yet even in this very conservative political environment, the FTC - a much-chastened agency - has proposed ten recommendations (fourteen, if you count the subheads) for reining in the patent system. n5 If that isn't a clear sign that something desperately needs attention, I don't know what is.

Therefore I'm going to take the premise of my talk - that something is wrong - for granted. In the short time that I have, I'd like to explore three further questions. First, what is wrong? Second, how can we fix it? And third, how important is it that we do so?

### I. Why These Issues Matter

Let me take the third question first. How important are these issues, anyway? Does it really matter if too many patents issue and that their claims are too broad? For two reasons, I think it matters a lot.

The attached article n6 outlines in some detail why I think it matters in two particular fields - software and business methods - in which the PTO has issued, and the Federal Circuit has upheld, what I think are too many patents on non-inventions. The following remarks take a broader and longer-range view of patents generally.

The first reason why having a properly balanced patent system matters relates to the historical period in which we find ourselves. The world is now in the process of transferring the self-evident benefits of robust innovation, free markets, and free trade from Anglo-American and other advanced societies to the rest of the planet. This transfer, often pejoratively termed "globalization" by "multinational corporations," involves far more than mere globalized marketing of [\*301] American products and far more than just the largest industrial combines. It is an extremely complex, far-reaching process. In the long run, it is likely not only to improve the standard of living in, but also to democratize, much of the planet. When the history of this period has been written, this transition may be as important as - or even more important than - the Industrial Revolution. Innovation and the patent laws that encourage it are, of course, a vital part of this process.

The internationalizing trend is probably irreversible, although retrenchment and backsliding no doubt will occur. In the short term, the transfer of wealth and jobs from advanced to poorer societies that attends it will cause considerable pain on the part of workers in the developed world. As many have noted, innovation and the laws that protect it are among the few bright spots for developed nations in the short term. Therefore, innovation and the laws governing it are exceedingly important, both for insuring the well-being of workers in the United States and other developed countries and thereby insuring that this inevitable long-term change proceeds with as little short-term pain as possible. If United States patent law provides the wrong balance and impairs innovation instead of fostering it, it will make the short-term pain in our country more acute, and perhaps longer, than it need be.

The second reason why patents and laws governing innovation are so important is seldom stated but perhaps most fundamental. The patent system and those laws affect a value we Americans perhaps hold most dear: liberty. Liberty is not only a matter of human rights or freedom from tyranny. There is such a thing as economic liberty. Indeed, as raw tyranny of the type exemplified by Saddam Hussein recedes from the world stage, economic liberty no doubt will become more and more important.

By virtue of his race, Justice Thurgood Marshall was no stranger to the blessings of liberty and the pain of its denial. Therefore, it is not surprising that he penned one of the most important and moving paeans to economic liberty ever written in a judicial opinion. When I used to teach antitrust law, I read his words aloud at some point in every class, and I'd like to read them now:

Antitrust laws in general, and the Sherman Act in particular, are the Magna Carta of free enterprise. They are as important to the preservation of economic freedom and our free-enterprise system as the Bill of Rights is to the protection of our fundamental personal freedoms. And the freedom guaranteed each and every business, no matter how small, is the freedom to compete - to assert with vigor, imagination, devotion, and ingenuity whatever economic muscle it can [\*302] muster. n7

Of course this passage addresses the antitrust laws, not patent law. But it is well understood that antitrust law and patent law are just two sides of the same coin - the coin of economic law. The English recognized this point nearly four centuries ago, when the Parliament adopted the Statute of Monopolies. n8 That statute imposed a general prohibition on monopoly, n9 much like our Sherman Act, n10 but it allowed patents as an exception to the general rule. n11 In the attached article, n12 I argue, inter alia, that American law should be similarly interpreted, as rule and exception, despite the fact that our Sherman Act was not adopted for nearly a century after our Constitution was ratified. n13

How does economic law, including patents, affect economic liberty? To answer that question, we need only look at the industry - software - in which our runaway patent system has most nearly run off the tracks. The notorious case of *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* n14 exemplifies the problem. The alleged "inventor" there had written a pedestrian computer program to manage a certain type of investment vehicle, a "hub and spoke" investment partnership. n15 The program made pedestrian arithmetic calculations, mostly as required by rules of the SEC and other accounting and tax authorities. n16 Nothing in the claims at issue addressed any particular [\*303] algorithm, programming technique or method of programming. n17 For all those claims revealed, the alleged "inventor" had done nothing more than write a pedestrian computer program for performing routine arithmetic calculations dictated by legal authority, using programming languages, techniques and computers invented - if at all - by someone else. n18

The claims, however, were not limited to any particular programming methods; they were broad enough to cover any computer program used in any manner to control that type of business. The district court, recognizing this point, invalidated the patent as directed to unpatentable subject matter, n19 but the Federal Circuit reversed. n20 Since the type of business involved could hardly be run today without programmed digital computers, the result of this decision was to give the inventor of nothing a twenty-year monopoly on a type of investment vehicle: a business method. n21

How do decisions like this affect economic liberty? Very negatively, I would say. Think of yourself as a young stockbroker or investment banker creating new and imaginative investment vehicles, whether of the hub-and-spoke or of another variety. If you consult with patent counsel, she will tell you that you have to get permission from this patentee to do so, perhaps paying a portion of your profits, and that, unless you buy a license, the patentee can stop your business on a whim. You ask her what programming method the patent covers, and she answers none: it covers any use of computers to run that type of business that you want to devise. So what do you do? Most likely, you forget about your new business ideas and go back to flogging stocks. That certainly doesn't sound like the free, entrepreneurial America that I was raised to revere.

You might say that *State Street* was an aberration, and, indeed, in the long sweep of American patent law and policy, it probably was. But lately the patent bar, the Federal Circuit, and the PTO seem to have been [\*304] swept up by a "land rush" mentality. If intellectual property protection is good, they seem to say, more protection is necessarily better. And so we have a seemingly endless procession of patents on such things as minor improvements of simple mechanical, electrical, and electronic devices, pedestrian computer programs that any college graduate in computer

science could write, and business methods - seemingly the very subject of the English Parliament's prohibition against monopoly nearly 400 years ago. n22 The basic institutions of our patent system seem to have forgotten entirely the notion of balance that has made the Anglo-American legal system so successful.

Lest readers think I am alone in decrying the "land rush" mentality, I would like to quote a short passage from a colleague's work. Consider Professor Thomas' lament:

Among the more reviled Patent Office grants has been its 1968 patent on a method of swallowing a pill. Now we need scant imagination to envision patents on corporate ingestion of poison pills as well. With business and medical techniques firmly under wing, and patents on sports methods and procedures of psychological analysis trickling out of the Patent Office, patents appropriating almost any sort of communicable practice seem easily attainable. Claims to methods within the disciplines of sociology, political science, economics and the law appear to present only the nearest frontier for the regime of patents. Under increasingly permissive Federal Circuit case law, techniques within such far-flung disciplines as language, the fine arts and theology also now appear to be within the realm of patentability." n23

This "land rush" mentality is not just wrongheaded and grossly out of balance. It has tangible economic costs. Just as the "land rush" mentality in California's Gold Rush days left less land for farming and settling, so the "land rush" mentality in patent law leaves little place for creative minds to go. Everywhere they turn, someone stands with a piece of paper and a lawyer in a pin-striped suit saying, "Sorry, you can't go here; this set of ideas is mine." The results of this "no room here" philosophy on creative minds, I believe, is only beginning to be felt in such places as Silicon Valley, Silicon Forest, and Route 128. I think it will get much worse before it gets better.

I first presented the subject matter of this article at the University of Akron's Sixth Annual Richard C. Sughrue Symposium on Intellectual [\*305] Property Law and Policy under the written title "Our Runaway Patent System: Can we Stop it before it Derails our Economy?" As I prepared to step up before an audience of 150-odd patent lawyers, it occurred to me that such a title would not particularly appeal to an audience of those who make a fine living from the "land rush." Therefore I proposed a change in title to the current one. The idea behind the title was a simple one: using the metaphor of "Alice in Wonderland" to look at our patent system with fresh eyes. In addition to "softening" what might appear to be the "radical" cast of this article, the new title captured perfectly its essence: a review of our patent system from a fresh perspective based on economics and simple common sense.

Patent lawyers and business people who rely on the present system all know its fundamental purpose: to create economic incentives for technical innovation when needed. Yet most of them spend their lives wholly immersed in the legal and procedural details of procuring and enforcing patents and the technological details of proving that the subject matter they want to control deserves a patent. They seldom have the occasion or the incentive to reflect on how the law and procedure on which they work daily affects the operation of the general economy. They have not the time or inclination, nor the motive, to take a fresh look at our patent system, as it operates today, to see whether it makes sense.

Enter Alice. Like most patent lawyers, Alice believes passionately in the value of intellectual property. Although still young, she is widely read. She knows that the Chinese made three of the most important inventions in human history: noodles, printing, and gunpowder. She also knows that, in the second millennium, Western culture surpassed the Chinese in technical innovation so soundly that virtually all the great technical inventions of the twentieth century were made in the West, and virtually none in China. Alice believes firmly that this difference had nothing to do with race or culture and everything to do with economic law. Western culture, she thinks, had developed the notion of intellectual property - economic incentives for innovation - while Chinese culture appears until recently to have clung to the notion of free appropriability of ideas, as exemplified in Imperial times by the slogan "To steal a book is an elegant offense." n24

In this strong belief in the value and necessity of intellectual [\*306] property protection, Alice concurs with most

U.S. patent lawyers. She differs from many of them, however, in three important ways. First, as the conception of an Englishman, n25 Alice naturally knows well the Statute of Monopolies. Just as strongly as she believes in the value of intellectual property, she believe that this venerable statute sets out the proper economic relationship between free competition in free markets and intellectual-property protection: that of rule and exception. Second, as the daughter of a mathematician, n26 Alice recognizes that economics is quantitative branch of science. Accordingly, she believes that whatever economic law decrees, it must make sense in terms of numbers and measurable economic effect. Finally, as the daughter of a logician, n27 Alice believes that all law - especially economic law - should make basic common sense. At very least, she thinks, it should answer the most obvious logical questions clearly and well.

## II. What's Wrong With our System Now?

So how would our Alice approach the United States patent system? What question would she ask first? Undoubtedly the first question that would occur to her would be "what things are patentable?" What types of things, she would ask, deserve the special incentive of a state-granted monopoly that, despite the four-century-old prohibition against monopoly, remove them from the general rule of free competition in free markets?

After diligent study, I think Alice would be disappointed with the answer that our current patent system gives to that question. She would consider it a bad answer in two respects. First, the answer is not very clear. Second, to the extent it is clear, it doesn't make much economic sense. The answer is not clear because it depends in large measure upon abstractions so airy that they are worthy of medieval scholars. n28 It [\*307] doesn't make economic sense because those abstractions have little, if anything, to do with the economic impact of patent monopolies or the dividing line between prohibited monopolies on businesses and permitted temporary monopoly on inventions. n29

The State Street decision exemplifies the problem. As State Street marvelously illustrates, the PTO is issuing, and the courts are upholding, patents on too many things that are not "inventions" in any way that makes economic sense. Furthermore, they are allowing alleged inventors to claim such non-inventions so broadly that their patents, in effect, give them business monopolies of the type that have been prohibited in Anglo-American law since the English Parliament enacted the Statute of Monopolies in 1623.

[\*308] To give the Federal Circuit and the PTO their due, both of these defects relate to fundamental line-drawing problems that, in the entire history of patents, have never been satisfactorily resolved. The first is the question "what is an invention?" or, in legal terms, "what subject matter is properly patentable?" The second is how broadly an inventor may claim what he has invented, i.e., to what extent his patent will cover things that are similar in concept, result, or method but not exactly the same. The answers to these questions seem perhaps the most important aspects of any patent system from an economic perspective, for they determine what otherwise unlawful monopolies the state may grant and how far those monopolies may extend in impairing others' economic liberty, i.e., others' freedom to innovate and to compete. Let us examine, from Alice's fresh perspective, how the current U.S. patent systems handles these vital issues.

### A. Patentable Subject Matter

Over the course of nearly four centuries, n30 the subject-matter inquiry has undergone a certain evolution in semantics. Yet it has reached no conceptual resolution that makes self-evident economic sense. Part of the problem is that the issue of subject matter relates to, and is often confused with, the other requirements for patentable inventions.

In 1623, the English Parliament approved, as an exception to the Statute of Monopolies, patents for "new Manufactures within this Realm[.]" n31 Besides introducing the separate requirement of "novelty" n32 - a universal requirement for patent protection today n33 - this formulation limited patents to "Manufactures." If our own patent statute contained only that word, it might, for example, have eliminated the [\*309] hub-and-spoke investment partnership in State Street on the ground that it was a service and not a "manufacture." Clever lawyers, however, would of course argue (as indeed the State Street patentee did) n34 that the programmed computer used to manage the partnership was a "manufacture," thereby circumventing the limitation. And indeed, it is hard to distinguish, on a

general and abstract basis, a programmed digital computer that performs novel functions by virtue of new programming from other novel machines or manufactures. For these and similar reasons, attempts at line drawing based on the meanings of words like "manufacture" or "technology" have generally been fruitless. n35

Thomas Jefferson made some progress in line drawing by recognizing that merely being "new" is not enough. As a prolific inventor himself and the father of our patent system, n36 he insured that our very first patent statute required patentable inventions, inter alia, to be "sufficiently useful and important[.]" n37 The historical record bears ample witness to his reasons for doing so: he feared the monopolistic effect or "embarrassment" of patents if too liberally granted. n38

Over time, Jefferson's verbal formulation evolved successively into (1) a requirement for more than the skill of an ordinary mechanic, n39 (2) "invention," meaning an undefined quality of inventiveness, n40 and finally (3) the criterion of nonobviousness that we have today under Section 103 of the Patent Act of 1952. n41

No apparent substantive change was intended in any of this semantic evolution. n42 Rather, each successive formulation was an [\*310] attempt to better articulate a criterion for distinguishing innovations that, although technically new, were not the sort that justified the economic harm of a state-granted monopoly, albeit for a limited term.

As is apparent from this brief review, however, this semantic evolution failed to solve the line-drawing problem. In some respects, it failed even to ask the right question. As Thomas Jefferson apparently understood, and as our Alice would appreciate, the basic question is an economic one: which innovations justify the negative social and economic effects that inevitably flow, according to economic science, from any monopoly, n43 especially one granted and protected by the awesome power of the State? The more recent historical formulations - more skill than an ordinary mechanic's, "invention" (meaning inventiveness), and nonobviousness - missed the point because they appeared to focus on the mental qualities and capacity of the inventor and her leap of imagination. Yet these factors have little to do with the fundamental economic problem. Thomas Jefferson's first formulation "sufficiently useful and important" got the right idea, but it wasn't very specific.

In 1966, the Supreme Court, in a seminal decision construing the meaning of obviousness, finally asked the economically relevant question. The issue, it said, was how to distinguish innovations that would not be made but for the incentive of a limited patent monopoly from those that would be made anyway. n44 This important conceptual breakthrough was vital for economic clarity; it was the first since Jefferson's to recognize, at least implicitly, that patents can actually do economic harm if they are granted when they are not needed. Alice would undoubtedly appreciate this restatement as a giant step toward common sense.

Unfortunately, the Federal Circuit's patent jurisprudence actually has "taught away" (to use patent jargon) from this beginning of a solution to the line-drawing problem. Instead of trying to solve the line-drawing problem, that court has largely tried to ignore it, substituting formalism for probing judgment. n45 It has all but ruled that anything fairly described by one or more of the laundry list of nouns in Section [\*311] 101 n46 is patentable subject matter, regardless of any economic need for or adverse effect of the patent. n47 In relying so heavily on that list of nouns (which contains the word "manufacture" drawn from the statute of monopolies) n48 the court has reverted to the formalistic, semantic games that Jefferson had apparently tried to avoid by his more probing formulation in our very first patent statute. In other words, the Federal Circuit appears to have foreclosed any substantive inquiry into the balance between monopoly (which nearly always has a negative economic effect) and the need for incentives for innovation that justifies a temporary monopoly.

Moreover, the Federal Circuit has all but eliminated the nonobviousness criterion - the modern successor to Jefferson's "sufficiently ... important" language. It has done so by interpreting that criterion as requiring "suggestions" in published references n49 and therefore as little more than the separate "novelty" requirement. n50 In the attached article I outline in much more detail precisely how the court has done so, n51 and I won't repeat that argument here. Suffice it

to say that the FTC, in its White Paper, also concluded that the Federal Circuit's "suggestion" test may be anticompetitive and counterproductive without [\*312] substantial modification. n52

Thus, the Federal Circuit, ignoring patent law's strong foundation in economics and policy, effectively has read the subject-matter and nonobviousness requirements out of the patent code. It therefore should be no surprise that two of the FTC's key recommendations are to resurrect the subject-matter inquiry, with due consideration for antitrust principles, n53 and to restore the nonobviousness criterion to at least a shadow of its former robustness with probing judgment not entirely dependent on explicit "suggestions" in the prior art. n54 Alice would no doubt applaud these suggestions.

The tragedy of this excessive formalism, which gave us patents like that in *State Street*, is that economic theory now provides a much better basis for answering the question that the Supreme Court posed in *Graham*: how to distinguish innovations whose development require the patent incentive from those that do not. The theory is neither new nor controversial; it is basic entrepreneurial risk-reward theory.

As I've explained in more detail in the attached article, n55 the analysis goes as follows. Risk-reward theory teaches that, in order to motivate firms to take business risk, we must offer them a potential reward proportionate to the risk. n56 This theory is well-accepted and noncontroversial; it explains such diverse phenomena as interest rates for bonds of varying terms, issued by firms with various prospects, and the relatively high prices of speculative technology stocks. Potential reward, it says, must bear a direct relationship to the level of risk undertaken and the chance of failure.

Now, as Alice would recognize, every new business venture has some risk of failure. A haberdasher takes a risk in expanding its product line into toiletries. A supermarket or bank takes a risk in building a new branch in a new suburb or in a formerly blighted inner-city neighborhood where no such branch currently exists. A funeral home takes a risk in offering a new program of prepaid funerals with installment financing. In each of these ventures, there is substantial risk of consumer nonacceptance, which Alice would call market risk.

Yet we don't grant patents for these ventures. Rather, we consider [\*313] the risk that they undertake to be ordinary business risk. We therefore subject them to the rigors of free competition and the Sherman Act's absolute prohibition against monopolies, derived from the old English Statute of Monopolies.

With her knowledge of the Statute and her firm belief in its rightness and balance, Alice would pose a burning question: "What makes business ventures involving patentable inventions and their development different from ordinary business ventures that must suffer the rule of free competition?" To answer this question, she might consider the paradigmatic patent-driven industry: pharmaceuticals. Recent figures are startling. n57 They suggest that the "fully loaded" cost of developing a single new pharmaceutical molecule, taking it through laboratory and clinical trials, and securing FDA approval for its marketing is today about \$ 800 million n58 (including the cost of project failures). n59 Furthermore, fewer than one in five drug candidates that make it out of the laboratory survive this tortuous process and reach the marketplace in the form of FDA-approved pharmaceuticals. n60

Thus, as drug firms enter the clinical testing phase, they must play a game of high-stakes roulette. They must ante up several hundred million dollars for each new drug, and their chances of taking it to market are one in five. Moreover, their risk is not market risk, i.e., the risk of consumer nonacceptance. It is a risk that the results of their research simply will not work, either at all or with enough safety and effectiveness to satisfy the panels of experts that advise the FDA and justify marketing to the public. The risk they face is thus not market [\*314] risk, but technological risk, i.e., the risk that their project will fall entirely and that they will lose their sunk investment, for reasons other than market acceptance. n61

With the pharmaceutical industry as a paradigm, Alice would understand the economic rationale for patents. Without patent protection, an innovating firm's rival could copy and market the innovator's successful drug without incurring the \$ 800 million cost of development. Of course, the copyist would have to incur the cost of building and



operating a manufacturing plant, but so does the innovator. n62 Because the copyist can avoid the additional high cost of innovation, as well as much of the costs of marketing and promotion, n63 it can afford to sell the drug at a lower price than the innovator. Its entry into the market will either drive the innovator out or prevent the innovator from recovering its enormous development cost. As other firms learn these "rules of the game," they will channel their investment out of risky innovation and into safe copying. Only patent protection can make the innovator's substantial investment in development and clinical testing economically rational and stem the "flight of capital" from innovation to copying. n64

All this would make eminent sense to innovators seeking to recover their cost of innovating. The direct, sunk cost of innovation, however, is only half the story; the other half is risk. Even if a third party (such as the government) guaranteed to repay the innovator's development and clinical-testing expenses for a successful product, Alice would still wonder whether innovation would be a rational act. The reason is risk. Since only one in five products succeeds, guaranteeing reimbursement for the development costs of successful products would not make the innovator whole. It would still be out the cost of all those products that failed in the process of development. Only patent protection, with its [\*315] potentially unlimited reward arising out of exclusive rights in successful innovation, can provide a potential reward high enough to justify this risk. n65

Alice therefore would see two key economic issues that patents in patent-driven industries address: (1) recoupment of the innovator's sunk costs of innovation, and (2) compensation for the risk that development will be unsuccessful and that those sunk costs will be a total loss. Moreover, patent-driven industries differ in the nature of that risk from other business ventures: the risk that they take is a risk of total loss for reasons other than market acceptance.

As this example of the pharmaceutical industry shows, patent-driven industries have an important characteristic that ordinary business ventures do not share. They incur substantial development costs, and those costs are at risk of total loss for technological reasons, i.e., for reasons other than market or consumer acceptance. With her theoretical and economic bent, Alice would be sure that this vital difference is something any rational patent system should recognize and reflect.

With further thought, Alice might conclude that this point - substantial development cost at nonmarket risk of total failure - serves as a useful economic criterion for patentable subject matter. n66 As such, it has three key advantages over previous tests. First, it addresses directly the relevant and probing economic question that the Supreme Court asked in *Graham*: what innovations require the incentive of patent protection? Second, it relies not on mere abstractions, but on well-understood economic theory with visible, common-sense application in the real world. n67 Finally, it avoids the semantic line-drawing and empty formalism that attends trying to determine what is a "manufacture" or what is "technology." For the risk criterion depends not upon the nature, function or operation of the invention, but on the nature of the economic risk, if any, incurred in developing it.

Alice might wonder what would change if the PTO and the courts [\*316] applied this common-sense criterion for patentable subject matter. After reflection, she would no doubt conclude that much in our present patent system would change. First and foremost, the troublesome nonobviousness criterion would not be necessary and could be dispensed with. After all, that criterion, properly understood, is historically and functionally just a proxy for proper subject matter. n68 As the *Graham* Court recognized, it is aimed at distinguishing inventions that justify, in Jefferson's words, the "embarrassment of an exclusive patent" from those that do not. By solving the subject-matter line-drawing problem based on actual economic effect, not formalism, the nonmarket-risk-of-total-failure criterion would obviate the need for nonobviousness determinations, with all their abstract legal hairsplitting.

The risk criterion also would simplify patent litigation in yet another respect. By focusing on economic and business matters like sunk investment and risk of failure, it would relieve one of the most troublesome sources of judicial chagrin and error in patent cases: most judges' lack of familiarity with science and technology. n69 No longer would judges without technical backgrounds have to understand the underlying technology sufficiently to judge whether an alleged innovation involves a concrete invention, on the one hand, or a "law of nature" or "abstract idea" on the

other. n70 Instead, they would have only to understand enough to evaluate the credibility and weight of expert testimony whether there was real nonmarket risk of total failure and loss when the development project began. The result would be to make patent law much less of an obscure field dependent on the intricacies of technical specialties, and much more a field of economic law accessible to legally-trained minds with some understanding of business and economics. If nothing else, such a change would both reflect and assist patent law's increasing importance in the new global economic order.

Of course, this criterion would reduce the number of patents granted and upheld, perhaps by a considerable margin. No longer would the PTO issue new patents, for example, for hundreds of variations of [\*317] circuit breakers distinguished from each other only through the use of slightly different semiconductors (invented by others) or slightly different circuitry. Minor improvements of patented inventions, developed in projects with little risk of failure, would be unpatentable no matter how "nonobvious" their methods of operation might seem, in the abstract, to judge or jury after the fact.

This change, however, would not remove the present patent statute's salubrious prohibition against hindsight. n71 Rather, it would require the risk of failure to be assessed as of the beginning of a research or development project, not after its successful conclusion.

This change might, however, require reassessment of the sentence in current Section 103 that precludes considering how an invention was made. n72 If an invention's manner of making entails no real economic risk - for example, if a mechanical device, conceived in a sudden inspiration, works the first time it is built - then there is no reason to provide a patent monopoly. No matter how brilliant the conception, there is nothing economically to distinguish such an invention from any ordinary business project, such as opening a branch of a bank or supermarket in a new neighborhood. The new criterion would, however, still allow some results of serendipity to be patented. For example, Charles Goodyear's fortuitous discovery of how to vulcanize rubber would probably still be patentable because it took a lot of work, and involved a lot of economic risk, to turn the lump of goo on his stove into a commercially viable process for making rubber tires.

If Alice read the well-known decision in *Pfaff v. Wells Electronics, Inc.*, n73 she might wonder whether the court focused on the right economic issue. As virtually every patent lawyer knows, the Supreme Court in *Pfaff* addressed the application of the one-year statutory "on sale" bar under Section 102(b) of the patent act. n74 It affirmed a holding [\*318] that the patent was invalid because the invention at issue - a socket for electronic components - had been placed on sale before the critical date, even though it had not then been reduced to practice. n75 But Alice might wonder why the case ever got to that point. Shouldn't courts, she might ask, logically address the most fundamental issues first? And isn't the most fundamental issue whether the claimed invention is patentable subject matter, i.e., whether it is the type of innovation for which a patent monopoly is economically justified?

As Alice looked at the simple socket at issue in *Pfaff*, she would have grave doubts whether its development entailed the sort of non-market risk of total failure that justifies a state-granted monopoly. She would note that the purported inventor, in testimony reproduced in a footnote, described a business in which he routinely cranked out such sockets by making drawings, ordering tooling, and beginning production, without so much as developing a prototype, and apparently without any experimentation at all. n76 She might laugh at the inventor's own description of his production process as "Boom-Boom." n77 Alice would scratch her head, wondering how a business that routinely cranked out socked after socket "Boom-Boom" could claim the technological risk that is the *raison d'être* of patent protection.

As the *Pfaff* case so well illustrates, computer-program and business-method patents are not the sole examples of patent protection that makes little economic sense. As Alice studied the U.S. patent system in greater detail, she would no doubt come across many patents that seemed less validations of meritorious undertaking of technological risk and more gratuitous exemptions from the general rule of the Statute of Monopolies: that economies work best when private businesses compete fairly and freely.

As for theory, Alice would no doubt view the long history and evolution of what is now the "nonobvious" criterion with disappointed bemusement. With her training in logic, she would recognize right away that that criterion was supposed from the beginning to serve as a proxy for valid subject matter, separate and apart from the criterion of novelty that has been part of every patent statute since the Statute of Monopolies. She would scratch her head in wonderment at the notion that anyone would choose "nonobviousness" as an economic test. What does cognitional difficulty, she would ask, have to do with any relevant [\*319] economic factor? And aren't mental and cognitional criteria, like state of mind, the hardest things to measure and prove in practice? Wouldn't it make much more sense, she might think, to focus on the technological risk that entrepreneurs take in developing their innovations - something that has direct economic relevance and can be measured and proven by normal economic and evidentiary techniques?

Reviewing the history of this subject-matter proxy, Alice would probably see the Hotchkiss decision in 1851 n78 as a tragically missed opportunity. If only the Court had changed one word, from the "skill" an ordinary mechanic n79 to the "risk" assumed by an ordinary mechanic, she might think, it might have advanced the cause of economically rational patent law by more than a century.

### III. The Breadth of Claims

The second most important question that our Alice would address, after distinguishing inventions for which patent monopolies are economically beneficial from those for which it is not, would involve the breadth of a patent's claims. Once an invention is proved worthy of an exception from the general rule of free competition in business, Alice would ask, how much does or should the patent on it cover? Unfortunately, the FTC's White Paper does not directly address this issue, although it has been historically one of the most contentious in our patent law.

Current patent law addresses this line-drawing problem under two separate doctrines, which - at least to some extent - pull in different directions. The first doctrine is essentially a rule of invalidation. If the claims are too broad for the specification, i.e., if they are not supported by the drawings and detailed description in the patent (apart from the claims), n80 the claims are invalid. n81 This "claim only what you've disclosed" doctrine technically involves four different types of [\*320] disclosure - enablement, best mode, written description, and definiteness n82 - but for economic purposes we can lump them together.

As long as the disclosure adequately supports the claims made, the second doctrine comes into play. The doctrine of equivalents broadens the reach of the claims to "equivalents" of what they literally describe. n83 The Federal Circuit disfavors the notion that this doctrine "broadens" the claims, but that is the effect of what it does. n84 It allows a patentee that cannot claim literal infringement to win an infringement suit although the patent's claims do not literally describe what the defendant does. n85

#### A. What is the Problem?

After reflection, our Alice would no doubt find this two-doctrine system quite odd, especially from an economic perspective. Of course a patentee has every incentive to draft claims as broadly as possible, since the claims determine the scope of the legal monopoly that the patent provides. n86 But the courts have no power or method to contain the results of that incentive by narrowing the claims. n87 A court can only invalidate claims or validate them and (under the doctrine of equivalents) extend them. Patent examiners have some power to narrow claims by rejecting and renegotiating their scope in the course of patent [\*321] prosecution n88 but, once a patent issues, courts do not have that option.

Under the current patent system, courts thus have no legal basis for making a truly independent judgment about what the patentee actually invented and how far that invention extends. When they construe the claims, they are stuck with what the patentee wrote and may only invalidate or accept it. n89 When they apply the claims, courts can expand their application under the doctrine of equivalents, but they cannot narrow them. Thus, courts have only the Hobson's choice of approving an overbroad claim or invalidating it.

Alice would find this Hobson's choice quite odd. It precludes courts from making an independent judgment on what appears, from an economic point of view, to be one of the most important questions for any patent: what did the inventor contribute to the art and how far did her contribution extend?

The seminal case of *O'Reilly v. Morse* n90 is a good example. Morse, who invented the telegraph, drafted and got the PTO to grant an eighth claim covering every means of using electromagnetism for telecommunication. n91 Of course, he hadn't invented every means; he had only invented the telegraph. The Supreme Court invalidated this claim on the ground that it was simply too broad, n92 and of course it was right in so doing. Morse's eighth claim would have covered, among other things, telephone, radio, television, microwave, wireless, and Internet communication, although they were all invented by others much later.

The Federal Circuit has interpreted Morse as based on an inadequate disclosure: Morse didn't disclose all means of telecommunicating by electromagnetic energy in his patent. n93 But [\*322] Morse did disclose one means - the telegraph - and it is black-letter patent law that a patent need not disclose every means of achieving the ends of every claim. n94 Cases are legion that allow inventors to claim more than their incomplete disclosures would literally warrant. n95 If every patentee didn't have that right, claims would be even more prolix than they are today - for they would have to describe explicitly all the many embodiments of a broad claim - and patents would be much easier to circumvent. n96

So it is no answer to say that Morse didn't specifically disclose all the other means of telecommunication using electromagnetism. Even modern patent practice would not have required him to disclose every possible embodiment of his invention. The real question is a much deeper one, which goes far beyond mere formalism: whether the invention that Morse made, considered in all of its inventiveness and all of its detail, truly encompassed all of the other modes of using electromagnetism for telecommunicating that followed. That is inevitably a question of judgment, requiring deep understanding of the patented advance, the pre-existing state of the art, and the extent of the advance over it. In other words, it is a question for experts versed in the relevant field of technology. Answering it can never be a matter of mere formalism, such as that involved in comparing a disclosure with the claims. Attempting to reduce it to formalism merely avoids the deeper issue.

For purposes of enablement, n97 at least, the Federal Circuit has developed a legal standard to determine whether a disclosure in the [\*323] patent specification adequately supports the claims. n98 The touchstone of that standard is whether verifying that undisclosed but claimed variants would work as claimed requires "undue experimentation." n99

From an economic standpoint, however, Alice would think that this distinction between disclosed embodiments and claims misses the point. The reason is that the general question of overbreadth involves two entirely separate sets of issues. A first set addresses, inter alia, whether the claims and specification adequately describe how to duplicate the invention and adequately warn potential infringers what they can and cannot lawfully do. n100 That set is adequately covered by the enablement, definiteness, and other aspects of patent disclosure. n101

But Alice would see a second set of overbreadth issues as much more important from an economic standpoint. It implicates a much deeper question: how much coverage should a patent give a legitimate inventor who properly discloses what his invention is and how it works? Provide too little coverage and patents can be circumventable and therefore become devalued or worthless. Provide too much and you will thwart further progress in technology, as well as "inventing around," and the patentee will receive a windfall. Although the doctrine of equivalents at least recognizes the economic problem, n102 the Federal Circuit apart from that doctrine appears to have studiously avoided answering the second question and appears to maintain that American patent law does not require it to do so. n103

[\*324] To some extent, the history of American patent law bears out its view. Before the mid-nineteenth century, American patent law used so-called "central claiming," in which the inventor described what her invention was and it was up to the courts to determine the breadth of coverage. n104 Later American law adopted so-called "peripheral claiming," under which a patent's claims are supposed not only to describe what the invention is, but to convey exactly how it differs from the "prior art" and therefore the extent of legal protection warranted. n105

Almost from the beginning, however, the courts saw this aspect of peripheral claiming as a trap for the unwary patentee. A patent's peripheral claims might be circumvented by avoiding their literal language but nevertheless taking the essence of the patentee's invention. To avoid this result, the courts used the doctrine of equivalents, which allows patents to cover more than just what the claims' literal language describes. n106

Yet the doctrine of equivalents has proved to be just as slippery as the notion of central claiming ever had been. As dissents in two seminal cases argued, n107 the doctrine undermined the very notion of certainty that peripheral claiming was supposed to promote. So, dissatisfied with the expansiveness and uncertainty of the doctrine of equivalents, the courts invented prosecution history estoppel to ameliorate its uncertainty. n108 Recently, in *Festo*, the Federal Circuit attempted to convert that doctrine into a largely formal process, based upon claim amendments, only to be rebuffed by the Supreme Court. n109

We are now left with a process of determining the breadth of patent [\*325] protection that Alice could only describe as byzantine. For each patent - no matter how trivial, how unlikely to be litigated, and how unlikely to be used or infringed - we insist that the inventor incur the enormous expense of describing the invention in great detail and precision (usually with the aid of expensive counsel) in patent claims, distinguishing those claims from the entire universe of prior art, arguing with the examiner, and (upon occasion) appealing disputes through the PTO and on up through the courts. Then, when and if the patent claims are litigated, we take a completely fresh, second look at whether what the patentee described supports the claims, on pain of invalidating them (which may require a second trip to the courts). Once we've determined that the claims are properly supported by the expensive description so obtained - and therefore valid - we then construe them, often in separate Markman hearings, n110 because, despite all the effort at precise formalism in the drafting and prosecution process, we really don't necessarily know what they mean after all. Finally, once we've determined what they mean literally, we have to apply them. In that process, we must determine not only what they mean literally, but what they mean equivalently, and whether coverage of equivalents has been abandoned through estoppel.

As a rational and logical being, not having invested years in learning and exploiting this byzantine and extravagantly inefficient system, Alice might be excused for concluding that it had been designed by a madman. More cynically, she might conclude that a cadre of lawyers had designed it, intent on sucking the well springs of innovation dry with fees. Certainly no rational economist, conscious of the enormous transaction costs and delay of patent prosecution, licensing and litigation - and the chances for multiplication of error at every stage - would propose such a system if designing new patent laws from scratch. Indeed, it would be hard to imagine a less efficient system more prone to error.

#### B. What Should We Do Now?

So what might Alice recommend we do now? Three things come to [\*326] mind. First and foremost, Alice might suggest that we stop pretending that assessing the breadth of an inventor's contribution to technology can ever be made an entirely formal, mechanical or literal process. Futile attempts to create an effective formalism so far have produced only 150 years of increasing complexity in law and practice, plus transaction costs no doubt measurable in the trillions of dollars.

Before the Markman decision and its progeny, expert witnesses used to help judges without technical training to understand enough of the complex technologies at issue to make good patent decisions. The rule against "extrinsic evidence" in construing patent claims n111 - a direct descendant of Markman n112 - virtually eliminated that testimony in claim construction. n113 As a matter of policy, Judge Newman and others were quite right to lament its passing. n114

But Alice would view the demise of expert testimony as a direct consequence of a patently ridiculous fiction: the notion that inventors can describe the essence of their contributions in such literal, unmistakable language that anyone, including people without any technical training whatsoever, can not only understand those cutting edge contributions,

but also see clearly their precise limitations with respect to prior art. Alice also would consider our current extravagantly wasteful and byzantine system a direct consequence of a further policy choice. Why, she would ask, must all inventors incur the enormous cost (in time and money) of reducing their inexpressible cutting-edge advances to this supposedly unmistakable language, whether or not anyone will ever use their inventions and whether or not their patent will ever be disputed?

[\*327] Perhaps, Alice might suggest, there is a simpler, more efficient alternative. Suppose an inventor could get a real patent, not just a provisional patent, n115 simply by filing a description of his or her invention, without claims. Suppose further that the law required a complete disclosure, as it does today, i.e., one that is enabling and definite, shows possession of the invention, and reveals the "best mode." n116 Suppose further that the law encouraged, if not required, the inventor to submit to the PTO relevant computerized files (logic diagrams, gene sequences, calculations, simulations, experimental data, etc.) describing the invention and its limits, to be published only after eighteen months (or, if earlier, after patent issuance or a bona-fide dispute requiring them). Next suppose that the inventor would not have to draft stylized, legalistic claims, but would simply describe the problem, if any, solved by the invention and how it worked (and, if relevant, how it was made), in ordinary, technical language. How would this approach change the economics of our current patent system?

At the outset, this approach would eliminate a major economic inefficiency of our current patent system: the fact that it requires every patentee - regardless of the importance of his invention or whether it will ever be disputed - to incur the enormous expense of attempting to reduce the solution of a complex problem at the forefront of technology to "bulletproof" stylized legal language. The FTC also has recommended reducing this expense, n117 but its recommendations - chiefly for post-grant inter partes review n118 - only apply to disputed patents and simply shift more business and more fees to another yet additional layer of procedure in this already overloaded system.

A more rational and effective approach might be to recognize that gauging the proper breadth of a patent is always a matter of understanding and judgment and can never be made a purely formal and mechanical process. Such an approach also might recognize an essential fact of life that patent lawyers and judges seem reluctant to acknowledge: a generalist lawyer or judge can never hope to achieve the same understanding of cutting-edge technology (let alone in a few days or weeks of litigation!) that the scientists and engineers who developed it [\*328] obtained through a lifetime of study and effort. All generalists can hope to do is see through a glass darkly, with foreseeable consequences for the technological and economic validity of their decisions. Therefore, Alice might conclude, a more rational approach might encourage the courts and other tribunals to make a single judgment, based on the patent disclosure alone, without claims, whether an alleged infringer took what the patentee invented. This approach would involve liberal use of expert testimony, including, where necessary, experts appointed and paid by the court and therefore presumed to be impartial. n119 This approach is not nearly as radical as it sounds: it is precisely the approach that courts took before the switch to peripheral claiming led, in the vain search for formal certainty, to the current byzantine system.

A second approach to simplifying our current terminally byzantine system would be to focus on how inventions are made and used in the real world. Present patent doctrine as exemplified in the doctrine of equivalents, focuses primarily on an invention's function, means and result. n120 Under black-letter patent law, however, function alone cannot be patented, n121 so that leaves means and result for assessment. Since result also cannot be patented separately, n122 Alice would no doubt see the primary focus of existing law as on the means that the inventor used to accomplish the desired result.

In this regard, a peculiarity of the patent system would sorely puzzle Alice. That system often neglects or underemphasizes the economic, commercial, scientific or engineering motivation for the development, i.e., the end to which the means is directed. In other words, the patent system, unlike virtually every scientist or engineer that ever lived, now ignores the problem to be solved.

To be sure, not every invention solves a particular problem. The laser, for example, was not developed to solve any stated problem, but to provide a useful source of coherent light, as earlier experiments had suggested could be done. Yet

many, if not most, inventions in industry arise out of research commissioned to solve a particular problem, develop a particular product, or fill a specified need. Forcing inventors to disclose the end (if any) to which their inventions are directed would [\*329] assist in interpreting patents and determining whether they are infringed. Just as using a different means to solve the same problem is ordinarily not infringement, n123 so using a similar means to solve a different problem might not be infringement, at least from an economic perspective, because verifying its ability to do so might still involve a significant risk of total failure. And, as we have seen, it is risk of total failure (for nonmarket reasons) that provides the sole rational economic justification for the patent system.

Another benefit of requiring disclosure of the problem to be solved would be reducing the flood of patents on inventions of no real value, which firms procure solely for legal or other strategic business reasons. n124 The FTC White Paper discusses what everyone who works with patents has long known: that many issue for such economically wasteful reasons as threatening or intimidating competitors, bulking up patent portfolios for threats or cross-licensing, or additional security in case of future disputes. n125 Requiring inventors to disclose the technological, economic, or other real-world problem, if any, that their invention solved would help reveal these patents for what they are and encourage courts to narrow their application appropriately. With the help of expert testimony, courts should not have much difficulty distinguishing cases in which no problem is cited for these reasons from those in which an invention, like the laser, has multiple unforeseen uses and should be treated as pioneering.

In the end, Alice would no doubt dwell at length on a third and most important suggestion for solving the patent-breadth line-drawing problem: focusing less on formalism and more on substantial economic effect. As she compared American patent law to American antitrust law, the relative backwardness of patent law in this respect would puzzle Alice. Hadn't the United States Supreme Court, as early as 1977, decreed that decisions in antitrust law should turn on economics, not [\*330] formalism? n126 Alice would ponder why the same salubrious principle had not found its way into American patent law, despite the fact that patent and antitrust are but two sides of the very same coin of economic law.

One way to weigh economic substance more than formalism, Alice might suggest, would be to focus on the economic considerations that make the invention patentable. As discussed above, the key factor is the risk of total failure and loss of investment that the development process overcame. Once a court knows the problem to be solved and the nature and outcome of that development process, it should not be too difficult for the court to determine whether the alleged infringer has taken the result of that development process without compensation - that is, has taken what made the development risky in the first place - thereby undermining the incentive to undertake the risk, or whether the alleged infringer, although engaged in similar activities, has not appropriated the benefits or results of the patentee's research to itself.

Perhaps these suggestions sound simple and obvious. Yet adopting them in legislation would make a radical departure from the current system, based as it is in large measure on formalism and economic irrelevancies (such as whether or not the invention would have been "obvious" to a person of ordinary skill). As far back as 1977, with its groundbreaking decision in *GTE Sylvania*, n127 the Supreme Court decided that antitrust law should turn on substantial economic effect, not barren formalism. Isn't it high time, Alice would wonder, that Congress or the courts make a similar decree in patent law?

#### IV. Conclusion: Pros and Cons of the FTC's White Paper

After studying our patent system for some time, Alice would no doubt conclude that, while vital to our economic well being and laudable in principle and purpose, our patent system is fundamentally flawed in both theory and practice. She would likely view the vain search for an effective formalism that began with the transition to peripheral claiming [\*331] in the nineteenth century as an abject failure. It has complicated, she would think, the processes of examining, prosecuting, interpreting and litigating patents immeasurably. It has also permitted and indeed encouraged a flood of patents on essentially worthless "me too" and other noninventions, put forward only for legally strategic purposes. At the same time, by treating all things "novel" essentially alike, without considering the investment and risk involved in

developing them or their general economic importance in the larger scheme of science and technology, it has sometimes obscured the value of and permitted circumvention of patents on fundamental, pioneering inventions.

Alice would hardly see these defects as the current system's only flaws. She would note the obsessive quest for precise formal descriptions of inventions that may never be tested. Then she would wonder why it has been allowed to raise the transaction costs of patent searches, infringement opinions, patent prosecution, patent litigation and technology management to the point where they are a significant drag on industry - perhaps so much so that the cost occasionally overwhelms the benefits of innovation that this system encourages. And she would wonder why the present system has forced lay judges and juries to immerse themselves in the entrails of technological specialties and esoteric semantic disputes far more than they need to do in order to understand the economic impact of innovation and patents and make good decisions based on real and substantial economic effect. As Alice reviewed all these shortcomings, she might well come to believe that patent claim prosecution, amendment, construction, and interpretation have become an inordinately expensive and irrelevant semantic game that is neither necessary to the healthy functioning of a patent system nor desirable for our (or any) economy.

What, then, might Alice think of the FTC's white paper? First of all, she would vigorously applaud the FTC for undertaking this project. Applause, she would think, is especially due because of the timing of the FTC's effort. We live at a time in our political history when antitrust law is "on the ropes," while our legal and political institutions concentrate on getting back to business as usual after the bubble, recession and scandals of recent years. By undertaking this project, the FTC has underscored what everyone who has eyes to see and ears to hear now knows: something is seriously wrong with our patent system. If it had done nothing else, the FTC would have made a substantial contribution just by making this point.

A second point on which Alice might praise the FTC is its collecting, through its hearings, a factual record underscoring what is [\*332] wrong with our patent system. It is one thing for nams like Alice or academics like me to criticize developments from our ivory tower. It is quite another to note that the very people who use and are often abused by the patent system are beginning to notice that it is often counterproductive in practice. The FTC has done our country a great service by showing that criticism of the system does not come solely from academic purists.

Alice might also praise the FTC for its fourteen recommendations (if you count the subheads). n128 Each of them, if adopted, would move our system in a better direction.

The main difficulty that Alice would perceive, however, is that the FTC's recommendations do not go nearly far enough. There are three respects in which the White Paper fails to demonstrate how wrongheaded and economically counterproductive certain modern trends in patent law may be.

First, by providing such a long laundry list of recommendations, the FTC risks hiding the wheat in the chaff. Such things as providing a new procedure for post-grant opposition n129 and changing the burden of proof to invalidate patents (from clear and convincing evidence to a preponderance) n130 may do something to reduce the economic impact of bad patents. But these expedients will do little to close the floodgates of litigation or to reduce the flood of patent applications that produces bad patents. Indeed, in the short run, they may actually increase the flood of litigation and transactions costs that is threatening to swamp genuine innovative industry. Alice might well view enacting these recommendations alone as doing little more than rearranging the deck chairs on the Titanic.

There is a second respect in which Alice might view the FTC White Paper as understating the need for reform. It buries its most important suggestions in the middle of the long list of fourteen. By far the most important, as Alice might see it, is the suggestion that the courts consider antitrust and competition principles in assessing what is patentable subject matter. n131 Had the courts done so, it is doubtful that the flow of software and business-methods patents would be at its present flood stage. Indeed, proper substantive economic balancing between competition and temporary monopoly to provide incentives for innovation might well eliminate whole classes of patents now allowed, [\*333] whose protection is economically counterproductive.



Finally, Alice might accuse the FTC White Paper of understating the need for reform by largely neglecting the second most important line-drawing problem in any patent system: the process by which courts construe the breadth of patent claims and apply those claims to alleged infringements. Although the FTC White Paper does briefly address the doctrine of equivalents, n132 its discussion is descriptive and inconclusive. n133 As Alice with her fresh approach would understand, the scope of patentable subject matter and the scope of protection that a patent provides go to the economic heart of any patent system. Their burial in the list of recommendations, or their virtual neglect, does not do them justice.

One last comment is worth making. The FTC white paper may be misleading in a rather subtle respect. It focuses on the relationship between patent law and antitrust law and suggests that patent law should be construed and applied with competitive principles in mind. n134 Alice would heartily agree with that view, but she would think that it does not go far enough. What is wrong with our patent system is not just that courts often fail to apply competition principles properly when, for example, they adjudicate patent licensing or similar commercial disputes. What is wrong with our patent system is that patent law itself, as practiced today, is seriously out of whack not only with competition principles, but with basic economic common sense. The defect is not just that patent law needs reform in its relationship to antitrust law. Rather, based on economic common sense, Alice would claim that patent law itself cries out for fundamental internal reform. It needs reform in order to cohere with modern economic thinking on the functioning of free markets and the role of entrepreneurial risk and reward, as embodied in (among a large number of other things) the antitrust law. In short, Alice would say it is not just the patent-antitrust interface that needs a fresh look, but patent law itself.

The need for plenary reform is not surprising. The vintage of our present patent statute is 1952. It became law not long after the end of [\*334] the Second World War and before the Cold War was far under way. Since that time, we have seen the advent of digital computers and software, the rise of the integrated circuits and the modern semiconductor industry, the discovery of DNA and the advent of biotechnology, the "cracking" of the human genome, the genetic engineering of plants and animals, and the exploration of space, not to mention the explosion of free trade, the globalization of commerce, the advent of the TRIPs Agreement, and wide-ranging advance in the science of economics. Here is a partial list of modern innovative industries that did not exist, or were in their infancy, when the patent law was last substantially revised in 1952:

- \* alternative energy (biomass, ethanol, wind, geothermal)
- \* atomic energy
- \* biotechnology
- \* digital computers
- \* environmental protection (scrubbers, monitors, etc.)
- \* integrated circuits
- \* modern medical tools (e.g., CAT, MRI, and PET scans)
- \* semiconductors
- \* software
- \* space exploration and the part of "aerospace" beyond propeller planes.

As this brief list shows, virtually all of the basic industries that make up our "innovative" economy arose since the patent law was last reformed. In addition, during the same period economic science grew by leaps and bounds, with the help of the very computers, software, and data processing techniques that these new industries fostered and made

possible. Isn't it just possible, Alice would wonder, that all these dramatic developments justify plenary and thorough reform of our patent law?

Despite all that has happened since the adoption of the 1952 Patent Act, Alice would see little difference in substance between it and the patent exception in the Statute of Monopolies that she knows so well, although the latter was drafted by the English Parliament nearly four centuries ago. At least as interpreted by the Federal Circuit, it still depends primarily on the concept of novelty to distinguish ordinary business (which is subject to the rule of free competition and a consequent prohibition on monopoly) from invention (which may deserve limited-term patent protection). And, as so interpreted, its limits still depend on a list of nouns like "manufacture," rather than on a deeper understanding of the economic rationale for patents. As for the [\*335] term of the patents, it differs little from the fourteen-year term in the Statute of Monopolies, n135 which was based on twice the length of an apprenticeship in the medieval trade guilds. n136 The Federal Circuit has even emasculated America's historic attempt to include economic factors, beginning with Jefferson's "sufficiently useful and important" language and culminating with today's nonobviousness requirement. Looking at the 1952 Act from a modern economic perspective, Alice could only conclude that it has added little that was unknown in the time of Queen Elizabeth I.

What Alice might fervently hope is that the FTC White Paper will be the first step in a long process that will eventually result in a new patent statute. She might hope that that process would be at least as thorough and comprehensive the process that which produced the Copyright Act of 1976. It should last five to ten years, include administrative, economic and academic studies, and bring to bear the considerable mass of legal and economic learning that humanity has accumulated during the last half-century. That process may find, as did the FTC itself, that different rules may be economically appropriate for different industries. n137 That is surely a decision that only Congress can make, for the judiciary has neither the expertise nor any statutory basis for making it.

As I suggested at the outset of this paper, the unique historical context in which we find ourselves make laws governing innovation among the most important for our nation's economic future. Because our nation is still a world leader, it perhaps is not too arrogant to say that our own patent laws may have similar importance for the entire world. It's a good time, and there are many good reasons, to begin the process of plenary revision. n138 Alice, no doubt, would hope the FTC White [\*336] Paper gives us all a much-needed shove in that direction.

### **Legal Topics:**

For related research and practice materials, see the following legal topics:

Patent Law Claims & Specifications Description Requirement General Overview Patent Law Date of Invention & Priority General Overview Patent Law Ownership Patents as Property

### **FOOTNOTES:**

n1. Jay Dratler, Jr., *Intellectual Property Law: Commercial, Creative, and Industrial Property* (Law Journal Press 1991) (two volumes, updated semiannually) [hereinafter 1 Dratler].

n2. Jay Dratler, Jr., *Licensing of Intellectual Property* (Law Journal Press 1994) (two volumes, updated semiannually).

n3. Jay Dratler, Jr., *Cyberlaw: Intellectual Property in the Digital Millennium* (Law Journal Press 2000) (one volume, updated semiannually).

n4. To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy, A Report by the Federal Trade Commission (October 2003), available at <http://www.ftc.gov/reports/index.htm> (containing an index to the document in Acrobat format) (last visited February 23, 2004) [hereinafter FTC White Paper].

n5. See FTC White Paper, *supra* note 4, at 7-18 (executive summary of recommendations).

n6. Jay Dratler, Jr., Does Lord Darcy Yet Live? The Case against Software and Business-Method Patents, 43 *Santa Clara L. Rev.* 823 (2003) [hereinafter Darcy Article].

n7. *United States v. Topco Assoc., Inc.*, 405 U.S. 596, 610 (1972).

n8. "An Act concerning Monopolies and Dispensations with penall Lawes and the Forfeiture thereof," 21 Jam., c.3 (1623), reprinted in 4 *Statutes of the Realm* 1212 (1810) [hereinafter Statute of Monopolies]. For further discussion of this seminal source of all modern economic law, its close resemblance to the United States' Sherman Act, and its relevance to modern patent law and policy, see Darcy Article, *supra* note 6, at 823-30.

n9. See Statute of Monopolies, *supra* note 8, 1 (decreeing in part that "all monopolies and all commissions, grants, licenses, charters, and letter patent heretofore made or granted ... of or for the sole buying, selling, making, working, or using of anything within this realm ... , are and shall be utterly void... ").

n10. Among other things, the Statute of Monopolies relied on common law and, case-by-case application to avoid circumvention and provided for treble damages and costs to prevailing plaintiffs. See *id.* 2, 4(1) - (2). See also Darcy Article, *supra* note 6, at 825-26. Cf. Sherman Act, ch. 647, 2, 26 *Stat.* 209 (1890) (prohibiting monopolization) (current version at 15 U.S.C. 2 (2004)); Clayton Act, ch. 323, 2, 38. *Stat.* 730 (1914) (providing for treble damages, costs, and attorneys' fees for successful plaintiff) (current version at 15 U.S.C. 15(a) (2004)).

n11. See Statute of Monopolies, *supra* note 8, 6, 10. See also Darcy Article, *supra* note 6, at 826.

n12. See generally Darcy Article, *supra* note 6.

n13. See Darcy Article, *supra* note 6, at 823-33.

n14. *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373-77 (Fed. Cir. 1998), cert. denied, 525 U.S. 1093 (1999).

n15. See *id.* at 1371-72. See also Darcy Article, *supra* note 6, at 862-63, 871-74.

n16. See *State St. Bank*, 149 F.3d at 1371-72.

n17. See *id.* (reciting part of key patent claim).

n18. I am hardly the only commentator to notice this anomaly. See John R. Thomas, The Patenting of the Liberal Professions, 40 B.C. L. Rev. 1139, 1156-57 (1999).

n19. See *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 927 F. Supp. 502, 516 (D. Mass. 1996), rev'd, 149 F.3d 1368 (Fed. Cir. 1998), cert. denied, 525 U.S. 1093 (1999).

n20. See *State St. Bank*, 149 F.3d at 1376-77 (quoting district court's finding that valid patent would provide monopoly over hub-and-spoke investment partnership business, but finding it lawful patent monopoly).

n21. See *id.* at 1375-76. The Federal Circuit saw a line of cases prohibiting business-method monopolies as misguided or misinterpreted. *Id.* For criticism of its reasoning and conclusion, see Darcy Article, *supra* note 6, at 871-75.

n22. See Darcy Article, *supra* note 6, at 871-76, 891-92, for more on this point.

n23. John R. Thomas, The Patenting of the Liberal Professions, *40 B.C. L. Rev.* 1139, 1163-1164 (1999) (footnotes omitted).

n24. Professor Alford describes this slogan as "a Chinese saying of unknown provenance." William P. Alford, *To Steal a Book is an Elegant Offense: Intellectual Property Law in Chinese Civilization* 1 (1995).

n25. Alice's creator was an Englishman named Rev. Charles Lutwidge Dodgson, a mathematician and logician who lectured at Oxford for some 26 years. His pen name was Lewis Carroll. See "The Making of Alice in Wonderland," available at <http://www.bedtime-story.com/bedtime-story/alice-background.htm> (last visited June 23, 2004).

n26. See *supra* note 25.

n27. See *id.*

n28. The chief culprit here is the requirement that patentable inventions not be "obvious" in light of prior art. 35 U.S.C. 103(a) (2004). Properly understood, this requirement is part of the subject-matter limitation of patent law, not an extraneous criterion. See *infra* the text accompanying notes 35-47. But what criterion could possibly be more abstract and evanescent - and more dependent on the eye of the beholder - than whether something is "obvious"?

In addition, a judge-made rule excludes from patentability "laws of nature, natural phenomena, and abstract ideas[.]" *Diamond v. Diehr*, 450 U.S. 175, 185 (1981). Since computer programming came on the scene as an independent industry in 1968, the courts have tried in vain trying to apply this rule - itself highly abstract - to alleged software-related inventions. See Darcy Article, *supra* note 6, at 841-42 & n.6 (citing six failed attempts to define the judge-made exception for such inventions and concluding: "In addressing software-related innovations, the courts have tried and rejected so many formulas that the list appears endless."); 1 Dratler, *supra* note 1, at 2.02[2][b] (outlining judicial history in more detail).

In *State Street* and an earlier case, the Federal Circuit tried to cabin the rule by distinguishing "laws of nature, natural phenomena, and abstract ideas" from inventions that produce a "useful, concrete and tangible

result[,]" meaning numbers that one can use. *State Street Bank*, 149 F.3d at 1373, quoting *In re Alappat*, 33 F.3d 1526, 1544, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994) (en banc majority opinion). This attempt, however, had two signal flaws. First, it confused the question of patentable subject matter with the distinct statutory requirement that a patentable invention be "useful" as specified in 35 U.S.C. 101. See Darcy Article, supra note 6, at 891 & n.218. Second and more important, it made the distinction between rule and exception "clear" by virtually extinguishing the exception. See infra note 47. In defining anything that produces useful numbers as "concrete" and not "abstract," the Federal Circuit virtually assured that no viable subject-matter objection could be made to software related inventions. General Gordius, who cut the eponymous Gordian knot, would approve.

n29. To my knowledge, no one has ever succeeded in articulating a direct relationship between the criterion of nonobviousness in cognition and any economic effect of the patent system (or the appropriate balance between the prohibition on business monopolies and the exception for temporally limited monopolies on inventions). As for the highly abstract distinction between abstract natural laws, phenomena and ideas on the one hand and concrete inventions on the other, modern understanding of the physical world has all but erased its significance. Computer programs are just abstract steps or instructions coded in ways established by human convention, yet they are the basis of virtually all modern business operations, as well as much in science and engineering. Moreover, the very basis of life is now understood to be abstract information contained in genetic sequences of amino-acids. This coalescence of abstract information with business and engineering operations and the practical characteristics of living organisms has made distinguishing the abstract from the concrete in patent law a fool's errand.

The usual rationale for this judge-made exception to patentable subject matter is that the tools of science, engineering and invention, as distinguished from inventions themselves, are too valuable and widely applicable to monopolize. See 1 Dratler, supra note 1, at 2.02[2][b][iv][F]. But this distinction becomes evanescent when both tools and results are expressed in abstractions, such as steps in a computer program or process or blocks of abstract information in a genetic code. In any event, the distinction has no economic relevance besides the obvious observation that keeping basic tools free from monopoly likely will result in more of what those tools build (in this case invention). Modern science and technology, which recognize that abstract sequences (of computer instructions or pairs of amino acids) are both the tools of invention and its results, demands a more economically relevant criterion for line-drawing.

n30. The Statute of Monopolies, which contained an exception for patents, was enacted in England in 1623. Statute of Monopolies, supra note 8.

n31. Statute of Monopolies, supra note 8, 6 (permitting, as exception to general prohibition on monopolies in 2, letters patent for the term of fourteen years or less, of the sole working or making of any manner of new manufactures, to the true and first inventor).

n32. Id. Under the limited exception to the general anti-monopoly rule, the subject of a patent had to be a "new" manufacture, granted to the "true and first Inventor" thereof, for something which "others at the tyme of

makinge such Lettres Patents ... shall not use [sic] [.]" Id.

n33. See, e.g., 35 U.S.C. 101-02 (2004) (prescribing and describing novelty requirement, respectively, in the United States). See also Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization [hereinafter WTO Agreement], Annex 1C, Legal Instruments - Results of the Uruguay Round vol. 31, 33 *I.L.M.* 81, art. 27.1 (1994) [hereinafter TRIPS Agreement] (requiring of member nations that their patents be limited to inventions that are "new, involve an inventive step and are capable of industrial application") (footnote omitted and emphasis added).

n34. See *State St. Bank*, 149 F.3d at 1375-76.

n35. See Darcy Article, *supra* note 6, at 836-38, 843-46, for further discussion of this point.

n36. See generally *Graham v. John Deere Co.*, 383 U.S. 1, 7-10 (1966) (describing Jefferson's role and attitudes in helping structure our patent system and, as Secretary of State, in serving as one of three officials who superintended its operation).

n37. Patent Act of 1790, ch. 7, 1 Stat. 109, 109-10 (1790) (allowing any two of Secretary of State, Secretary of War, and Attorney General to issue patent if they found "the invention or discovery sufficiently useful and important") (emphasis added in text).

n38. See *Graham*, 383 U.S. at 9 (noting Jefferson's recognition of difficulty of "drawing a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not" (quoting letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), reprinted in 6 Writings of Thomas Jefferson 181 (H.A. Washington ed., New York, John C. Riker 1857))).

n39. See *Hotchkiss v. Greenwood*, 52 U.S. (11 How.) 248, 267 (1850).

n40. See *Graham*, 383 U.S. at 11-12 (describing evolution in meaning of term "invention" to describe, but not resolve, line-drawing problem in interval between *Hotchkiss* and Patent Act of 1952).

n41. See 35 U.S.C. 103(a) (2004) (precluding patent if, inter alia, "the subject matter [of the invention] as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art") (emphasis added).

n42. See *Graham*, 383 U.S. at 12-17 (reviewing history of 1952 Act and concluding that it "was not intended by Congress to change the general level of patentable invention").

n43. See Darcy Article, supra note 6, at 823-25 (discussing several consequences - principally higher prices, reduced output, and lower innovation, of monopoly as compared to an equivalent competitive market).

n44. See *Graham*, 383 U.S. at 11 ("The inherent problem was to develop some means of weeding out those inventions which would not be disclosed or devised but for the inducement of a patent.").

n45. See Darcy Article, supra note 6, at 876-894, for further discussion of this point.

n46. See 35 U.S.C. 101 (2004) ("Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.") (emphasis added).

n47. See, e.g., *State St. Bank*, 149 F.3d at 1373 ("The repetitive use of the expansive term 'any' in 101 shows Congress's intent not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in 101."); *In re Alappat*, 33 F.3d 1526, 1542, 1545 (Fed. Cir. 1994) (en banc) ("Because claim 15 is directed to a 'machine,' which is one of the four categories of patentable subject matter enumerated in 101, claim 15 appears on its face to be directed to 101 subject matter."). In both cases, the Federal Circuit of course addressed the judge-made exceptions to patentable subject matter for abstract ideas and laws of nature, but in reducing them to their narrowest, most literal scope - and in confusing them with a lack of utility - the court deprived them of all vitality. See Darcy Article, supra note 6, at 887-891, 890 n.218.

n48. See supra note 46 and the text accompanying note 31.



n49. See, e.g., *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 664 (Fed. Cir. 2000) (stating that the "relevant inquiry" is "whether there is a reason, suggestion, or motivation in the prior art or elsewhere that would have led one of ordinary skill in the art to combine the references"); *In re Gartside*, 203 F.3d 1305, 1319 (Fed. Cir. 2000); *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999) (requiring "rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references"), rev'd on other grounds. See generally Dratler, *supra* note 1, 2.03[3][f] (discussing Federal Circuit's "suggestion test" for obviousness).

n50. See Darcy Article, *supra* note 6, at 882-83. Under the doctrine of "complete anticipation," patent law requires a single prior-art reference to render an invention non-novel. *Id.* (discussing doctrine and citing authority). The Federal Circuit's "suggestion" test for obviousness, which permits combining more than a single reference but generally requires something explicit in each, therefore requires little more than novelty as a nonlawyer would understand it, i.e., something not described in any combination of prior-art references. See *id.* at 883-85.

n51. See *id.* at 882-91.

n52. See FTC White Paper, *supra* note 4, at 11-12 (recommending modification of the "suggestion" test); *id.* at 9-11 (analyzing deficiencies of test).

n53. See *id.* at 14-15 (recommending consideration of anticompetitive and other harm before "extending the scope of patentable subject matter").

n54. See *supra* notes 49-50.

n55. See Darcy Article, *supra* note 6, at 840-53.

n56. See John Craven, *Introduction to Economics: An Integrated Approach to Fundamental Principles* 248 (Basil Blackwell ed., 1984).

n57. The most recent industry figures suggest that development costs for a single successful drug may be as high as \$ 1.7 billion. See Drug Development Costs Rise to \$ 1.7 Billion, Study Finds, *Drug Industry Daily*, Dec.

9, 2003, available at LEXIS, News Library, DRGDLY. This paper, however, relies on a slightly less recent and accepted independent study by Dr. Joseph A. DiMasi at Tufts University's Center for the Study of Drug Development, which put the full cost of drug development at \$ 800 million. See Tufts Center for the Study of Drug Development, News Release: Tufts Center for the Study of Drug Development Pega Cost of a New Prescription Medicine at \$ 802 Million (Nov. 30, 2001), at <http://csdd.tufts.edu/NewsEvents/RecentNews.asp?newsid=6> (last visited Feb. 6, 2004) [hereinafter Tufts News Release].

n58. See Tufts News Release, *supra* note 57.

n59. See Tufts News Release, *supra* note 57. The \$ 800 million figure includes "expenses of project failures and the impact that long development times have on investment costs." *Id.*

n60. See Henry Grabowski, Pharmaceuticals: Politics, Policy and availability: Patents and New Product Development in the Pharmaceutical and Biotechnology Industries, 8 *Geo. Public Pol'y Rev.* 7, 9 (2003) (citing Joseph A. DiMasi, Success Rates for New Drugs Entering Clinical Testing in the United States, 58 *J. Clinical Pharmacology and Therapeutics* 1-14 (1995)). The author stated that, "typically, many thousands of compounds are examined in the pre-clinical period for every one that makes it into human testing." *Id.* "Only 20 percent of the compounds entering clinical trials survive the development process and gain FDA approval[.]" *Id.*

n61. See Darcy Article, *supra* note 6, at 840-51 for further discussion of the distinction between market and technological risk.

n62. The copyist might also have to incur some additional expense to convince the FDA that its manufacturing process was as safe and reliable as the innovator's.

n63. As long as the law allows the copyist to market its copycat drug, the law should not prevent it from truly describing that drug as an exact copy. The copyist could even use the innovator's trademark to identify its copy (truthfully) as a duplicate of the innovator's drug. See Dratler, *supra* note 1, 10.04 (discussing doctrine of trademark fair use). As a result, the copyist could "free ride" on the innovator's marketing and promotion expenses, as well as on its development and clinical-testing costs.

n64. See Darcy Article, *supra* note 6, at 842-43. See also Grabowski, *supra* note 60, at 11 ("Without a

well-structured system of global patent protection, neither the research pharmaceutical industry nor the generic industry would be able to grow and prosper, and the rate of new product introductions and patent expirations would decline significantly.").

n65. See Darcy Article, *supra* note 6, at 843-53, for further discussion of this point. See also 1 Dratler, *supra* note 2, 3.02[1] (discussing exclusive rights and running royalties as means to extract potentially unlimited reward from marketplace and thereby to justify unknown and unknowable development risk).

n66. See also Darcy Article, *supra* note 6, at 844-53.

n67. See *supra* notes 57, 60. Real economic risk can be demonstrated by such evidence as expert testimony, historical and statistical records of similar projects, and the record in the actual development project at issue, including false starts, blind alleys, and development and/or testing expense incurred without tangible result. In other words, courts can rely on exactly the same sort of evidence compiled in studies such as those cited in notes 57 and 60. *Id.*

n68. See *supra* text accompanying ns. 35-45.

n69. See *Folsom v. Marsh*, 9 F. Cas. 342 (C.C.D. Mass. 1841) (No. 4,901). No less a distinguished figure in American jurisprudence than Judge (later Justice) Story lamented that "patents and copyrights approach, nearer than any other class of cases belonging to forensic discussions, to what may be called the metaphysics of the law, where the distinctions are, or at least may be, very subtle [sic] and refined, and, sometimes, almost evanescent." *Id.* at 344.

n70. These are two of the three (themselves abstract) terms that define the traditional judge-made exceptions to patentable subject matter. See *Diamond v. Diehr*, 450 U.S. 175, 185 (1981) ("Excluded from ... patent protection are laws of nature, natural phenomena, and abstract ideas.") (citations omitted).

n71. See 35 U.S.C. 103(a) (2004) (precluding patent if invention "would have been obvious at the time the invention was made to a person having ordinary skill in the art") (emphasis added). For a discussion of the effect of this statutory phrase in precluding invalidation of patents by hindsight, see 1 Dratler, *supra* note 1, 2.03[3][a].

n72. See 35 U.S.C. 103(a) (2004) ("Patentability shall not be negated by the manner in which the invention was made.").

n73. *Pfaff v. Wells Electronics, Inc.*, 525 U.S. 55 (1998). See also Dratler, *supra* note 1, at 2.03[1][b][ii].

n74. 35 U.S.C. 102:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States[.]

*Id.* (emphasis added).

n75. See *Pfaff*, 525 U.S. at 66, 68-69.

n76. See *id.* at 58 n.3.

n77. See *id.*

n78. *Hotchkiss*, 52 U.S. at 267.

n79. See *id.* (stating that "unless more ingenuity and skill in applying the old method ... were required in the application of it [in the claimed invention] than were possessed by an ordinary mechanic acquainted with the business," the invention was not patentable.). *Id.*

n80. See 35 U.S.C. 112 (2004). The statute defines the "specification" as the patent narrative including the claims. *Id.* (stating that "the specification shall conclude with one or more claims ...") (emphasis added). Yet both practitioners and courts are in the habit of referring to the "specification" as the part of the patent other than the claims, especially the narrative description of the invention and the drawings.

n81. See 1 Dratler, *supra* note 1, 2.04[1] (discussing four different legal disclosure requirements - enablement, best mode, written description, and definiteness - and the rule that failure to satisfy any one invalidates the patent).

n82. See *id.* See also *id.* 2.04[1][a], [b], [d], [f] (discussing each disclosure requirement separately and citing authority).

n83. See, e.g., *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 25-29 (1997) (reconfirming vitality of doctrine of equivalents against challenges based on Patent Act of 1952); *Graver Tank & Mfg. Co. v. Linde Air Prod. Co.*, 339 U.S. 605, 608 (1950) (stating that an accused device is equivalent to the claimed invention "if it performs substantially the same function in substantially the same way to obtain the same result" (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929))); *Winans v. Denmead*, 56 U.S. (15 How.) 330, 334 (1854) (providing the seminal decision on doctrine of equivalents).

n84. See *Ultra-Tex Surfaces, Inc. v. Hill Bros. Chem. Co.*, 204 F.3d 1360, 1365 (Fed. Cir. 2000) ("As we recently acknowledged in *Streamfeeder*, the doctrine of equivalents does not operate to 'broaden' claims, but rather broadens the right to exclude. For the sake of convenience, however, we will likewise use these terms here, 'cognizant of the fact that it is the right to exclude which is being expanded, not the claims.'" (quoting *Streamfeeder, LLC v. Mailing Mach. Serv., Inc.*, 175 F.3d 974, 981 n.1 (Fed. Cir. 1999))). Of course applying the doctrine of equivalents does not literally rewrite the claims, but it does give them the practical effect of claims, hypothetical or otherwise, with broader scope than their literal language commands.

n85. See 1 Dratler, *supra* note 1, 2.05[3][b][i] (discussing doctrine of equivalents in depth).

n86. See *id.* 2.05[3][a] (introduction), [i] (discussing claims as determining scope of patent monopoly).

n87. *35 U.S.C. 251* (2004). The patentee can narrow the claims in reissue, if excessive breadth was due to "error without any deceptive intention[.]" *Id.* The courts, however, have no power to narrow the claims at all.

n88. See 1 Dratler, *supra* note 1, 1.06[1] (describing patent prosecution procedure).

The Patent and Trademark Office may also narrow claims in re-examination, after a patent has issued, but that process requires an external request or sua sponte action by the Office and is subject to judicial review. See *35 U.S.C. 301-318* (2004).

n89. See *id.* Courts can and do interpret the claims, but they are bound by the claim language, for the present system puts the burden of describing the legal limits of the invention on the patent applicant, aided by the patent examiner. See also *id.* at 2.05[3][a] (discussing rules and procedures by which courts construe patent claims in litigation).

n90. *56 U.S. (15 How.) 62 (1854)*.

n91. See *id.* at 112 (reciting eighth claim).

n92. See *id.* at 113 (stating that the "court is of opinion that the claim is too broad, and not warranted by law").

n93. See *In re Hyatt*, 708 F.2d 712, 714-715 (Fed. Cir. 1983). See also *id.* at 714 (stating that "the claim is properly rejected for what used to be known as 'undue breadth,' but has since been appreciated as being, more accurately, based on the first paragraph of 112[.]" i.e., lack of an enabling and definite disclosure).

n94. See generally 1 Dratler, *supra* note 1, 2.05[3][b] (describing cases in which scope of claims may extend beyond what patent literally discloses).

n95. See, e.g., *Atlas Powder Co. v. E.I. du Pont de Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984) (stating disclosure of "numerous salts, fuels, and emulsifiers that could form thousands of emulsions" useful as blasting agents was enabling, even if some candidates were inoperative, where those skilled in art would know

how to select components); *In re Angstadt*, 537 F.2d 498, 502 n.2 (C.C.P.A. 1976) (validating claims for genus consisting of "thousands" of catalysts of similar chemical formulation, where patent applicant had tested only forty of them, and "some" had not worked); *Ziegler v. Phillips Petroleum Co.*, 483 F.2d 858, 871, 875-876 (5th Cir. 1973), cert. denied, 414 U.S. 1079 (1973) (holding patent on catalytic process covered polymerization of polypropylene, although polypropylene was not mentioned in specification).

n96. See 1 Dratler, *supra* note 1, 2.04[1][a], [b] (discussing these rationales for the law's flexible disclosure requirements).

n97. See *supra* notes 81-83 and accompanying text. One of the four statutory disclosure requirements is that the patent specification "enable any person skilled in the art to which [the patented invention] pertains, or with which it is most nearly connected, to make and use [it]." 35 U.S.C. 112 (2004). This is known as the "enablement" requirement, or the requirement for an "enabling disclosure." See 1 Dratler, *supra* note 1, 2.04[1][a].

n98. See 1 Dratler, *supra* note 1, 2.04[1][a].

n99. See, e.g., *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988) (listing factors to be considered in determining whether experimentation is undue); *Ex parte Jackson*, 217 U.S.P.Q. (BNA) 804, 807 (Board of Patent Appeals Nov. 12, 1982) (explaining rule of reason).

n100. See 1 Dratler, *supra* note 1, 2.04[1][b]. The "definiteness" requirement for claiming boils down to describing the invention definitely in order to allow proper patent prosecution and to warn putative infringers precisely what they can and cannot do. *Id.*

n101. See *supra* notes 81-83 and accompanying text.

n102. Strong dissents and the majority opinions in each of two seminal cases recognized the tension - inherent in the doctrine of equivalents - between precision in claiming and avoiding circumvention of the claims through literalism. See *Graver Tank & Mfg. Co. v. Linde Air Prod. Co.*, 339 U.S. 605, 613-614 (1950) (Black, J., dissenting) (arguing that doctrine of equivalents obviates statutory requirement for distinct claiming); *Winans v. Denmead*, 56 U.S. (15 How.) 330, 347 (1854) (Campbell, J., dissenting) (arguing that doctrine of equivalents would undermine statutory requirement that patent applicant "particularly specify and point out what he claims

as his invention") (internal quotation marks omitted). See also *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 26 n.3 (1997) (noting that the Court's majorities in both *Graver* and *Winans* approved doctrine of equivalents despite tension argued in both dissents).

n103. See *supra* note 93 and text accompanying notes 92-93. The Federal Circuit has recognized only the formal question: whether what the inventor has disclosed supports his claims. *Id.* It appears to have refused to address the deeper substantive question: the extent of the inventor's contribution to the art, as reflected in the claims and the specification.

n104. See *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1565-1569 (Fed. Cir. 1995) (en banc) (Nies, J., dissenting) (outlining history of central and peripheral claiming in discussing history of doctrine of equivalents), *rev'd on other grounds*, 520 U.S. 17 (1997).

n105. See *id.*

n106. See *id.* Courts had developed the doctrine of equivalents even before the transition to peripheral claiming. See *id.* That transition, however, made the doctrine even more important in avoiding circumvention of patents, because the formality of peripheral claiming lent itself to literalism. See *id.* Thus, despite the argument - reasonable as a matter of history but not substance - that peripheral claiming was intended to avoid the very sort of uncertainty that the doctrine created, the Supreme Court has thrice upheld the doctrine of equivalents under the newer peripheral-claiming regime. See *supra* notes 83, 102.

n107. See *supra* note 102.

n108. See 1 *Dratler*, *supra* note 1, 2.05[3][b][i][B], 2.06[2]. Prosecution history estoppel attempts to cabin the doctrine of equivalents by holding patent applicants to claim-narrowing amendments and statements made in the course of patent prosecution. *Id.*

n109. See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 563, 569 (Fed. Cir. 2000) (en banc) (barring application of doctrine of equivalents to any claim element narrowed by amendment in course of patent prosecution), *rev'd*, 535 U.S. 722, 737 (2002) (rejecting complete bar in favor of more flexible, case-by-case approach).



n110. A Markman hearing is named for the seminal case that made claim construction a task for judges, not juries. See *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996) (unanimous decision) (stating "we hold that the construction of a patent, including terms of art within its claim, is exclusively within the province of the court."). Because courts exclusively construe claims, they may decide, at the parties' request or sua sponte, to determine the meaning of claims in separate hearings, which may occasion separate appeals. See 1 Dratler, *supra* note 1, 2.05[3][a][iv].

n111. See *Vitronics Corp. v. Conception, Inc.*, 90 F.3d 1576 (Fed. Cir. 1996).

The claims, specification, and file history, rather than extrinsic evidence, constitute the public record of the patentee's claim, a record on which the public is entitled to rely. In other words, competitors are entitled to review the public record, apply the established rules of claim construction, ascertain the scope of the patentee's claimed invention and, thus, design around the claimed invention ... . Allowing the public record to be altered or changed by extrinsic evidence introduced at trial, such as expert testimony, would make this right meaningless.

*Id.* at 1583 (Citations omitted).

n112. See also *Cybor Corp. v. FAS Technologies, Inc.*, 138 F.3d 1448, 1451, 1456 (Fed. Cir. 1998) (en banc) (confirming that even issues of technical definition of terms used in claiming are matters of claim construction and therefore matters of law, not subject to deferential review on appeal, and confirming importance of intrinsic evidence expressed in *Vitronics*).

n113. See generally 1 Dratler, *supra* note 1, 2.05[3][a][iii] (discussing decisions cited in *Vitronics* and *Cybor Corp.*, their derivation from *Markman*, their effect in eliminating expert testimony from claim construction, and the dissenting views of several judges on this point).

n114. See, e.g., *Cybor Corp.*, 138 F.3d at 1480 (stating the additional views of Judges Newman and Meyer); *id.* at 1475 (stating the dissenting views of Judges Rader and Newman).

n115. See 35 U.S.C. 111(b). Present law allows an inventor to get a provisional patent, good for one year only, by filing an application without claims. See also 1 Dratler, *supra* note 1, 1.06[1].

n116. See 1 Dratler, *supra* note 1, 2.04[1]. These are the four disclosure requirements of today's patent law in the United States. *Id.*

n117. See FTC White Paper, *supra* note 4, at 11-12, 17-24 (discussing proposals for expanded post-grant inter partes review).

n118. See *id.* at 7-8.

n119. See *Fed. R. Evid. 706(a)* (permitting court to appoint experts of its own selection or agreed to by parties).

n120. See *supra* note 83.

n121. See, e.g., *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 234 (1942); *Gen. Elec. Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 371 (1938). See also 1 Dratler, *supra* note 1, 2.05[3][c][i] (discussing these cases).

n122. A patent on a result without the means to achieve it would provide nothing useful to the public.

n123. See, e.g., *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 568 (1898) (enunciating "reverse doctrine of equivalents," under which device that performs same function to achieve same result by substantially different means than patented invention does not infringe, even if described literally by patent's claims); *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1123 (Fed. Cir. 1985) (same). See generally 1 Dratler, *supra* note 1, 2.06[3] (discussing reverse doctrine of equivalents).

n124. See FTC White Paper, *supra* note 4, at 6-7 (executive summary) (recognizing the same problem and discussing negative impact of "thicket" of patents on computer industry). See also *id.* at 27-36 (discussing transaction costs and strategic impediments to follow-on innovation resulting from multiple patents).

n125. See *id.* at 34-43 (discussing computer industries); *id.* at 51-56 (discussing software and Internet industries).

n126. See *Cont'l T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36, 58-59 (1977) (stating "departure from the rule-of-reason standard [in antitrust law] must be based upon demonstrable economic effect rather than ... upon formalistic line drawing."). See also *Bus. Elec. Corp. v. Sharp Elec. Corp.*, 485 U.S. 717, 724-726 (1988) (reiterating twice the preference for considering substantial economic effect, rather than formalism).

n127. See *Cont'l T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36, 58-59 (1977) (stating "departure from the rule-of-reason standard [in antitrust law] must be based upon demonstrable economic effect rather than ... upon formalistic line drawing."). See also *Bus. Elec. Corp. v. Sharp Elec. Corp.*, 485 U.S. 717, 724-726 (1988) (reiterating twice the preference for considering substantial economic effect, rather than formalism).

n128. See FTC White Paper, *supra* note 4, at 7-17 (executive summary).

n129. See *id.* at 7-8 (executive summary, Recommendation 1).

n130. See *id.* at 8-10 (Recommendation 2).

n131. See *id.* at 14-15 (Recommendation 6).

n132. See *id.* at 6, 31-33.

n133. See *id.* at 6. The FTC White Paper does, however, call for "seeking the right balance between protection of the patentee and impact on outside competition." *Id.* (footnote omitted).

n134. See, e.g., FTC White Paper, *supra* note 4, at 4-6 (executive summary, general remarks), 10-11 (Recommendation 3(a), suggesting that courts place greater emphasis on commercial success in determining

whether invention is obvious), 14 (Recommendations 5(d), and 6, suggesting consideration of public interest and competition policy, generally and in extending patentable subject matter), 17 (Recommendation 10, suggesting expanded consideration of economics generally).

n135. See Statute of Monopolies, *supra* note 8, 6, 10.

n136. See Darcy Article, *supra* note 6, at 895 n. 232.

n137. Cf. FTC White Paper, *supra* note 4, at 4-14 (describing generally positive role of patents in pharmaceutical industry); *id.* at 33-43, 48-53 (describing difficulties arising from "thicket" of patents in computer hardware, semiconductor, software and Internet industries).

n138. During the University of Akron's Sixth Annual Richard C. Sughrue Symposium on Intellectual Property Law and Policy, former Commissioner of Patents Bruce Lehman opined that political realities might cause any attempt at patent revision to skew even more dramatically in favor of a "land rush" toward economically unjustified private monopoly. The modern ability of industry groups and trade associations, such as the patent bar, to influence Congress on legislation important to their interests through lobbying certainly supports this view. Alice might hope that members of Congress might pay close attention to the public interest in revising a statute that bears so directly on our nation's ability to survive economically in a globalized economy in which our comparative advantage in manufacturing and farming will have vanished. In that hope as in others, however, Alice might well be naive.