TAKING THE UTILITARIAN BASIS FOR PATENT LAW SERIOUSLY: THE CASE FOR RESTRICTING PATENTABLE SUBJECT MATTER

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Courts, the Patent Office, and commentators are in vigorous disagreement about what types of innovation should be patentable, and what, if any, innovation should remain off limits to patenting. This Article shows that the disarray in the area of patentable subject matter results from a widespread failure to take the utilitarian policy underlying patent law seriously. Despite near-universal agreement that patent rights exist to provide incentives for innovation by allowing inventors to recoup their costs of research and development, courts have expanded patentable subject matter to many new fields without first demanding evidence that the newly patentable fields suffer from lack of incentives to innovate. The failure to ask the threshold question of whether patents are needed in a particular field to achieve efficient levels of innovation has resulted in both incoherent case law on patentable subject matter and costs to society from increased patent monopolies.

This Article explains that the sensible basis for determining patentable subject matter is to determine whether innovation is unlikely in the absence of patents. Part II of the Article sets forth an explanation and model showing that there is no reason to expand patentable subject matter into fields where innovation is already healthy due to other incentives such as low research and development costs, leadtime, or reputation benefits from innovation, or other legal protections such as trade secret and copyright law. To the extent that others argue for patentability even where there is no market failure in innovation, they are not following the utilitarian rationale for patent law, and inefficiency results.

Part III of the Article demonstrates how courts historically considered the issue of innovation market failure, at least implicitly, in their decisions as to what types of inventions were unpatentable. But with the advent of software and the Information Age, the courts' patentable subject matter tests no longer fit. Rather than reworking their tests to serve patent law's underlying rationale, they instead slowly abandoned their role as gatekeepers of patentable subject matter, resulting in the current inefficient regime in which almost all innovation is patentable. The

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courts' failure to grapple with the utilitarian rationale for patentability means that current judicial consideration of patentable subject matter continues to be misdirected. Part IV applies the model and explanation from Part II to the sample case of business methods—one of the most harmful areas of patenting—showing an example of a field in which patents are not efficient. Part V draws out the implications from the analysis presented in this Article, and suggests solutions most prominently, that the courts or Congress should revive the patentable subject matter gatekeeper function. The Article concludes in Part VI.

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I. INTRODUCTION

There is widespread agreement that the reason we have a patent system is utilitarian—to solve a market failure problem. The theory is that absent the right

to exclude that patents provide, copycats will quickly enter the market and drive down prices below the price at which the inventor can recoup her research and development costs. In other words, without patent grants, too little innovation will occur because the rational inventor will not bother to invent knowing that she will not be able to recoup the cost of invention.¹ It is also well recognized that our patent system's mechanism for incentivizing innovation—granting property rights to inventors—causes deadweight loss to society in the form of higher prices, and some consumers ending up priced out of the market.² Accordingly, a properly crafted patent law should provide enough property rights to incentivize the socially desirable (efficient) level of innovation, and no more. Patents broader in scope or longer in duration than the inventor needs to recoup her costs of invention (research and development) inevitably harm society in the form of higher prices on patented goods, fewer numbers of consumers able to purchase the patented goods, and decreased gross domestic product through deadweight loss.

A review of patent literature confirms the widespread agreement on the above propositions.³ It is, therefore, anomalous and troubling that the current

2. Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1, 50 (2001) (stating that "central task" of patent system is "ensuring sufficient rewards (and therefore sufficient incentives) to patentees while avoiding an unnecessary degree of deadweight loss to society as a whole").

^{1.} The utilitarian rationale for patent law is set forth explicitly in the Constitution, U.S. CONST. art. I, § 8, cl. 8: "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." Moreover, a survey of patent law casebooks shows that law students uniformly learn that our patent system exists to achieve explicitly utilitarian aims, incentivizing the production and distribution of innovation. See, e.g., ROCHELLE COOPER DREYFUSS & ROBERTA ROSENTHAL KWALL, INTELLECTUAL PROPERTY: TRADEMARK, COPYRIGHT AND PATENT LAW 553 (1996) (indicating that patents make costliness of inventing worthwhile); WILLIAM H. FRANCIS & ROBERT C. COLLINS, CASES AND MATERIALS ON PATENT LAW INCLUDING TRADE SECRETS-COPYRIGHTS-TRADEMARKS 70-73 (4th ed. 1995) (noting that patents promote ingenuity by creating temporary monopolies); ROBERT P. MERGES ET AL., INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE 127 (rev. 4th ed. 2007) (explaining that patents provide incentives to inventors); ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 1-13 (4th ed. 2007) (discussing historical use of patents to encourage innovation and protect individual interests); Rebecca S. Eisenberg, Patents and the Progress of Science: Exclusive Rights and Experimental Use, in MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW 33, 33-45 (1998) (describing patents' dual purposes of incentivizing inventiveness while contributing to public body of knowledge).

^{3.} See, e.g., WILLIAM D. NORDHAUS, INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE 70–90 (1969) (analyzing tradeoff between patents' enhanced incentives and reduction in competition due to patent exclusivity); Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEGAL STUD. 247, 247 (1994) (discussing utilitarian basis for patent law); Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 265–71 (1977) (setting forth thoroughly utilitarian "prospect theory" of patents); Paul Klemperer, *How Broad Should the Scope of Patent Protection Be*?, 21 RAND J. ECON. 113, 114–15 (1990) (discussing optimal scope of patents to provide profit to inventors while minimizing societal loss); Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CAL. L. REV. 803, 808–09 (1988) (laying out utilitarian motivation for patent protection); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 839, 871 (1990) (noting that "[t]he economic significance of a patent depends on

law in the United States regarding what types of inventions are eligible for patenting (patentable subject matter) has developed with little explicit consideration of the utilitarian question that should guide our crafting of patent law, and especially of the determination of which subject matter should be patentable.⁴ If we are utilitarian about patent law, then the question to be asked for each potentially patentable subject matter is whether there is a market failure present such that granting patentable subject matter status to a particular type of innovation will do more harm than good. If there is, the subject matter should be patentable. If not, no patent rights should exist for that area of innovation. Thus, when it comes to whether a particular type of innovation should be patentable, the following questions should be asked: (1) Would this type of innovation occur at sufficient levels without a patent grant? (2) Would granting a patent right for this type of innovation cause more loss to society than gain? (3) If society would not benefit from granting patentability to the particular type of innovation, can sufficiently clear lines be drawn between this subject matter and other subject matter that does need the protection of patentability? If the answer to the third question is no, then a fourth question should be asked: Considering as a whole the type of subject matter within which the particular subtype of innovation that does not need patentability falls, does society gain or lose from granting patents to the broader subject matter as a whole?

While this analysis and these questions naturally follow from taking seriously patent law's purpose of solving market failures, it may be surprising for the non-initiate to learn that the courts have allowed a breathtaking expansion of patentable subject matter in the last few decades without any discussion as to whether each new area of patentability is welfare enhancing.⁵ Some might justify this by arguing that the patentable subject matter section of the patent statute does not say anything about granting patents only in cases of market failure. This is true, but such an argument ignores that for most of the history of this country, courts limited patentable subject matter in ways that, at least implicitly, sought to

its scope: the broader the scope, the larger the number of competing products and processes that will infringe the patent" and that "proprietary control of technology tend[s] to cause 'dead weight' costs due to restrictions on use"); Alan Greenspan, Chairman, Fed. Reserve Bd., Remarks at the Stanford Institute for Economic Policy Research Economic Summit: Intellectual Property Rights (Feb. 27, 2004) (transcript available at http://www.federalreserve.gov/boarddocs/speeches/2004/200402272/ default.htm) (querying "[a]re the protections sufficiently broad to encourage innovation but not so broad as to shut down follow-on innovation?").

^{4.} None of the recent cases on patentable subject matter explicitly address the utilitarian question of whether patents are needed for an efficient level of invention in the subject matter category at issue. *See generally* Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354 (Fed. Cir. 2004); *In re* Bilski, 545 F.3d 943, 956 (Fed. Cir. 2008), *cert. granted sub nom.* Bilski v. Doll, 129 S. Ct. 2735 (2009); *In re* Nuijten, 500 F.3d 1346 (Fed. Cir. 2007); *In re* Comiskey, 499 F.3d 1365 (Fed. Cir. 2007), *superseded by* 544 F.3d 967 (Fed. Cir. 2009); State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998), *abrogated by In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008). Moreover, recent literature regarding patentable subject matter also ignores the utilitarian question. *See, e.g.*, Michael Risch, *Everything Is Patentable*, 75 TENN. L. REV. 591, 591–92 (2008) (arguing other "patentability criteria" operate to fulfill policy rationales underlying patentable subject matter).

^{5.} See infra Part III.B for a discussion of tests and standards for patentability.

deny patentability where it was likely that no market failure was present. Such limitations became almost nonexistent in recent years. Now, however, likely in an effort to avoid Supreme Court review, the Federal Circuit has announced that to qualify as patentable subject matter ("PSM"), inventions must be tied to a particular machine or cause a physical transformation.⁶

The purpose of this Article is threefold. First, the Article seeks to answer the question: Why has this large expansion of patentable subject matter occurred seemingly without any analysis of its efficiency? Second, using business methods as a specific example, the Article argues that not all types of innovation need the incentive of a patent grant to be produced at a socially desirable level. Third, the Article suggests that while courts could take the utilitarian analysis into account and return to the roles they played as crafters of a federal common law of patentable subject matter for the first century and a half of this country's existence, the optimal solution may be to assign an administrative agency the task of conducting explicit utilitarian analysis and rulemaking in determining what types of innovation should be patentable.

The Article proceeds as follows. Following this Introduction, Part II explains the utilitarian basis for patent law, the basic economics of the market failure problem that patent law seeks to solve, and the corresponding problem of deadweight loss that is created from patent protection. Part II explains the indisputable harms that come from granting patents where they are not needed.

Part III examines the federal courts' historic approach to PSM. PSM has always been defined very broadly in the patent statutes. Nevertheless, starting almost immediately, courts limited the types of innovations that qualified for patentability. Courts early on excluded abstract ideas, phenomena of nature, and laws of nature from patentability.⁷ These exclusions were sensible, because any increased incentive to innovate arising from patentability would have been far overshadowed by the cost to society of allowing ownership of these types of inventions and discoveries. In effect, the courts treated the broad wording of the PSM section of the patent statute as an invitation to engage in crafting a federal common law of PSM. This federal common law approach has continued for over two hundred years.⁸ Generally, the courts' determinations of what should not be PSM lined up with areas that likely did not need the incentive of a patent grant, or for which the patent grant would be unduly costly.⁹

Historically, the federal courts did a fairly good job of denying patentability to types of innovations that did not require patentability in order to be produced at socially optimal levels. Regardless of whether this resulted from fortuitous

^{6.} *In re Bilski*, 545 F.3d at 956. The Federal Circuit began its rollback of patentable subject matter with *In re Nuijten*, 500 F.3d at 1346 and *In re Comiskey*, 499 F.3d at 1365.

^{7.} See generally Gottschalk v. Benson, 409 U.S. 63, 67 (1972) (describing Court's long-standing refusal to allow patenting of abstract ideas, phenomena of nature, and laws of nature). See *infra* note 74 for a discussion of the historical exclusion of abstract ideas, phenomena of nature, and laws of nature from the realm of patentable subject matter.

^{8.} See Benson, 409 U.S. at 67 (relying on nineteenth-century cases).

^{9.} See infra Part III.B.1 for a discussion of the methods used by courts to determine patentability.

accident or from an implicitly utilitarian approach to PSM, until the recent *Bilski* case, the courts had largely abandoned their role as gatekeepers of subject matter patentability. A review of the history of patentable subject matter jurisprudence shows that for much of U.S. history the federal courts took it upon themselves to analyze classes of subject matter and exclude from patentability those types of innovation for which the patent grant likely would increase beneficial invention by less than the patent monopoly would cost society.

Critics of the courts' approach to PSM cases have pointed out that, especially with regard to older cases, the decisions sometimes seemed to turn on the issue of claim scope as much as PSM.¹⁰ The courts were wary about granting patent claims that were too broad or that allowed the invention to be described and claimed at too high a level of abstraction.¹¹ This phenomenon certainly occurred in some of the cases, and for sensible reasons. If patentees were allowed to claim their invention at too high a level of abstraction, then their patent claims might cover more than they had actually invented, and such claims would have allowed patentees to block subsequent innovation.¹² But in addition to cases in which claim scope was perhaps the core issue, courts also held that some types of innovation simply were not patentable under the Patent Act.¹³ The case law review in Part III shows that a utilitarian market failure analysis

^{10.} See Laura R. Ford, Alchemy and Patentability: Technology, "Useful Arts," and the Chimerical Mind-Machine, 42 CAL. W. L. REV. 49, 59 (2005) (describing Supreme Court's early focus on patent scope in making patentable subject matter determinations, and importance of written description requirement to cabining patent scope); Risch, supra note 4, at 591 ("The currently confused and inconsistent jurisprudence of patentable subject matter can be clarified by implementing a single rule: any invention that satisfies the Patent Act's requirements of category, utility, novelty, nonobviousness, and specification is patentable. In other words, if a discovery otherwise meets the requirements of patentability, then the discovery will be properly patentable without need to consider non-statutory subject matter restrictions such as the bars against mathematical algorithms, products of nature, or natural phenomena." (footnotes omitted)); Peter M. Kohlhepp, Note, When the Invention Is an Inventor: Revitalizing Patentable Subject Matter to Exclude Unpredictable Processes, 93 MINN. L. REV. 779, 798–99 (2008) ("The currently confused and inconsistent jurisprudence of patentable subject matter can be clarified by implementing a single rule: any invention that satisfies the Patent Act's requirements of category, utility, novelty, nonobviousness, and specification is patentable. In other words, if a discovery otherwise meets the requirements of patentability, then the discovery will be properly patentable without need to consider non-statutory subject matter restrictions such as the bars against mathematical algorithms, products of nature, or natural phenomena" (footnotes omitted)).

^{11.} See, e.g., Gottshalk, 409 U.S. at 67 (describing Court's long-standing refusal to allow patenting of abstract ideas, phenomena of nature, and laws of nature); The Incandescent Lamp Patent, 159 U.S. 465, 472 (1895) (requiring patentees to confine their claim to particular material used in invention); The Tel. Cases, 126 U.S. 1, 533 (1887) (noting that only "the useful art, process, [or] method of doing a thing" may be patented); O'Reilly v. Morse, 56 U.S. 62, 113 (1853) (determining that patent claim over yet-to-be-developed science is too broad).

^{12.} E.g., The Incandescent Lamp Patent, 159 U.S. at 472. These days courts can reject such claims on the grounds of inadequate written description or enablement. 35 U.S.C. § 112 (2006) (requiring specification in patent application).

^{13.} E.g., Parker v. Flook, 437 U.S. 584 (1978) (noting that Patent Act does not allow applications of established principles to be patented). See *infra* notes 113–25 and accompanying text for a discussion of *Parker v. Flook*.

seems to have underlain courts' analyses in these cases, and that generally the courts got the cost-benefit question right.

In Part III, I also engage the argument of some commentators that substantive PSM analysis was rightly abandoned because patents can be adequately examined under the statutory sections analyzing novelty, nonobviousness, written description, and enablement. I point out that while it is true that individual patent claims in some cases (especially very old cases) could be better analyzed under other sections of the Patent Act, it does not follow that all types of innovation need patent grants to be produced at adequate levels. Put differently, it does not follow from analyzing particular decisions about the scope of particular claims that no analysis should ever be done as to whether a type of innovation for which research and development costs are low, and trade secrecy, head starts, lock-ins, or other sets of incentives adequately incentivize innovation. These types of innovations should not receive patent protection if we are concerned with achieving higher levels of societal welfare.

Part III finishes its review of PSM case law by showing that in recent decades, as technology and innovation have moved from the physical to the electronic and intangible-to computers, software, and Information Age processes-the traditional tests that courts developed to distinguish unpatentable subject matter have seemed inadequate. By relying on ossified tests instead of the underlying utilitarian calculus that courts historically used, at least implicitly, the courts in recent years found themselves in both line-drawing predicaments and in situations where innovation that obviously suffers from a market failure problem would be excluded by strict application of their old PSM tests.¹⁴ Instead of reworking their PSM tests for the Information Age, the Federal Circuit, and to a lesser but still significant extent, the Supreme Court, simply threw up their hands and started reading section 101 of the patent statute broadly, such that virtually "anything under the sun that is made by man"¹⁵ became patentable. While this eliminated the trouble of making hard decisions regarding PSM, patent examiners and courts left with only the remaining sections of the Patent Act as screens for patentability have been unable to refuse granting patents where they are not needed to incentivize invention.

Thus, federal courts have largely stopped denying patents based on rulings about the patentability of broad subject classes. Notwithstanding the recent *Bilski* case holding that a patent claim must at least interact with the physical world,¹⁶ the trend over the last decades toward allowing patents on virtually every type of subject matter is exemplified by such things as the allowance of

^{14.} See Richard S. Gruner, Intangible Inventions: Patentable Subject Matter for an Information Age, 35 LOY. L.A. L. REV. 355, 355–57 (2002) (arguing that previous line drawn between intangible ideas that did not qualify as PSM and tangible innovations that warranted patent protection provided "troublingly narrow" arena of patent protection that denied patentability to valuable intangible innovation).

^{15.} Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) (quoting S. REP. NO. 82-1979, at 5 (1952)).

^{16.} In re Bilski, 545 F.3d 943, 956 (Fed. Cir. 2008), cert. granted sub nom. Bilski v. Doll, 129 S. Ct. 2735 (2009).

patents on business methods,¹⁷ tax strategies¹⁸ and sports moves;¹⁹ the elimination of the "technological arts" requirement for patentability; and the upholding of a patent on medical diagnosis in *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.*²⁰

This Article argues that while the abandonment of the PSM gatekeeper role happened for historically understandable reasons, it has been very problematic. The case law shows how we are now left with a specialized patent court, the Federal Circuit, that has increasingly relied on a bare textualist approach to the Patent Act, creating the current situation in which inventions not traditionally considered within the "technological arts" are nonetheless patentable. Since the courts have stopped actively excluding certain subject matter from patentability, no one else has stepped in to perform this function. This Article analyzes how the present lack of any utilitarian arbiter of patentable subject matter is costly to society. After setting out a model to show how some classes of subject matter are appropriate for patentability while others are not, this Article applies the model to business methods and concludes that patentability for business method claims, even when they are tied to a machine, is inefficient. This conclusion begets the corollary conclusion that the reinstatement of a real patentable subject matter gatekeeper is desirable. Not only would this go a long way toward preventing unmerited patents and their significant attendant costs to society, it would also decrease the number of patent applications that must be fully examined by an overburdened Patent and Trademark Office ("PTO").

The problem caused by unneeded patents has become more acute in recent years as entities have arisen that attempt to monetize patents not by practicing the patent, but by enforcing them aggressively against those who arguably infringe.²¹ This has led to a state of affairs in some industries, like software, in which firms forbid their employees from reviewing patents for fear of being sued for willfully infringing someone else's patent.²² While this perverse behavior is caused in part by problems with the willfulness standard for patent infringement,²³ it is also quite telling that firms in some areas do not think that

^{17.} E.g., U.S. Patent No. 5,960,411 (filed Sept. 12, 1997) (Amazon.com patent on 1-Click ordering).

^{18.} E.g., U.S. Patent No. 6,292,788 (filed Dec. 3, 1998) (tax-deferred real estate transaction); U.S. Patent No. 6,567,790 (filed Dec. 1, 1999) (funding of Grantor Retained Annuity Trust with nonqualified stock options); U.S. Patent No. 7,149,712 (filed Dec. 23. 2004) (purchase of annuity contract to fund charitable remainder trust); U.S. Patent No. 7,177,829 (filed July 16, 1999) (H&R Block's Tax Refund System).

^{19.} E.g., U.S. Patent No. 5,616,089 (filed Mar. 29, 1996) (method of putting).

^{20. 548} U.S. 124 (2006).

^{21.} See Jason Rantanen, Slaying the Troll: Litigation as an Effective Strategy Against Patent Threats, 23 SANTA CLARA COMPUTER & HIGH TECH. L.J. 159, 160 (2006) ("Patent trolls – entities who neither develop new technologies nor participate directly in the market, but instead acquire patent rights solely for the purpose of obtaining a revenue stream – have become a major threat to market participants.").

^{22.} Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law's Willfulness Game*, 18 BERKELEY TECH. L.J. 1085, 1085 (2003).

^{23.} Id.

reading patents is necessary to their product development. In other words, the benefit of disclosure of a new invention that is the quid pro quo for a patent is thought to be of little or no use in some fields. That some firms are competing and producing new products without any reliance on the innovation disclosed in patents in the relevant field should give us some pause as to the value of, and need for, such patents.

The extension of patentability to new areas of innovation—some of which likely do not need the additional incentive—causes problems for the patent system in another way: it overburdens the patent office and, correspondingly, the PTO issues more bad patents. There is wide consensus that thousands of unmerited patents are being granted each year.²⁴ These patents lack merit either because they are obvious or non-novel, or because no one makes use of the patented invention.²⁵ Unfortunately, such "worthless" patents are not costless. The owners of these patents increasingly are extracting payments from firms that do or make things that arguably are covered by these obvious or noncommercialized patents. Some entities have arisen that quite successfully monetize large portfolios of otherwise worthless patents. These entities are referred to disparagingly as "trolls," and various reform proposals have been made to address them.²⁶ While numerous commentators have suggested reforms to improve patent quality,²⁷ knocking out whole areas of subject matter from

^{24.} See, e.g., Mark Lemley et al., What to Do About Bad Patents, IP L. & BUS., Jan. 2006, at 20, 20 (recognizing prevalence of ridiculous patents); Kimberly A. Moore, Worthless Patents, 20 BERKELEY TECH. L.J. 1521, 1525–26 (2005) (identifying worthless patents based on patent expiration from lack of payment of maintenance fees); James Gleick, Patently Absurd, N.Y. TIMES, Mar. 12, 2000, § 6, at 44 (claiming that historians will see turning point in breakdown of U.S. Patent system in Amazon.com's 1999 Patent for "1-Click" technology, which allows customers to make purchases online with one mouse click, bypassing the delay associated with entering billing information); Lawrence Lessig, *The Problem with Patents*, INDUSTRY STANDARD, Apr. 23, 1999, http://www.thestandard.com/article/0,1902,4296,00.html (explaining that patent system provides obstacles to challenging undeserving patents).

^{25.} Some patents are simply absurd. *See, e.g.*, U.S. Patent No. 5,443,036 (filed Nov. 2, 1993) (granting patent to method of exercising cat by inducing it to chase dot projected by laser pointer); U.S. Patent No. 6,368,227, at [57] (filed Nov. 17, 2000) ("A method of swing[ing] on a swing is disclosed, in which a user positioned on a standard swing suspended by two chains from a substantially horizontal tree branch induces side to side motion by pulling alternately on one chain and then the other.").

^{26.} See Robin M. Davis, Failed Attempts to Dwarf the Patent Trolls: Permanent Injunctions in Patent Infringement Cases Under the Proposed Patent Reform Act of 2005 and Ebay v. MercExchange, 17 CORNELL J.L. & PUB. POL'Y 431, 433–34 (2008) (discussing various reforms aimed at eliminating patent trolling).

^{27.} See, e.g., Jay P. Kesan & Andres A. Gallo, Why "Bad" Patents Survive in the Market and How Should We Change?—The Private and Social Costs of Patents, 55 EMORY L.J. 61, 70–71 (2006) (supporting use of patent oppositions to streamline functioning of Patent Office); Mark A. Lemley & Kimberly A. Moore, Ending Abuse of Patent Continuations, 84 B.U. L. REV. 63, 106–18 (2004) (setting forth five ways to restrict abuse of patent continuations); Kristen Osenga, Entrance Ramps, Tolls, and Express Lanes—Proposals for Decreasing Traffic Congestion in the Patent Office, 33 FLA. ST. U. L. REV. 119, 141–51 (2005) (proposing multitiered patent system to accelerate patent process); Michael Risch, The Failure of Public Notice in Patent Prosecution, 21 HARV. J.L. & TECH. 179, 204 (2007) (arguing that PTO should cease using "broadest reasonable construction rule" in prosecuting and

patentability would reduce the load on the patent office, allowing examiners to do a better job on patent examination. Moreover, although commentators have argued that patent quality will improve in areas of newly patentable subject matter as the PTO builds up its library of prior art and trains examiners in the new fields,²⁸ such improvement seems to be a long time coming, judging by the continuing high volume of bad patents in areas that were formerly unpatentable, like software and business methods.²⁹

Part IV analyzes the specific example of business methods and concludes that business methods are one area of innovation that does not need the incentive of patentability. Rather, Part IV shows that, in fact, patents on business methods preclude competition and harm consumers.

Part V discusses solutions to the problem. First, the Supreme Court and the Federal Circuit could resume their roles as serious gatekeepers of subject matter

29. Robert P. Merges, As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform, 14 BERKELEY TECH. LJ. 577, 589 (1999) ("There are persistent reports that patents in the software area, and perhaps especially, patents for 'business methods' implemented in software, are of extremely poor quality. People familiar with the technology involved and the history of various developments in it report that patents in this area are routinely issued which overlook clearly anticipating prior art."); see also NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., A PATENT SYSTEM FOR THE 21st CENTURY 41-49 (Stephen A. Merill et al. eds., 2004) (noting that patents in fast-changing technological fields are increasingly issued without reference to traditional standards); Michael J. Meurer, Business Method Patents and Patent Floods, 8 WASH. U. J.L. & POL'Y 309, 323-24 (2002) ("Time pressure, lack of expertise, and lack of prior art yield low patent quality during floods.... And the technical breakthrough precipitating a flood might take a while to enter the prior art."); Susan Walmsley Graf, Comment, Improving Patent Quality Through Identification of Relevant Prior Art: Approaches to Increase Information Flow to the Patent Office, 11 LEWIS & CLARK L. REV. 495, 504 (2007) ("[I]t is widely perceived that in the software and business method areas, where there is a short history of patenting and there is not a strong tradition of nonpatent literature publishing, much that is known will not be found in prior art searches.").

reviewing patent grants); Matthew Sag & Kurt Rohde, *Patent Reform and Differential Impact*, 8 MINN. J. L. SCI. & TECH. 1, 6 (2007) (suggesting differential impact approach to patent reform).

^{28.} E.g., Jeffrey R. Kuester & Lawrence E. Thompson, *Risks Associated with Restricting Business Method and E-Commerce Patents*, 17 GA. ST. U. L. REV. 657, 681 (2001). Kuester and Thompson argue that the PTO will improve the patent process for new technologies:

Every new technology presents the PTO with the challenges of creating a sufficient prior art database and channeling the expertise necessary to evaluate the prior art. Internet business method patents are similar, in this respect, to biotechnology and software. The PTO is designed to promote and incorporate new technologies; this, however, takes time. The PTO is taking steps to improve the prior art database and the expertise of the examining core. It is the authors' belief that the PTO will be able to improve the prior art database over time; thus, the costs associated with the challenges of business method patents will eventually be reduced.

Id.; see also Kevin M. Baird, Business Method Patents: Chaos at the USPTO or Business as Usual, 2001 U. ILL. J.L. TECH. & POL'Y 347, 364 ("The lack of prior art references and examiner training has led to the issuance of many invalid business method patents resulting in more patent litigation and greater uncertainty in the patent system."); Jeffrey A. Berkowitz, Business Method Patents: Everybody Wants to Be a Millionaire, 609 PRAC. L. INST. 7, 9 (2000) (explaining that prior art database will improve as result of influx of patent applications); Greg S. Fine, Note, To Issue or Not to Issue: Analysis of the Business Method Patent Controversy on the Internet, 42 B.C. L. REV. 1195, 1210 (2001) (noting that as quantity of prior art increases, bases for bad patents decrease).

patentability. Recent cases suggest that both courts are considering doing just that.³⁰ Second, if courts are unwilling to resume their historic role as subject matter gatekeepers given current broad construction of section 101 of the Patent Act, then Congress could pass legislation explicitly setting forth a utilitarian calculus that courts and the PTO should use in determining whether particular types of innovation should qualify as patentable subject matter. A third, and perhaps better, solution may be for Congress to delegate the determination of categories of patentable subject matter to an administrative agency, perhaps in the form of creating a commission within the PTO to hold hearings, take evidence, and decide what subject matter is patentable.

II. THE EFFICIENT FUNCTIONING OF THE PATENT SYSTEM

A. The Patent System Exists to Promote Public Goods

The Patent Act was enacted pursuant to Article I, Section 8 of the Constitution, which grants Congress the power to provide patent and copyright protection. The patent laws are codified in title 35 of the United States Code. Section 101 states: "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."³¹ Section 101 does two things. First, it sets forth the subject matter that may be patented—any "process, machine, manufacture, or composition of matter."³² Second, it requires that a thing be "useful" before patent protection is granted.³³

^{30.} See Lab. Corp. of Am. Holdings v. Metabolite Labs, Inc., 548 U.S. 124, 125 (2006) (Breyer, J., dissenting) (arguing that, in order to resolve subject matter patentability issue, writ of certiorari should not be dismissed); *In re* Bilski, 545 F.3d 943, 956 (Fed. Cir. 2008) (holding that, to qualify as patentable subject matter, process claim must be connected to machine or cause physical transformation), *cert. granted sub nom.* Bilski v. Doll, 129 S. Ct. 2735 (2009).

^{31. 35} U.S.C. § 101 (2006). The term "process" is defined by 35 U.S.C. § 100(b): "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material."

^{32.} Id. § 101.

^{33.} The bar for usefulness is set quite low, however. An applicant need merely show operational, beneficial, and specific utility. This means that an applicant's invention must work as intended (this is presumed), that it must be capable of some beneficial use (to be judged by the market), and that the inventor must know for what, specifically, the invention is useful. *See In re* Fisher 421 F.3d 1365, 1371 (Fed. Cir. 2005) (requiring specific and substantial utility); Juicy Whip, Inc. v. Orange Bang, Inc., 185 F.3d 1364, 1366 (Fed. Cir. 1999) (noting that useful inventions provide identifiable benefit); United States Patent and Trademark Office Utility Examination Guidelines, 66 Fed. Reg. 1092, 1097–99 (Jan. 5, 2001) (describing specific and substantial utility requirements for patentability). If an application clears these low utility hurdles, it will be granted a patent. The extent of its usefulness is left to be decided by the market, as Judge Story explained: "[I]f the invention steers wide of these objections, whether it be more or less useful is a circumstance very material to the interests of the patentee, but of no importance to the public. If it be not extensively useful, it will silently sink into contempt and disregard." Lowell v. Lewis, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8,568), *abrogation recognized by In re* Fisher, 421 F.3d 1365 (Fed. Cir. 2005).

The other primary sections of the Patent Act that determine whether a patent is granted are sections 102, 103, and 112. Section 102 specifies the requirements an invention or discovery must meet to be determined novel.³⁴ Section 103 requires that an invention be nonobvious.³⁵ Finally, Section 112 requires that a patent enable a person having ordinary skill in the art to practice the invention without undue experimentation, that the patent contain adequate written description to delimit the patent grant, and that the applicant disclose her best mode of practicing the invention.³⁶

I take as a well-accepted starting point that the purpose of a patent is to encourage inventors to produce socially valuable goods that would not otherwise be produced.³⁷ So long as the cost of copying someone else's invention is less than the cost of inventing, inventors are not incentivized to invent, because they are unable to recover the costs of inventing.³⁸ This is known as a public goods problem. The patent system solves the public goods problem of invention by granting inventors monopoly rights³⁹ over the production and sale of their

^{34. 35} U.S.C. § 102.

^{35.} Id. § 103(a) ("A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.").

^{36.} Id. § 112 ("The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.").

^{37.} Note that while there is wide agreement that the purpose of the patent laws is to encourage invention, *e.g.*, Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1031 (2005), this position is not without critics. For example, F. Scott Kieff disagrees that the purpose of this section of the Constitution, or at least of the patent laws as enacted, is to encourage invention and disclosure. Kieff argues that patents are not necessarily efficacious in encouraging invention and that the current patent laws were rather written "to facilitate commercialization of new goods and services." F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 753 (2001). Kieff contends that "treatment of patents as property rights provides incentives for the investment and ordering of private activities necessary for such a complex commercialization process while at the same time providing a workable framework for deciding which inventive activities merit government intervention in the first instance." *Id.* This debate is beyond the scope of this Article. Instead, in this Article I adopt the generally accepted view that the purpose of the Progress Clause of the Constitution, U.S. CONST. art. I, § 8, cl. 8, is to encourage invention.

^{38.} *See* MERGES & DUFFY, supra note 1, at 178 (noting that increasing costs of creating financial services might require patentability to provide incentives to innovate).

^{39.} Note that my use of the term "patent monopoly" or "monopoly rights" in this context is not meant to refer to a producer who has monopoly power in a certain market. Rather, I use the term in this section to signify that the patent right gives the holder exclusive control over the use of the patented technology to make products or practice methods covered by the patent.

The Supreme Court has repeatedly referred to patents as "monopolies." *E.g.*, Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found., 402 U.S. 313, 343 (1971) ("Although recognizing the patent system's desirable stimulus to invention, we have also viewed the patent as a monopoly which, although

inventions for a limited period of time—currently twenty years from the filing of a patent.⁴⁰ The ensuing monopoly rents act as incentives to invent. But monopoly rights also entail obvious costs to society—the so-called deadweight loss of monopoly.⁴¹ Society's goal should be to provide the efficient quantity of patent protection—that quantity of protection that maximizes the difference between these benefits and costs.

The patent monopoly granted to inventors is hefty: inventors have the sole right to make, sell, use, or license their inventions. Anyone else who makes, sells, uses, or licenses the invention or an equivalent thereof—even if that person invented it independently—infringes the patent and can be enjoined from practicing the patent and made to pay damages.⁴²

This hefty monopoly power is only granted in exchange for new, useful, and nonobvious inventions, and it is only granted in exchange for a disclosure of the invention that is sufficient to enable a person having ordinary skill in the art to make the invention.⁴³ The system also is designed to keep the price paid by society in the form of the patent monopoly, with its resultant decreased competition and increased costs, less than the benefit that society gains from the increased invention of new, useful, nonobvious things.⁴⁴ Thus it is vitally

The Federal Circuit, on the other hand, has often derided the use of the term "patent monopoly." *E.g., In re* Kaplan, 789 F.2d 1574, 1578 (Fed. Cir. 1986); Jamesbury Corp. v. Litton Indus. Prods., Inc., 756 F.2d 1556, 1559 (Fed. Cir. 1985) ("Further, this court has disapproved of a challenger's characterization of a patentee by the term 'monopolist,' which is commonly regarded as pejorative."); Schenck v. Nortron Corp., 713 F.2d 782, 786 n.3 (Fed. Cir. 1983) ("It is but an obfuscation to refer to a patent as 'the patent monopoly' or to describe a patent as an 'exception to the general rule against monopolies.").

40. 35 U.S.C. § 154(a)(2).

41. Cohen & Lemley, *supra* note 2, at 50; *see also* Peter Eckersley, *Virtual Markets for Virtual Goods: The Mirror Image of Digital Copyright*, 18 HARV. J.L. & TECH. 85, 118 n.111 (2004) (defining deadweight loss as "any cost to society which could be relieved without harming anyone").

43. Id. §§ 101–103, 112.

44. Robert Nozick argues that the patent monopoly should exist only for the period of time when no one else would have thought of the invention. ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA, 178–82 (1974). Actually, the benefit may still exceed the cost of the patent even if someone else would have invented the same thing late in the patent's coverage. A cost-benefit analysis must be done weighing the incentive needed by the inventor against the benefit to the public of having the invention earlier than someone else would have invented it. But in any case, patent protection should not extend beyond the point at which the cost of protection equals the public benefit from the early invention. And in fact, the policy should be to try to give the minimum amount of protection needed to incentivize adequate levels of invention.

Nozick also argues that, conceptually, patent protection should not apply to cases of independent

sanctioned by law, has the economic consequences attending other monopolies."); United States v. Line Material Co., 333 U.S. 287, 305 (1948); Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co., 324 U.S. 806, 816 (1945) ("[A] patent is an exception to the general rule against monopolies and to the right to access to a free and open market. The far-reaching social and economic consequences of a patent, therefore, give the public a paramount interest in seeing that patent monopolies spring from backgrounds free from fraud or other inequitable conduct and that such monopolies are kept within their legitimate scope."); United States v. Masonite Corp., 316 U.S. 265, 277 (1942); United States v. Univis Lens Co., 316 U.S. 241, 250 (1942).

^{42. 35} U.S.C. § 271.

important that the patent laws be properly balanced. If the patent laws extend too far, they decrease social utility by allowing more harm to society from patent monopoly than is gained by promoting new inventions. If the patent laws provide too little protection for inventions, then social utility is decreased because inventors do not have adequate incentive to invent.⁴⁵

B. The Efficiency of Patentability Determinations at the Level of Subject Matter Classes: (Re)Applying Economic Analysis

Although the Patent Act attempts to guard against patent monopolies being granted for old or obvious inventions or for inventions that have not been adequately disclosed to the public, the Act leaves open two areas of inefficiency. First, the current patent application examination regime overwhelms patent examiners with the sheer number of patents that must be examined.⁴⁶ Second, examining a patent application for novelty, nonobviousness, and disclosure/enablement does not alone assure that patents are granted only on inventions for which society realizes gains greater than the costs of the monopoly

While it may be that, historically, independent invention was rare once a patent had issued, if this was once so, it is no longer. In recent years numerous patents have been asserted against firms that began their allegedly infringing activity without any knowledge of the patent. *E.g.*, IPXL Holdings, LLC v. Amazon.com, Inc., 430 F.3d 1377, 1381 (Fed. Cir. 2005). In fact, many firms discourage their engineers and researchers from reading patents so that they can avoid liability for willful infringement. Lemley & Tangri, *supra* note 22, at 1085. Multiple instances of independent invention are thus common in some fields.

46. The current patent regime requires that patent examiners thoroughly examine a patent and list all bases for rejection, rather than working in a piecemeal fashion as bases for rejection are discovered and overcome. This requirement obviously increases the amount of time that must be spent on even facially invalid patents, and consequently leads to less time overall for examining any patent. *See* FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, EXECUTIVE SUMMARY 10 (2003), *available at* http://www.ftc.gov/os/2003/10/innovationrptsummary.pdf ("Hearings participants estimated that patent examiners have from 8 to 25 hours to read and understand each application, search for prior art, evaluate patentability, communicate with the applicant, work out necessary revisions, and reach and write up conclusions. Many found these time constraints troubling."); Bronwyn H. Hall & Dietmar Harhoff, *Post-Grant Reviews in the U.S. Patent System – Design Choices and Expected Impact*, 19 BERKELEY TECH. LJ. 989, 995–96 (2004) (noting that "patent grant rates have also risen, suggesting that time pressures have led to less scrutiny of each individual application"); Walmsley Graf, *supra* note 29, at 502 ("This more than tripling in the rate of utility application filings has resulted in overburdened examiners who have little time to devote to each patent application.").

invention, but that difficulties of proving this, combined with the fact that few will try to invent something from scratch once it has been invented and made public, may make it reasonable to exclude all others after an invention is patented. *Id.* at 182.

^{45.} Judge Posner explained the economics behind patent law in *Roberts v. Sears, Roebuck & Co.*, 723 F.2d 1324, 1345 (7th Cir. 1983) (Posner, J., concurring and dissenting). Judge Posner asserted that patent protection should be granted only for inventions that would not otherwise be developed. *Id.* at 1345–46. Posner's view is that the nonobvious standard should serve the strictly economic purpose of awarding patent protection only when such protection is a necessary incentive to spur invention. *Id.* at 1346. Thus, for Posner, patent grants for inventions developed in a flash of inspiration are troubling, since the inventive process required no incentive to occur. *Id.* Posner rationalizes the fact that patent law grants protection in these cases by claiming that such protection encourages potential inventors to seek the training necessary for experiencing such flashes of creative brilliance. *Id.*

rights under consideration. Commentators who argue that the work of section 101 can be done under the other sections of the Patent Act ignore the benefit of using section 101 to screen out patents on innovation that would happen at sufficient levels even in the absence of patentability.⁴⁷

It is true that the Patent Act does not explicitly state that patent examiners should reject a patent if it is not needed to incentivize the particular type of invention. Instead, courts and the PTO traditionally have interpreted section 101 of the Patent Act as a basis for rejecting types of inventions for which it is not efficient to provide patents.⁴⁸ Specifically, courts and the PTO have traditionally ruled that particular classes of subject matter are outside the realm of patentability.

This subject matter discrimination was efficient for two reasons. First, it allowed courts to exclude classes of matter for which the patent grant was not needed to incentivize invention, or for which the deadweight loss of the patent monopoly obviously outweighed any increased incentive.⁴⁹ Second, by excluding certain classes of subject matter, the courts increased the efficiency of the PTO by eliminating whole classes of inventions from examination.⁵⁰

1. Basic Economics of Patent Monopolies⁵¹

Before introducing the subject matter patentability model in the next subsection, this subsection first gives a synopsis of the economic explanation for the general need for patents to incentivize invention, as well as the costs to society that come from patent monopolies.

Potential inventors must decide what quantity of time and resources to invest in inventing. The returns from inventing are the revenues an inventor can gain from selling, licensing, or using her invention. An inventor will choose to invent to the extent that she can get greater returns from her next invention than

^{47.} See, e.g., MERGES & DUFFY, supra note 1, at 67 (arguing that patent eligibility, though distinct, is not entirely separate from requirements of novelty, utility, nonobviousness, and disclosure that patent must meet); Risch, supra note 4, at 591 (arguing that policy concerns underlying patentable subject matter are addressed by other sections of Patent Act).

^{48.} Courts and the PTO have not done an explicit efficiency analysis when determining unpatentable subject matter. For an argument that such analysis underlies their subject matter patentability determinations, see *infra* Part III.

^{49.} See *infra* Part III.B for a discussion of tests that the Supreme Court has established and rejected in an attempt to strike a balance between incentivizing invention while avoiding societal deadweight loss.

^{50.} See *infra* Part II.B.2 for an argument in favor of using subject matter patentability screenings to determine entire classes of unpatentable inventions.

^{51.} Because the cost to society due to patent monopolies is a crucial component of this Article, I set out in this section a brief explanation of the economics of competitive and monopoly markets. It is well known that monopolies are costly to society. Economists call the loss to society caused by monopolies "deadweight loss." Cohen & Lemley, *supra* note 2, at 50. This subsection sets out the basic economic explanation for why monopolies cause deadweight loss. Readers familiar with basic economics, as well as those who accept that monopolies cause loss to society but who are not interested in walking through the economics of patent monopolies, may want to skip this subsection and proceed directly to the model set out in the next subsection.

from other investments of her time and talent. Once she has an invention, she will seek to make money from it.

If she cannot exclude rivals from entering the market for her invention, she will often not be able to recoup her costs of invention because competitors will be able to copy her invention and undersell her because they have no costs of invention to recoup. In many cases, once the product goes on sale it takes little time and expense for competitors to gain the knowledge and ability to make the invented product. Economists call this free dissemination of the knowledge needed to make the invention a "public good."⁵² Such knowledge is nonexcludable, and one person's use of the knowledge does not prevent another from using it.⁵³ Accordingly, the rational producer will not expend resources to invent in a competitive market when she cannot make back the cost of her investment in inventing.

This is a classic example of what economists call a "public goods problem," and illustrates why public goods such as inventions may be underproduced in a

Id. (internal citations omitted).

^{52.} E.g., David W. Barnes, *Trademark Externalities*, 10 YALE J. L. & TECH. 1, 4 (2007). Barnes explains the relationship between public goods and patent protection:

Public goods are characterized by non-rivalry in consumption and non-excludability. Consumption of information is non-rivalrous because one person's use does not diminish the ability of another to benefit from the information. Information is non-excludable because, once the information has been disclosed, it is difficult to prevent people who have not paid for the information from exploiting it. The policy implication of characterizing a good as a public good is that private markets may not efficiently allocate and encourage the production of public goods. Copyright and patent laws are ways of addressing these market failures.

^{53.} Inventors often develop means to overcome the nonexcludable nature of their invention, such as requiring employees to contract not to reveal company trade secrets. See Gideon Parchomovsky & Peter Siegelman, Towards an Integrated Theory of Intellectual Property, 88 VA. L. REV. 1455, 1494 (2002) (noting that businesses can choose either patent or trade secret protection, but not both). This may provide effective protection from competition and thus delay the emergence of a competitive market. When trade secret protection is available to inventors, no patent is needed. In other cases, however, such as when the invention is sold publicly, keeping the invention a trade secret is not an option. In cases where both patent protection and trade secret protection is available, a rational inventor will elect whichever regime gives greater protection. See Dan L. Burk, Legal Constraint of Genetic Use Restriction Technologies, 6 MINN. J. L. SCI. & TECH. 335, 348 (2004) ("[T]he inventor's choice is an election between twenty years of certain patent protection or perpetual, but less certain, trade secret protection"). Thus, if an inventor feels confident that she can keep her invention secret for more than twenty years, she will elect trade secrecy over patenting. Note, Patent Preemption of Trade Secret Protection of Inventions Meeting Judicial Standards of Patentability, 87 HARV. L. REV. 807, 821-22 (1974) ("Although there are thus several factors which indicate that patentable inventions will ordinarily be patented, there are situations in which an inventor with a clearly patentable innovation may prefer to rely on trade secret protection rather than to apply for a patent."). Note that an inventor is not allowed to elect trade secrecy and then patentability serially. See Ellen Lauver Weber, Note, Patenting Inventions That Embody Computer Programs Held as Trade Secrets-White Consolidated Industries v. Vega Servo-Control, 713 F.2d 788 (Fed. Cir. 1983), 59 WASH. L. REV. 601, 604-05 (1984) ("Thus, the secrecy essential to trade secret protection is incompatible with patent protection. This policy conflict requires an inventor to choose between trade secret protection and patent protection.").

competitive market.⁵⁴ The classic solution to a public goods problem is to subsidize production of the public good. The patent system does this by granting inventors patents that give them the exclusive right to control their invention for twenty years. Once an inventor has a patent, she has monopoly power, at least with regard to her invention.⁵⁵

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Once a patentee has market power as to her invention, she will charge a price above the competitive level. This has two consequences: First, some money that would have stayed in consumers' pockets (consumer surplus) in a competitive market now goes to the monopolist. This is a redistribution of surplus between consumers and the producer (rents), and is not in itself a source of inefficiency.⁵⁶ But the second consequence of supra-competitive pricing is that consumers who value the good above its competitive price but below the price charged by the patentee will no longer buy the good. Thus, some of the surplus that would exist in a competitive market is lost. This lost surplus, the "deadweight loss" (L) from monopoly, *is* a source of inefficiency. In addition, allocation inefficiency is created because resources that would have gone to making additional units of the invention now go to a lower-valued use. Thus, society's total utility is less than in a competitive market. This deadweight loss from monopoly provides the efficiency-based rationale for antitrust law.⁵⁷

2. Economic Model Showing the Need for Subject Matter Discrimination

Society must strike a balance between a system with no patent protection and fewer inventions than socially optimal, and a system of overly broad patent protection and a large cost to society from the deadweight loss of patent monopolies.⁵⁸

One can graphically represent three different possible relationships between amount of increased invention (I) and monopoly deadweight loss (L) that result from patent protection. In Figures 1.a, 2.a, and 3.a, amount of patent

56. But note that the shift in money from consumer to producer may raise fairness, equality, or distributional concerns.

^{54.} See Barnes, supra note 52, at 4 (explaining interplay between public goods and free-riders).

^{55.} The primary characteristics of a monopoly are (1) a single seller who is (2) a price maker in (3) a market with blocked entry, and (4) who sells a good with no close substitutes. HAL R. VARIAN, INTERMEDIATE MICROECONOMICS (5th ed. 1999). Patent holders are single sellers, at least if they choose not to license others. They sell in a market with blocked entry because the patent allows them to legally block others from making, using, or selling their invention. Whether the patented invention has close substitutes such that the patent holder can be a true price maker is another question. In reality, many patented goods may have close substitutes in the market. In such situations the inventor's ability to extract monopoly rents is diminished accordingly. If patents are effective, however, they must either confer some pricing power, or at least lead inventors to believe that they will confer pricing power sufficient to compensate the inventor for investing the cost of invention, or the inventor would not be incentivized to produce the invention in the first place.

^{57.} HERBERT HOVENKAMP, THE ANTITRUST ENTERPRISE: PRINCIPLE AND EXECUTION 15–20 (2005).

^{58.} In this analysis I make the reasonable assumption that amount of innovation (I) increases as patent protection increases but that the increase is at a decreasing rate. I assume that the deadweight loss from patent protection increases at a constant rate.

protection (p) is graphed on the horizontal axis. For the sake of simplicity, the amount of patent protection is considered as one continuous variable. Thus, longer patent durations and increased areas of patent coverage—such as a broader interpretation of the breadth of patent coverage—are both represented as simply increasing patent protection (p).⁵⁹ The vertical axis measures dollar value. These figures assume that for increased invention (I) there are diminishing marginal returns to increased patent protection to a grant of a three-year patent is likely to lead to a larger increase in invention (I) than a switch from a twelve-year to fifteen-year monopoly.⁶¹ Except in Figure 1, deadweight loss (L) is modeled as a straight line. This means that deadweight loss (L) is a constantly increasing function of patent protection (p).⁶² This reflects the assumption that deadweight loss (L) from patent protection is as high in one year as it was the year before.⁶³

60. In other words, dI/dp is a decreasing function of p.

61. Of course, there may be individual cases in which this assumption does not hold. For instance, if a patentee thinks that his patented invention will only develop a significant market after several years of marketing, in such a case the marginal value of an additional three years of patent protection will be greater at the end of the patent term than at the beginning. Likewise, a small increase in the subject matter covered by the law of equivalents may induce relatively little additional invention, but once the equivalents coverage increases to a certain level a large jump in invention may occur as inventors imagine being able to apply their patents to vastly wider areas. In such a case the amount of invention, I, would not be a smoothly increasing function of p (amount of patent protection), but would instead discontinuously jump upwards at the point that inventors saw great potential for additional coverage and profits. Notwithstanding that there are likely numerous examples in which amount of invention, I, is not a continuously increasing variable of p, it seems reasonable to assume for the sake of this model that in the aggregate such factors will balance out such that I can be modeled as a continuously increasing function of p. For instance, for each patent that takes a few years to establish a market, there may be other patents in fields where the technology has changed to such an extent after three years that the patent is virtually worthless.

62. In other words, dL/dp = k.

63. Because the deadweight loss from monopoly is assumed to be the same each year the patent is in effect, the total deadweight loss from a patent will increase at a constant rate. If a one-year monopoly yields total deadweight loss = L, a two-year monopoly will yield twice that amount of deadweight loss (2 * L), a three-year monopoly will yield thrice the deadweight loss (3 * L), etc. Of course, for the same reasons discussed in modeling the variable for amount of increased invention (I), for individual patents the deadweight loss may not be a smoothly increasing function of patent protection (p). For instance, in fields where technology is rapidly changing, a patent may become obsolete after ten years such that the deadweight loss is zero after that point. In other cases, in which it takes some time to establish a market, the deadweight loss may not be significant until after a few years. As with modeling amount of increased invention (I), however, it seems likely that in the aggregate these individual differences should even out such that it is reasonable to model deadweight loss (L) as a smoothly increasing function of patent protection. In the aggregate, it is indeed unlikely that deadweight loss (L) is a concave curve (i.e., that dL/dp is a decreasing function of p). This is because it is unlikely that on aggregate the fifth year of a monopoly should yield a smaller amount of deadweight loss than the fourth year.

^{59.} In reality, the term of a patent, the breadth of claims, the strength of equivalents protection, etc., may be functions of patent protection that are somewhat discontinuous. For the sake of simplicity, however, and because an aggregation effect is likely to smooth out the discontinuity somewhat, for purposes of this model everything that may increase a patent's strength is modeled simply as amount of patent protection (p).











Figures 1.b, 2.b, and 3.b correspond to Figures 1.a, 2.a, and 3.a, respectively. Here the horizontal axes again express amount of patent protection (p). The vertical axis measures utility in dollar value. For each of these Figures the curve represents the gain to overall utility from increased invention (I) minus the deadweight loss from the patent monopoly (L).

For the class of inventions in Figure 1.a, deadweight loss (L) is not a straight line. Instead it decreases as patent protection increases, such that deadweight loss (L) is always less than increased invention (I). Figure 1.b shows that utility continuously increases as patent protection is increased. Accordingly, for

situations that correspond to Figure 1.a, patent protection should always be granted. No amount of patent protection is too much; greater patent protection (p) always yields increased values of utility (U). The relationship depicted in Figure 1.a likely only exists theoretically. It is hard to imagine a class of subject matter or even a single item for which no amount of patent protection is too high.⁶⁴

The second possibility, as illustrated in Figure 2.a, is that deadweight loss (L) is always greater than increased invention (I). Figure 2.b illustrates that patent protection should never be granted to such subject matter because utility constantly decreases as patent protection increases. Abstract ideas and laws of nature most likely correspond to Figure 2.a, because a patent on an unapplied abstract idea would confer monopoly power over all products and processes relying on the idea, resulting in enormous deadweight loss.⁶⁵

Discovery of natural phenomena also historically has been classified as unpatentable subject matter. This rule may derive more from a policy value of common ownership of the fruits of nature than from any economic rationale. Or perhaps this rule originated at a time when most natural phenomena were discovered by accident, or would have been discovered soon by another. For the scientist who spends years gathering plants in the rainforest and testing them to see if they have any positive medicinal value, however, the increase in invention or discovery provided by patent protection is likely to be greater than the deadweight loss of the patent monopoly, and thus the relationship in Figure 2 should not apply.⁶⁶

A third possibility is represented in Figure 3.a. Here deadweight loss (L) is initially less than increased invention (I), but at some point deadweight loss (L) becomes greater than the additional amount of invention (I). Figure 3.b shows that patent protection provides positive social utility up to the point where L = I. Past this point, patent protection decreases social utility. One can imagine that most currently patentable subject matter correspond to the curves in Figure 3. Mechanical devices are classic examples of Figure 3.a inventions. A limited time patent on a better mousetrap increases social utility by increasing invention, but

^{64.} Even in the case of a natural monopoly patent protection would not produce constantly greater invention (I). The additional patent protection would produce no difference in market structure, but instead would simply substitute the inventor for an alternate natural monopolist.

^{65.} A lack of patent protection for abstract ideas may yield a less than optimal production of such ideas. *Cf.* 3 STEPHEN P. LADAS, PATENTS, TRADEMARKS, AND RELATED RIGHTS: NATIONAL AND INTERNATIONAL PROTECTION 1850–75 (1975) (detailing proposals to award patent-like rights to researchers who discover basic scientific principles in order to incentivize adequate level of investigation and discovery); Robert P. Merges, *Property Rights Theory and the Commons: The Case of Scientific Research*, 13 SOC. PHIL. & POL'Y 145, 152–55 (describing proposals to grant property rights for findings of basic scientific researchers). However, allowing patents on such ideas would produce problems of defining the breadth of an idea and determining what constitutes "use" of the idea. See *infra* Part III for a discussion of this difficulty.

^{66.} Recognition of this seems to have occurred. *See* Diamond v. Chakrabarty, 447 U.S. 303, 310 (1980) (granting patent on man-made bacterium); Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354, 1358–59, 1366–68 (Fed. Cir. 2004) (allowing patent claim on process that used amino acid levels to test for vitamin deficiency).

an unlimited patent right on the mousetrap likely results in excessive deadweight loss. The Patent Act's grant of strong patent protection for a limited time implicitly assumes that conditions conform to Figure 3.a.

In a world without information and transaction costs and with unlimited time, each patent application would be evaluated to determine to which Figure it best corresponds. In the real world, however, these costs preclude matching each individual patent claim to its corresponding Figure. In other words, ideally the Patent Office would determine for each patent application whether the invention costs are large enough to need patent protection to be recouped, and if so, whether the benefit of the invention is greater than the deadweight loss from granting the patent. But in reality, undertaking this analysis on a patent-by-patent basis would be impossibly time and resource intensive.⁶⁷ Moreover, even if there were sufficient time and resources, information asymmetries inherent in the process could make it impossible for the Patent Office to gather all of the relevant information that the applicant possesses in order to correctly determine whether a particular application should be granted.

While some commentators argue that we would be better off abandoning the patentable subject matter inquiry and screening for patentability using the requirements contained in sections 102, 103, and 112 of the Patent Act, the above analysis shows that the most efficient patent regime is one that starts by determining initially, on a category-by-category basis, whether classes of inventions should be patentable. If it is determined that a class of inventions needs the incentive of the patent grant, then the other tests for patentability such as novelty, nonobviousness, and enablement/written description, that are set out in sections 102, 103, and 112 of the Patent Act should be applied.⁶⁸ If it is determined that the incentive of patents is not needed for a class of inventions, then it is a waste of time and resources to engage in any of the tests set out in sections 102, 103, and 112 of the Patent Act. And indeed, the Patent Act sets out the determination of subject matter patentability in section 101 of the Act as the very first step in determining the patentability of an invention or discovery.⁶⁹ The following flowchart illustrates why these other tests for patentability cannot take the place of the subject matter patentability screen, and why it would be inefficient not to apply the subject matter patentability screen first.

^{67.} Indeed, determining whether a proposed invention is novel is alone often too time-intensive a task for the PTO to complete accurately. *See* Mandy Barbara Seuffert, Comment, *Soft-Science Examiners at the USPTO: A Non-Obvious Solution to Reduce Erroneous Patent Grants*, 10 MARO. INTELL. PROP. L. REV. 111, 111–12 (2006) (suggesting that time and resource constraints imposed on patent examiners lead to issuance of invalid patents).

^{68. 35} U.S.C. §§ 102–103, 112 (2006).

^{69.} Id. § 101.

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This flowchart illustrates that if only the screens for patentability contained in sections 102, 103, and 112 of the Patent Act are used to determine patentability, inventions that need no incentivization—that do not suffer from the public goods problem—will inefficiently be granted patents. In other words, once we get to section 102 of the Patent Act, we have already assumed that a public goods problem exists such that patents are needed to incentivize meritorious inventions within a field. But if no public goods problem exists, as is the case for, say, movie scripts, which are already incentivized by the existence of copyright, then no amount of screening for novelty, nonobviousness, and enablement can make the granting of a patent efficient or necessary.⁷⁰

Thus, the critical first inquiry for the patentability of an invention should be whether the invention is within a subject matter area that is subject to a public goods problem such that absent patent protection an underproduction of inventions in that subject matter will result. If a public goods problem exists, then the subject matter should be patentable and the other tests for patentability should be applied. If no public goods problem exists, either because of the nature of the subject matter, or because other factors exist that adequately incentivize production of the public good, then subject matter patentability should be denied and the patentability inquiry should end.

As will be described more fully in the next section, the traditional patent law regime implicitly recognized the efficiency of making categorical determinations about patentable subject matter first before continuing to the other screens for patentability. The traditional regime addressed this need through a systematic classification of inventions by subject matter. These classifications allowed patentability first to be decided on a class-by-class basis, rather than on an invention-by-invention basis. The traditional patent law regime implicitly matched each proposed subject matter class to its corresponding Figure. If a class corresponded to Figure 2, where deadweight loss (L) is always greater than additional invention (I), then all the inventions within that class received no patent protection.⁷¹ Of course, an individual invention within an unpatentable class may have been an exception and actually merited some patent protection. But if the information costs of correctly categorizing this invention outweigh the utility gained from patenting it, society is better off simply determining subject matter patentability on a broad class-by-class basis and leaving unpatentable those individual inventions that do not correspond to

^{70.} Not that this stops some from enthusiastically endorsing patents on such things as storylines. *E.g.*, Knight and Associates – Storyline Patents & Plot Patents, http://www.plotpatents.com/ (last visited Sept. 12, 2009). *But see* Note, *Pure Fiction: The Attempt to Patent Plot*, 19 HARV. J.L. & TECH. 231, 234–42 (2005) (arguing that fictional plots should not qualify as patentable subject matter).

^{71.} I am not suggesting that historically Congress and the courts went through this formal modeling when determining the patentability of various types of inventions. But as explained *infra*, such analysis seems to have occurred implicitly. The model set forth in this Article is an attempt to formalize the analysis of what should and should not be patentable subject matter.

the rest of the class.⁷² When a class of inventions historically has been deemed to merit some patent protection (i.e., when the class is deemed to correspond to Figure 3), each patent application has received additional attention.⁷³

III. THE ROLE OF COURTS IN EXCLUDING INEFFICIENT SUBJECT MATTER

A. The Courts' Historical Classification of Unpatentable Subject Matter Based on Congress's Delegation

In this part of the Article I attempt to show two things. First, courts historically have served as gatekeepers making rough determinations, albeit in an informal, implicit, or intuitive manner, of whether invention in particular subject matter classes needed incentivization via patent grants. Second, I show the gradual process by which the federal courts abandoned their gatekeeping role.

Historically the federal patent statutes have adopted broad language as to what types of inventions are patentable. In fact, the language of the various patent statutes has been so broad that one might think that virtually anything is patentable, so long as it meets the requirements of novelty, nonobviousness, and enablement/written description. Such a broad reading of the statute would, however, make patentable even those classes of inventions where the deadweight loss of the patent grant exceeds increased invention. Implicitly recognizing this, the Supreme Court and federal courts have traditionally ruled certain classes of subject matter to be outside the patent statutes' broad allowance of patentability. The oldest and most enduring of these exceptions to subject matter patentability are laws of nature, natural phenomena, and abstract ideas.⁷⁴ Moreover, courts historically have focused on a variety of tests for subject matter patentability that, either intentionally or felicitously, managed to

Id. (alteration in original) (quoting Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980)).

Note that wrapped up in the Court's holdings that these areas are not properly subject to patent protection under § 101 may be practical problems regarding deciding the novelty of discoveries in such areas, addressed by § 102, or in describing or enabling discoveries in these areas, addressed by § 112.

^{72.} Cf. Peter S. Menell, A Method for Reforming the Patent System, 13 MICH. TELECOMM. & TECH. L. REV. 487, 501–02 (2007) (advocating comprehensive framework for reformation of patent system based on both categorical and systemic reforms).

^{73.} Note that patent claims are given more or less coverage during the application process when the patentee typically negotiates with the patent examiner on the breadth of the claims that will be allowed and, therefore, implicitly, on the equivalents that will be covered by the patent.

^{74.} See, for example, *Diamond v. Diehr*, 450 U.S. 175 (1981), in which the Court stated that it "has undoubtedly recognized limits to § 101 and every discovery is not embraced within the statutory terms. Excluded from such patent protection are laws of nature, natural phenomena, and abstract ideas." *Id.* at 185 (citations omitted). The Court went on to explain that "[a] principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right." *Id.* (citation omitted). The Court further explained that

a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E = mc^2$; nor could Newton have patented the law of gravity. Such discoveries are "manifestations of . . . nature, free to all men and reserved exclusively to none."

exclude classes of subject matter for which deadweight loss of patentability likely exceeded increased invention.

Congress traditionally has recognized the value of the patent common law created by the federal courts. Accordingly, Congress has worded the patent acts broadly, so as to continue to give discretion to courts in determining subject matter patentability. The current Patent Act, passed in 1952, is no exception. In the 1952 Act, Congress kept the definition of patentable subject matter very general.⁷⁵ Congress did not overturn or narrow any of the judicially created law regarding patentable subject matter. All that Congress did was change the term "art" to "process" and define "process" as either "process or method," which definitions were in keeping with judicial decisions,⁷⁶ as the Supreme Court has recognized.⁷⁷ Nothing in the 1952 Patent Act indicated that Congress intended the courts to change their patent common-law-making roles or stop performing their function as gatekeepers of subject matter patentability.

B. Judicial Tests for Patentable Subject Matter

The difficulty in determining the dividing line between efficiently incentivizing invention and causing excessive deadweight loss from the patent monopoly has caused courts to create and reject a number of different tests. The physical transformation test, the mathematical algorithm exception, the mental steps doctrine, and the business method exception are some of the many tests that courts have created for this purpose. I will review these four tests that help distinguish, albeit not explicitly, efficient from inefficient subject matter for patentability as well as, sometimes, patentable process from abstract idea. A review of the ways the Supreme Court and Federal Circuit have developed and

The definition of "process" has been added in section 100 to make it clear that "process or method" is meant, and also to clarify the present law as to the patentability of certain types of processes or methods as to which some insubstantial doubts have been expressed.

Id. (emphasis added).

^{75.} See 35 U.S.C. § 101 (2006) ("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.").

^{76.} See S. REP. No. 82-1979, at 5 (1952), reprinted in 1952 U.S.C.C.A.N. 2394, 2398–99 (explaining purpose of modifications was to reconcile statute and judicial decisions). The Senate Report explained:

The present law states that any person who has invented or discovered any "new and useful art, machine, manufacture, or composition of matter . . . may obtain a patent." That language has been preserved except that the word "art" . . . has been changed to the word "process." "Art" in this place in the present statute has a different meaning than the words "useful art" in the Constitution, and a different meaning than the use of the word "art" in other places in the statutes, and it is interpreted by the courts to be practically synonymous with process or method. The word "process" has been used to avoid the necessity of explanation that the word "art" as used in this place means "process or method"....

^{77.} See, e.g., Diehr, 450 U.S. at 182–84 (noting that change from 1793 Patent Act's use of term "art" to use of term "process" in 1952 Patent Act did not change scope of subject matter patentability for processes because "[i]n the language of the patent law, [a process] is an art" (quoting Cochrane v. Deener, 94 U.S. 780, 787–88 (1877))).

discarded these tests gives insight into how the courts eventually rejected their roles as determiners of efficient subject matter for patentability and threw open the gates for the patentability of business methods and virtually everything else.

1. The Rise and Fall of the Physical Transformation Test, the Mental Steps Doctrine, and the Mathematical Algorithm Exception

The physical transformation test⁷⁸ served courts well over the years as a test that excluded classes of subject matter for which the deadweight loss of monopoly exceeded increased invention. This test functioned by asking a simple question about processes for which patents were sought: Does the process achieve a physical transformation of something in the material world?⁷⁹ If so, then the invention was the type of subject matter that was patentable, and further inquiry into novelty, nonobviousness, enablement, etc., would proceed. If not, the court held the process to be unpatentable, and the inquiry ended. Conducting this test at the initial subject-matter level served both to prevent the patenting of inventions or discoveries for which deadweight loss was likely to outweigh increased invention, and to determine which inventions were of a sort that was worthy of further examination for patentability. In other words, the initial subject matter patentability test in the form of the physical transformation test served to quickly exclude entire classes of invention and to save the PTO time and resources.⁸⁰

The physical transformation test was particularly effective at separating out inefficient subject matter classes in the pre-information age during which economically valuable inventions mainly concerned mechanical devices and processes rather than, say, software or information.⁸¹ At the time, most economically valuable processes were those that accomplished physical results.⁸² Moreover, the perfection of such mechanical and chemical processes generally

^{78.} The physical transformation test overlaps with and may in many instances be identical to the mental steps doctrine, which traditionally held that processes involving mental steps are not patentable. *See, e.g., In Re* Heritage, 150 F.2d 554, 556–58 (C.C.P.A. 1945) (finding invalid claims drawn to process of testing optimal amount of coating to be applied to porous boards because process is "purely mental").

^{79.} The Supreme Court began to sketch out the physical transformation test in *The Telephone Cases*, 126 U.S. 1 (1888). There the Court was confronted with Alexander Graham Bell's claim for the use of electric current to transmit vocal or other sounds. *Id.* at 531–32. In upholding the patent, the Court stressed that the patent did not cover "the use of electricity distinct from the particular process with which it is connected in his patent." *Id.* at 535. The Court distinguished between the idea of using electricity as a motive power—which idea was not patentable—and claims for particular processes using electricity to accomplish specified physical objectives. *Id.* at 534–35.

^{80.} Robert E. Thomas, *Debugging Software Patents: Increasing Innovation and Reducing Uncertainty in the Judicial Reform of Software Patent Law*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 191, 195 (2008) (noting that "[t]his physical transformation requirement (physical-transformation test) lasted over one hundred years and the Supreme Court has never rejected it" and further noting that "[t]he physical-transformation test provided a clear delineation between patentable and non-patentable subject matter. It provided, perhaps, as objective a test as exists in patent law.").

^{81.} Merges, supra note 29, at 581-82.

^{82.} Kuester & Thompson, supra note 28, at 683; Merges, supra note 29, at 581-82.

required sustained research and investment of time and resources. Accordingly, allowing a patent on processes that affected physical transformation incentivized such invention.⁸³ Drawing the line at physically transformative processes served to cabin the patent within a reasonably narrow zone, so that future invention was not discouraged and the amount of deadweight loss from monopoly was decreased.⁸⁴ In addition, requiring inventors to state their inventions in the form of a patent *for* something narrowed the scope of patent claims by forcing inventors to tie their processes to certain and definite physical activity, thus leaving abstract processes unclaimed and free of patent protection.⁸⁵

The physical transformation test began to erode as the use of computers in business and industry became widespread. As patent claims moved from processes that mixed particular substances together to produce a new tangible product to processes that used programmable computers to monitor timing or temperature in industrial processes, courts were faced with new challenges in determining where the physical transformation line lay, and what exactly should constitute a patentable physical transformation.⁸⁶ As courts continued to wrestle

84. See Gottschalk v. Benson, 409 U.S. 63, 69 (1972). The Benson Court observed that,

In *Corning v. Burden*, [56 U.S.] (15 How.) 252, 267–68 (1853), the Court said, "One may discover a new and useful improvement in the process of tanning, dyeing, etc., irrespective of any particular form of machinery or mechanical device." The examples given were the "arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores." *Id.*, at 267. Those are instances, however, where the use of chemical substances or physical acts, such as temperature control, changes articles or materials. The chemical process or the physical acts which transform the raw material are, however, sufficiently definite to confine the patent monopoly within rather definite bounds.



85. Thus, an inventor who discovered a new method of refining flour was not allowed to patent the use of currents of air to remove impurities, but rather was forced to claim the use of air currents as part of an overall process *for refining flour. Cochrane*, 94 U.S. at 785–86. This left the abstract process open for incorporation and use by others, yet gave enough protection to the inventor to incentivize his invention and disclosure in the form of a patent. The inventor in such a case gained protection from others who might wish to appropriate the process in the iron smelting industry, but did not achieve monopoly over all potential adaptations and incorporations of his process. Of course, an inventor might have been able to claim his invention more broadly (depending on the prior art), such that he could have claimed a process *for refining a metal*, or perhaps even a process *for refining a substance*. Even such broad claims still serve to cabin the patent right, however, because they still tie the use of the process to refining something. Thus, for instance, a novel adaptation of the process to more homogenously mix materials would not be prohibited by the patent grant.

86. See In re Musgrave, 431 F.2d 882, 892–93 (C.C.P.A. 1970) (reversing rejection of claim based on 35 U.S.C. § 101 and finding that process that can be performed in human mind is not necessarily unpatentable subject matter); In re Prater, 415 F.2d 1378, 1387–89 (C.C.P.A. 1968) (finding process claims to be patentable subject matter where process concerns mathematical calculations performed by computer, and distinguishing similar case where calculations were performed mentally), superseded by 415 F.2d 1393 (C.C.P.A. 1969); In re Tarczy-Hornoch, 397 F.2d 856, 866–67 (C.C.P.A. 1968) (overruling cases holding that process claims are invalid when they merely cite new function of

^{83.} Thus, the Court allowed the patenting of processes that accomplished physical transformations of materials, but did not allow patents on processes that did not achieve physical transformations. *See, e.g.*, Cochrane v. Deener, 94 U.S. 780, 788 (1876) ("A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.").

with this line-drawing dilemma, the 1966 Presidential Commission on the Patent System concluded that software should not be patentable.⁸⁷ In making its recommendation, the Commission analyzed whether the costs of the patent system needed to be incurred in order to stimulate invention in the software field, then in its infancy. The Commission concluded that they did not, noting "the creation of programs has undergone substantial and satisfactory growth in the absence of patent protection and that copyright protection for programs is presently available."⁸⁸ The Commission also recommended that the line-drawing problems regarding software should be resolved against patentees and that neither software nor computers programmed in a specified manner should be allowable subject matter.⁸⁹

claimed apparatus); Ford, supra note 10, at 63-70 (discussing erosion and then elimination of physical transformation requirement and mental steps doctrine); Thomas, supra note 80, at 195–96 (noting that "[p]rior to the twentieth century, it was inconceivable that an inventive process would produce a result that was not a physical transformation of matter," but observing that, with the advent of computers, "[a]ttacks on the physical-transformation test began in earnest" and continued until courts rejected the physical transformation, mental steps, and technological arts requirements). It is important to note that this problem arose from increasing difficulty in drawing lines as to physical transformation, rather than from a sense that software or information-based processes were not being adequately incentivized without patent protection. The physical transformation test began to unravel once the PTO was faced with patent applications for machines that included software that controlled the machine's manufacturing processes. In these cases, the software was given patent protection as part of the machine, even though software on its own still resided outside the boundary of patentable subject matter. New problems arose when patent applications began claiming software that merely affected the inside of a computer. In such cases it was harder to distinguish a physical transformation of the abstract ideas and processes embodied in the software. This problem worried courts throughout the 1960s and 1970s. Any position taken by the Court other than one in favor of the patentability of software was problematic, since the same functionality often could be achieved by changing a system's hardware, which was unarguably patentable under the law of the day. Thus it seemed that disallowing software patents would cause a senseless division in the kinds of computer innovation that received patent protection. Chisum et al. describe the problem this way: "If a mechanical device is patentable subject matter, then why not an electronic device like computer hardware? And if hardware is patentable subject matter, then why not a general purpose piece of hardware programmed for a specific purpose? And for that matter, why not software?" DONALD S. CHISUM ET AL., PRINCIPLES OF PATENT LAW 754 (1998).

87. The President's Comm. On the Patent System, "To Promote the Progress of . . . Useful Arts" in an Age of Exploding Technology 13 (1966).

88. Id.

89. The Commission stated:

Uncertainty now exists as to whether the statute permits a valid patent to be granted on programs. Direct attempts to patent programs have been rejected on the ground of nonstatutory subject matter. Indirect attempts to obtain patents and avoid the rejection, by drafting claims as a process, or a machine or components thereof programmed in a given manner, rather than as a program itself, have confused the issue further and should not be permitted.

Id. The Commission also pointed out and predicted the problems with adequately examining software patents given the lack of prior art files and the prodigious amounts of new software being created all the time:

The Patent Office now cannot examine applications for programs because of the lack of a classification technique and the requisite search files. Even if these were available, reliable searches would not be feasible or economic because of the tremendous volume of prior art

At roughly the same time, the PTO published new examination guidelines that were designed to disallow software patents and maintain the physical transformation test that had functioned so efficiently for so long.⁹⁰ The proposed guidelines deemed a computer program by itself, whether claimed as an apparatus or a process, unpatentable subject matter.⁹¹ The PTO formally adopted the guidelines in 1968, noting, however, that a programmed computer *could* be *part* of a patentable process if the process was otherwise nonobvious and produced a *physical* result.⁹²

The conclusions of the President's Commission and the PTO guidelines were well supported by the patent law decisions of the day. Specifically, the mental steps doctrine, a variation on the physical transformation test, attempted to draw the line between patentable processes and abstract ideas by denying patentability to inventions consisting mainly of mathematical formulas, methods of computation, or other mental operations.⁹³ The mental steps doctrine served the same function as the physical transformation test in that it prohibited patents for subject matter for which the deadweight loss of the patent monopoly was likely to outweigh the incentive to invent. First, the mental steps doctrine protected against excessive deadweight loss by not allowing patents on abstract formulas or mental steps.⁹⁴ Second, the doctrine prevented patents on known methods to which some mental step had been added.95 Third, the doctrine implicitly acknowledged that less incentive was needed to encourage the invention of processes of mental steps or the discovery of new mathematical formulas than was needed to encourage the invention of new industrial processes. Simply put, the material resources needed to invent a mental process are low, while the materials required to design and test a new industrial process could be considerable. Accordingly, it made sense to incentivize invention of

being generated. Without this search, the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent.

Id. Note that the problems the Commission warned about with regard to the inadequacy of prior art search capability at the PTO for software appear to have been well founded and apply with at least equal force to business method patents.

^{90. 829} Off. Gaz. Pat. Office 865 (Aug. 16, 1966).

^{91.} These guidelines were based on the mental steps doctrine and on the definition of "process" given in *Cochrane v. Deener*, 94 U.S. 780, 788 (1876). Examination of Patent Applications on Computer Programs, 33 Fed. Reg. 15,609, 15,610 (Oct. 22, 1968).

^{92.} Examination of Patent Applications on Computer Programs, 33 Fed. Reg. at 15,610.

^{93.} See, e.g., In re Shao Wen Yuan, 188 F.2d 377, 380 (C.C.P.A. 1951) (denying patentability of calculation method for creation of airfoils where method is "purely mental"); In re Heritage, 150 F.2d 554, 556–58 (C.C.P.A. 1945) (denying patentability of mental process to determine optimal application of coating material); In re Bolongaro, 62 F.2d 1059, 1059–60 (C.C.P.A. 1933) (denying patentability of method of producing printed publications from manuscripts, even though method presents novel formula for calculating length of publication).

^{94.} A patent on a formula itself might have costs in terms of deadweight loss far in excess of the incentive it provided to derive such formulas.

^{95.} For example, a person could not patent a known method of catalyzation simply by adding a computer program that used an algorithm to continuously update the alarm limits for the process. Parker v. Flook, 437 U.S. 584, 594–95 (1978).

physically transforming processes via the patent grant, while leaving mental processes unpatentable.

Notwithstanding the above, in 1968—the very year in which the PTO urged the rejection of software patents—the Court of Customs and Patent Appeals ("CCPA")⁹⁶ rejected the mental steps doctrine in *In re Prater*.⁹⁷ The CCPA did not engage in an analysis of the efficiency of granting patents to inventions involving mental steps.⁹⁸ Rather, the CCPA engaged in a broad textual analysis of the patent statute, largely abandoning the role the federal courts had traditionally occupied as shapers of the federal patent common law.⁹⁹ The CCPA held that the precedent that the mental steps doctrine depended upon had either been inadequately reasoned or simply misinterpreted over the years.¹⁰⁰ The court held that just because a process may be done mentally (as is possible with the derivation or application of a formula), it should not be barred from patent protection if the same process could, in the alternative, be accomplished by another mechanism, such as a programmed computer.¹⁰¹

The CCPA went further two years later in *In re Musgrave*,¹⁰² when it announced that any process containing a sequence of operational steps was patentable under section 101 so long as it was within the "technological arts."¹⁰³

^{96.} The CCPA was the predecessor court to the Federal Circuit Court of Appeals. The CCPA was given jurisdiction over appeals of patentability from the Patent and Trademark Office. Act of Mar. 2, 1929, ch. 488, 45 Stat. 1475, 1475–76 (repealed 1982). In 1982 the Court of Appeals for the Federal Circuit was created with jurisdiction over all appeals from the PTO and also from all patent claims raised by plaintiffs in any district court. Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, § 127(a), 96 Stat. 25, 37–39 (codified as amended at 28 U.S.C. § 1295 (2006)). The Federal Circuit does not have jurisdiction over patent claims raised as defenses. 28 U.S.C. § 1338(a); Christianson v. Colt Indus. Operating Corp., 486 U.S. 800, 808–09 (1988).

^{97. 415} F.2d 1378 (C.C.P.A. 1968), superseded by 415 F.2d 1393 (C.C.P.A. 1969). In *Prater*, the claim was for an improved process for analyzing spectrographic data. *In re Prater*, 415 F.2d at 1379. The claimant used an analog computer to calculate mathematical formulas that he had come up with in order to obtain the best results. *Id.* at 1380. The patent application gave an analog computer as the preferred embodiment, but stated that a programmed digital computer would also work. *Id.* The Patent Office previously had rejected the process claims based on the mental steps doctrine. *Id.* at 1381. It found that the only novel part of the process was the discovery of an unpatentable mathematical principle. *Id.* It also rejected the apparatus claim, holding that once the mathematical formula was held to be within the prior art, there was no patentable part of the apparatus. *In re Prater*, 415 F.2d at 1379–81.

^{98.} Id. at 1387-89.

^{99.} Id.

^{100.} Id. at 1386.

^{101.} Id. at 1389.

^{102. 431} F.2d 882 (C.C.P.A. 1970).

^{103.} In re Musgrave, 431 F.2d at 893. Note that the majority opinion in Musgrave used the term "technological arts" without ever defining it. Judge Baldwin, in a concurring opinion, criticized this new and indefinite test for patentability. Id. at 895 (Baldwin, J., concurring) ("First and foremost will be the problem of interpreting the meaning of 'technological arts': Is this term intended to be synonymous with the 'industrial technology'— mentioned by Judge Smith? It sounds broader to me. Necessarily, this will have to be considered a question of law and decided on a case-by-case basis. Promulgation of any all-encompassing definition has to be impossible.").

The next year, in *In re Benson*,¹⁰⁴ the CCPA allowed the patenting of software generally by holding that computers are within the "technological arts" for purposes of section 101, regardless of the use to which they are put.¹⁰⁵

The Supreme Court accepted certiorari in *Benson* and reversed.¹⁰⁶ The claimants in *Benson* claimed a method for converting binary-coded decimal (BCD) numerals into the pure binary numerals used as the basic language of computers.¹⁰⁷ The respondents apparently had varied the order of steps for the conversion from the usual order that a human would use to accomplish the conversion, but the results were the same.¹⁰⁸ Faced with such a broad claim for a method of solving a mathematical problem, the Court held that the claims were outside of patentable subject matter because they amounted to a patent on the algorithm itself:

Here the "process" claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion. The end use may (1) vary from the operation of a train to verification of drivers' licenses to researching the law books for precedents and (2) be performed through any existing machinery or future-devised machinery or without any apparatus.¹⁰⁹

Thus, the Court used the mathematical algorithm exception¹¹⁰ to exclude subject matter (algorithms not tied to particular uses) the patenting of which would cause much more deadweight loss than necessary to incentivize the invention.¹¹¹

108. The Supreme Court, unlike the CCPA, did not engage in a formalistic interpretation of the bare patent statute. Rather, the Court implicitly analyzed the monopoly cost of the patent by examining the breadth and preclusive effect the patent would have. *Id.* at 68, 71. The Court noted that the patentee claimed his method of numeric conversion without limiting it "to any particular art or technology, to any particular apparatus or machinery, or to any particular end use." *Id.* at 64. The claims "purported to cover any use of the claimed method in a general-purpose digital computer of any type." *Id.* In other words, the claims were tied to no physical transformation. Nor were they tied to a particular use within a program or computer. The patentee sought rights over the numeric conversion method generally.

109. Benson, 409 U.S. at 68.

110. For an in-depth discussion of the shift from a focus on mental steps to algorithms, see Pamela Samuelson, Benson *Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1042–43 (1990). For an argument that *Benson* "stemmed from an antipatent judicial bias" and that there are strong policy reasons for computer algorithms to be patentable, see Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 961 (1986).

111. The Court stated its holding "in a nutshell" as the following:

It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is

^{104. 441} F.2d 682 (C.C.P.A. 1971), rev'd sub nom. Gottschalk v. Benson, 409 U.S. 63 (1972).

^{105.} In re Benson, 441 F.2d at 688. Note that patent protection has been broadened even further subsequently due to the PTO's complete rejection of the "technological arts" limitation for patentability. See, e.g., Ex parte Lundgren, 76 U.S.P.Q.2d 1385, 1388 (B.P.A.I. 2005) (stating that courts do not recognize technological arts test).

^{106.} Gottschalk v. Benson, 409 U.S. 63, 64, 71-73 (1972).

^{107.} Id. at 65-67.

It is notable that the Court did not simply apply the physical transformation test; instead the Court retreated somewhat from that test, stating,

It is argued that a process must either be tied to a particular machine or apparatus or must operate to change articles or materials to a "different state or thing." We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. It is said that the decision precludes a patent for any program servicing a computer. We do not so hold.¹¹²

In backpedaling from the physical transformation test, the Court implicitly acknowledged that it is not the physical transformation test *per se* that is needed, but rather that the test thus far had served the efficient and prudential purpose of precluding classes of inventions from patentability for which a patent grant would be inefficient.

Just six years later, the Supreme Court revisited the issue of the patentability of algorithms in *Parker v. Flook.*¹¹³ The claimant in *Flook* sought to patent a method that utilized a mathematical algorithm to continuously update alarm limits (safety limits) for a catalyzing process.¹¹⁴ The claimant used a computer in his machine to continuously do the math to change the alarm limits.¹¹⁵ The Court recognized that in order to determine the patentability of the process in *Flook* it again had to distinguish between patentable processes and abstract ideas.¹¹⁶ The Court said: "The line between a patentable 'process' and an unpatentable 'principle' is not always clear. Both are 'conception[s] of the mind, seen only by [their] effects when being executed or performed."¹¹⁷

The Court in *Flook* decided to draw the line of patentability well away from the unpatentable principle side of the spectrum by treating all mathematical algorithms as unpatentable subject matter. Since defining the parameters of the mathematical algorithm exception had been difficult for courts in the past, *Flook*

But note that claim 8 of the patent in *Benson* discusses "shift register[s]," which seems to at least tie this claim to a particular way of implementing the process on a computer. *Id.* at 73–74 (app.). Claim 13, however, was not limited to shift registers. *Id.* at 74.

affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.

Benson, 409 U.S. at 71–72. The Court here may have been conflating claim scope with patentable subject matter, at least to some extent. But allowing excessively broad ranges of patentable subject matter necessarily allows broader claim scope. If, for instance, patents on processes not linked to any physical apparatus or transformation are allowed as patentable subject matter, then the scope of such patents' claims will obviously be very broad. Further, even if the scope of the claim here were limited somehow, such as to computers, the increased incentive to innovate that this would give would likely be dwarfed by the deadweight loss that would occur if the discoverer could claim ownership of all uses of the algorithm itself, even if the uses are limited to computers. As the Court said, this seems the only practical medium in which to utilize the formula anyway.

^{112.} Id. at 71.

^{113. 437} U.S. 584 (1978).

^{114.} Flook, 437 U.S. at 585.

^{115.} Id. at 586.

^{116.} Id. at 588-89.

^{117.} Id. at 589 (alteration in original) (quoting Tilghman v. Proctor, 102 U.S. 707, 728 (1880)).

provided an opportunity to stake out new, firmer boundaries. The Court wrote, "[w]e use the word 'algorithm' in this case, as we did in *Gottschalk v. Benson* \dots . . ., to mean '[a] procedure for solving a given type of mathematical problem."¹¹⁸ The Court clearly equated these types of procedures for solving mathematical problems with unpatentable "law[s] of nature,"¹¹⁹ and held that process claims containing mathematical algorithms must be tested for subject matter patentability in two steps.¹²⁰ The first step was to assume the mathematical algorithm was part of the prior art, even if it was novel and nonobvious.¹²¹ The second step was to examine the process as a whole to determine whether, once the algorithm was assumed to be part of the prior art, the process contained a patentable invention. The Court in *Flook* held that the claimant failed the test.¹²² Here the court was saying that because the discovery

First, respondent incorrectly assumes that if a process application implements a principle in some specific fashion, it automatically falls within the patentable subject matter of § 101 and the substantive patentability of the particular process can then be determined by the conditions of §§ 102 and 103. This assumption is based on respondent's narrow reading of *Benson*, and is as untenable in the context of § 101 as it is in the context of that case. It would make the determination of patentable subject matter depend simply on the draftsman's art and would ill serve the principles underlying the prohibition against patents for "ideas" or phenomena of nature. The rule that the discovery of a law of nature cannot be patented rests, not on the notion that natural phenomena are not processes, but rather on the more fundamental understanding that they are not the kind of "discoveries" that the statute was enacted to protect. The obligation to determine what type of discovery is, in fact, new or obvious.

Here the Court discusses the efficiency of conducting a first screen to exclude certain inefficient classes of inventions before engaging in the more time- and labor-intensive tasks of examining novelty and nonobviousness of the intention.

121. *Id.* at 591–92. The Court claimed that its prior precedents led to the two-part test: *Mackay Radio* and *Funk Bros.* point to the proper analysis for this case: The process itself, not merely the mathematical algorithm, must be new and useful. Indeed, the novelty of the mathematical algorithm is not a determining factor at all. Whether the algorithm was in fact known or unknown at the time of the claimed invention, as one of the "basic tools of scientific and technological work," see *Gottschalk v. Benson*, 409 U.S., at 67 ..., it is treated as though it were a familiar part of the prior art.

Flook, 437 U.S. at 591–92. Here again the Court is asserting that the discovery of the algorithm is not the sort of thing to be incentivized by the patent system. Rather, it is inventive uses of algorithms that should be incentivized by the patent grant. Discovery of algorithms, the Court is therefore saying, is not the sort of thing for which the gain to invention of allowing patents is likely to exceed the deadweight loss of the patent monopoly.

122. The Court held:

^{118.} *Id.* at 585 n.1 (internal citations omitted) (quoting Gottschalk v. Benson, 409 U.S. 63, 65 (1972)).

^{119.} Flook, 437 U.S. at 589.

^{120.} *Id.* at 593. The Court declared that whether claims were drafted as process claims or machine claims was not determinative, because if it were, clever drafting could determine patentability. The Court instead held that claims that were novel only because of inclusion of an algorithm could not be patented. *Id.* at 593–94. In its description of algorithms the Court equated algorithms directly to laws of nature:

Id. at 593.

or design of algorithms is not the sort of thing it is efficient to incentivize by means of the patent grant, no patent on the algorithm is available.¹²³ Nevertheless, as with all inventions, if aside from the unpatentable subject matter there is something that makes the remaining subject matter novel and nonobvious, then a patent may be had.¹²⁴ Justice Stewart, joined by Chief Justice Burger and Justice Rehnquist, dissented in *Flook*, arguing that the majority was smuggling in the novelty and inventiveness requirements of sections 102 and 103 to the consideration of statutory subject matter under section 101.¹²⁵ What the dissent did not realize, however, is that making a quick analysis to determine subject matter patentability is quite different than doing a fulsome novelty analysis. The majority's rule allowed courts and examiners to efficiently say that inventions in certain classes of subject matter were not patentable—in this case, algorithms—and quickly move on to analyze whether the patentable subject matter patentable.

A sea change began in 1980. In *Diamond v. Chakrabarty*,¹²⁶ the Supreme Court extended patent protection to a living organism—a man-made bacterium capable of breaking down crude oil and thus useful in treating oil spills. Although the long-held rule against the patentability of living things had been economically efficient in the past, the court in *Chakrabarty* recognized that biotechnology changed things. In the past, a patent sought on a living thing would have been for an organism that was discovered in nature. Thus, prior to the biotechnology industry, living organisms were discoveries that corresponded to Figure 2 in Part II.B.2, for which patenting would cause more deadweight loss than increased invention or discovery. With the advent of bioengineered organisms, however, the calculus changed. As the record in *Chakrabarty* made clear, a great deal of time, effort, and experiment were necessary to produce the

Respondent's process is unpatentable under § 101, not because it contains a mathematical algorithm as one component, but because once that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention. Even though a phenomenon of nature or mathematical formula may be well known, an inventive application of the principle may be patented. Conversely, the discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application.

Id. at 594.

^{123.} Id.

^{124. 35} U.S.C. §§ 102–103 (2006); Flook, 437 U.S. at 594.

^{125.} Flook, 437 U.S. at 600 (Stewart, J., dissenting). Justice Stewart wrote:

Indeed, I suppose that thousands of processes and combinations have been patented that contained one or more steps or elements that themselves would have been unpatentable subject matter. *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, is a case in point. There the Court upheld the validity of an improvement patent that made use of the law of gravity, which by itself was clearly unpatentable.

Id. at 599–600 (footnote omitted) (parallel citation omitted). 126. 447 U.S. 303 (1980).

man-made oil-eating bacterium.¹²⁷ Accordingly, if invention in the field was to be encouraged, patent protection was necessary. And indeed, when it comes to patents for engineered organisms, the deadweight loss is much less than for discovered organisms because no use of a naturally occurring organism is thereby precluded by the patent.¹²⁸

Unfortunately, however, the Court went beyond this efficiency analysis. Rather than simply expanding subject matter patentability piecemeal, as economic efficiency dictated, the Court followed suit with the CCPA and largely abandoned its common-law-making role in the area of patent law. Thus, the Court announced that its decision was based on a bare textual reading of the Patent Act.¹²⁹ Rather than continue to wrestle with issues of how to draw lines on physical transformation, mental steps, and what types of living organisms should receive patent protection, the Court largely abandoned any gatekeeping role and stated that courts "should not read into the patent laws limitations and conditions which the legislature has not expressed."¹³⁰ The Court then announced that Congress had meant patentable subject matter to "include anything under the sun that is made by man."¹³¹

One problem with this abdication of subject matter patentability analysis is that under a bare textual reading of the Patent Act, it is no longer apparent why even the traditionally off-limit subject matters should not be patentable. Even though the Court in *Chakrabarty* asserted that abstract ideas, laws of nature, and natural phenomena remain unpatentable subject matter, there is no textual basis for this exception.¹³²

This is not to suggest that § 101 has no limits or that it embraces every discovery. The laws of nature, physical phenomena, and abstract ideas have been held not patentable. Thus, a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter.

^{127.} See Chakrabarty, 447 U.S. at 305 & n.1, 309–10 (describing Chakrabarty's substantial research efforts in developing "genetically engineered bacterium" and contrasting with nonpatentable natural phenomenon).

^{128.} The Court recognized this difference between engineered and discovered organisms and held that "the patentee has produced a new bacterium with markedly different characteristics from any found in nature and one having the potential for significant utility. His discovery is not nature's handiwork, but his own; accordingly it is patentable subject matter under § 101." *Id.* at 310. The Court was careful to distinguish the labor- and capital-intensive human-engineered bacteria from those organisms that are merely discovered:

Id. at 309.

^{129.} *Id.* at 307 (characterizing decision as "a narrow one of statutory interpretation requiring us to construe 35 U.S.C. § 101").

^{130.} Id. at 308 (quoting United States v. Dubilier Condenser Corp., 289 U.S. 178, 199 (1933)).

^{131.} Chakrabarty, 447 U.S. at 309 (citing S. REP. NO. 82-1979, at 5 (1952); H.R. REP. NO. 82-1923, at 6 (1952)).

^{132.} See 35 U.S.C. § 101 (2006) ("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."). Under this bare text, there is no reason to exclude new and useful discoveries or inventions of abstract ideas, laws of nature, or natural phenomenon from patentability. An abstract idea can surely be a new and useful

The second case signaling the Supreme Court's abandonment of a subject matter gatekeeping role came in the 1981 case of *Diamond v. Diehr*.¹³³ The Court's holding there is diametrically opposed to its holding in *Flook*, notwithstanding the two cases' similar facts. The claimant in *Diehr* sought a patent for a process for curing synthetic rubber that included the use of a well-known mathematical formula and a programmed digital computer.¹³⁴ Although there was some wrangling over whether the method of continuously measuring the curing temperature was new, in the end it appears that the only novel element of the process was the use of a programmed digital computer that received information on the temperature as the rubber curied and, by repeatedly solving the appropriate mathematical formula, adjusted the timer that opened and closed the mold to achieve a more perfect cure than had previously been possible.¹³⁵

Justice Rehnquist distinguished *Flook* by saying that the application in *Flook* had only "sought to protect a formula for computing [an alarm limit],"¹³⁶ while the claim in *Diehr* was "for a process of curing synthetic rubber."¹³⁷ This rather weak distinction showed that the tide had turned toward increased patentability of nonphysical processes and computer programs.

The Federal Circuit (which succeeded the CCPA)¹³⁸ took its cue from the Supreme Court's change of direction and continued to expand the scope of

135. Justice Stevens pointed out that the Patent and Trademark Office Board of Appeals expressly found that the only difference between the claimed method and traditional methods of rubber curing was the constant recalculating of the time the mold should be closed. *Id.* at 208 (Stevens, J., dissenting). These findings were not disturbed by the CCPA.

138. Congress created the Court of Appeals for the Federal Circuit in 1982. Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (codified as amended in scattered sections of 28 U.S.C.). The formation of the Federal Circuit did not change the path the federal courts were on towards an abandonment of the patentable subject matter gatekeeper role, but Congress's concurrent consolidation and assignment of patent appeals to the Federal Circuit, 28 U.S.C. § 127(a) (2006), likely sped the abandonment of the gatekeeper role because there were no longer a number of circuit courts to debate and disagree about the patentability of various subject matter. Once the Federal Circuit embraced ever-expanding subject matter patentability there were no other circuit courts to disagree and stir debate.

In addition, the Federal Circuit has often been accused of a pro-patent bias. *See, e.g.*, Mark D. Janis, *Reforming Patent Validity Litigation: The "Dubious Preponderance*," 19 BERKELEY TECH. L.J. 923, 928 (2004) ("[T]he generally received wisdom [is] that the Federal Circuit adopted a pro-patent bias early in its tenure."); Glynn S. Lunney, Jr., *E-Obviousness*, 7 MICH. TELECOMM. & TECH. L. REV. 363, 380 (2001) ("[T]he Federal Circuit has taken its role as defender of the patent system seriously."); Merges, *supra* note 3, at 822 (noting that "the Federal Circuit appears to be a 'pro-patent' court").

Moreover, until lately the Supreme Court has not often granted certiorari to patent cases. The Supreme Court has not been required to decide patent law issues arising from circuit splits, but instead only seems to accept certiorari of patent cases if it thinks that changes may need to be made to the Federal Circuit's case law.

process, just as a law of nature can be. And a natural phenomenon can surely be a composition of matter.

^{133. 450} U.S. 175 (1981).

^{134.} *Diehr*, 450 U.S. at 177–78 & n.2.

^{136.} Id. at 186 (majority opinion) (citing Parker v. Flook, 437 U.S. 584, 586 (1978)).

^{137.} Id. at 187.

patentable subject matter by adopting the Court's bare textualist reading of the Patent Act and not performing any separate efficiency analysis gatekeeping as to subject matter patentability. Thus, in 1992, in *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*,¹³⁹ the Federal Circuit found valid a patent on a method of converting the signal from an electrocardiogram machine into a different visual image that could be used to help determine ventricular tachycardia.¹⁴⁰ The process used a mathematical formula and a programmed computer, although the claims stated that hard-wired logic circuitry could be used.¹⁴¹ In deciding *Arrhythmia Research*, a concurring opinion asserted that Congress had never meant to exclude algorithms from patentability.¹⁴²

Interestingly, the Federal Circuit did not entirely abandon the requirement that a process do something physical to be patentable. Instead it held that the "claimed steps of 'converting', 'applying', 'determining', and 'comparing' are physical process steps that transform one physical, electrical signal into another. The view that 'there is nothing necessarily physical about signals' is incorrect."¹⁴³ The Federal Circuit then adopted its own two-step procedure for determining unpatentable algorithms, which de-emphasized the physical transformation requirement.¹⁴⁴

In the case of *In re Alappat*,¹⁴⁵ the Federal Circuit further expanded the patentability of algorithms.¹⁴⁶ It held that "the proper inquiry in dealing with the so called mathematical subject matter exception to §101... is to see whether the claimed subject matter *as a whole* is a disembodied mathematical concept."¹⁴⁷ The concurring and dissenting opinion of Chief Judge Archer and the concurring opinion of Judge Rader made it clear that they thought that only abstract mathematical formulas should be denied patentable subject matter status, and

143. Id. at 1059 (majority opinion) (quoting In re Taner, 681 F.2d 787, 790 (C.C.P.A. 1982)) (internal quotation marks omitted).

144. The concurrence described the new test as follows:

First, the claim is analyzed to determine whether a mathematical algorithm is directly or indirectly recited. Next, if a mathematical algorithm is found, the claim as a whole is further analyzed to determine whether the algorithm is "applied in any manner to physical elements or process steps," and, if it is, it "passes muster under § 101."

Id. at 1063 (Rader, J., concurring) (quoting In re Pardo, 684 F.2d 912, 915 (C.C.P.A. 1982)).

145. 33 F.3d 1526 (Fed. Cir. 1994) (en banc), abrogated by In re Bilski, 545 F.3d 943 (Fed. Cir. 2008).

^{139. 958} F.2d 1053 (Fed. Cir. 1992).

^{140.} Arrhythmia Research, 958 F.2d at 1059-60.

^{141.} Id. at 1055.

^{142.} *Id.* at 1064 (Rader, J., concurring) ("Indeed Congress has never stated that section 101's term 'process' excludes certain types of algorithms. Therefore, as *Diehr* commands, this court should refrain from employing judicially-created tests to limit section 101.").

^{146.} For further discussion of *Alappat* and algorithms, see John A. Burtis, Comment, *Towards a Rational Jurisprudence of Computer-Related Patentability in Light of* In re Alappat, 79 MINN. L. REV. 1129, 1150–53 (1995) (noting erosion effect of *Alappat* on patentable subject matter restrictions and corresponding instability of patentable subject matter jurisprudence).

^{147.} In re Alappat, 33 F.3d at 1544 (emphasis in original).

that applications of mathematical formulas should always be patentable.¹⁴⁸ Judge Rader thought that this approach was especially justified by the fact that "the line of demarcation between a dedicated circuit and a computer algorithm accomplishing the identical task is frequently blurred and is becoming increasingly so as the technology develops. In this field a software process is often interchangeable with a hardware circuit."¹⁴⁹

Thus by the time business method patents reached the Federal Circuit, the court's jurisprudence had all but reached the point at which any applied use of an abstract idea was patentable. This broadening of subject matter patentability with regard to software algorithms made it difficult for the Federal Circuit to uphold the business method exception to patentability.

2. The Business Method Exception and Its Undoing

The first thing to understand about the business method exception¹⁵⁰ is that for all of its efficiency in excluding business methods from patentability, it was

Id. at 1557 (Archer, C.J., concurring in part and dissenting in part) (citation omitted) (quoting *In re* Meyer, 688 F.2d 789, 795 (C.C.P.A. 1982)).

149. Id. at 1583 (Rader, J., concurring). Judge Rader's concurring opinion was even more expansive of patentability:

In the wake of *Diehr* and *Chakrabarty*, the Supreme Court only denies patentable subject matter status to algorithms which are, in fact, simply laws of nature.

Id. at 1582-83.

150. The phrases "business method exception" and "business method patents" raise the questions of what, exactly, is a business method, and how is it distinguished from other processes. Unfortunately, there is not a clear answer to the question, especially when it comes to software related to conducting business, like the software at issue in State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998), abrogated by In re Bilski, 545 F.3d 943 (Fed. Cir. 2008). The United States Patent and Trademark Office sets out Class 705 for patents that claim "machines and their corresponding methods for performing data processing or calculation operations . . . utilized in the 1) practice, administration, or management of an enterprise, or 2) processing of financial data, or 3) determination of the charge for goods or services." U.S. PATENT & TRADEMARK OFFICE, A USPTO WHITE PAPER: AUTOMATED FINANCIAL OR MANAGEMENT DATA PROCESSING METHODS (BUSINESS METHODS) 8 (2000), available at http://www.uspto.gov/web/menu/busmethp/whitepaper.pdf [hereinafter PTO BUSINESS METHODS WHITE PAPER]. Drawing the line between business methods on the one hand and software processes on the other can be particularly difficult when it comes to online businesses or processes. For example, Amazon's 1-Click patent describes a method of allowing customers to place orders for merchandise over the Internet. U.S. Patent No. 5,960,411 (filed Sept. 12, 1997).

^{148.} Chief Judge Archer stated:

The dispositive issue is whether the invention or discovery for which an award of patent is sought is more than just a discovery in abstract mathematics. Where the invention or discovery is only of mathematics, the invention or discovery is not the "kind" of discovery the patent law was designed to protect and even the most narrowly drawn claim must fail. To come within the purview of § 101 and the patent law, a mathematical formula or operation must be "applied in an invention of a type set forth in 35 U.S.C. § 101."

^{•••}

The limits on patentable subject matter within section 101 do not depend on whether an invention can be expressed as a mathematical relationship or algorithm. Mathematics is simply a form of expression—a language.

always an exception based on dicta. For most of this century, *Hotel Security Checking Co. v. Lorraine Co.*¹⁵¹ was cited as the case that made business methods unpatentable per se.¹⁵² But the court in *Hotel Security* never held this. The patent at issue in *Hotel Security* was for a method of keeping track of the food waiters were taking to tables in order to verify that the waiters were giving the full cost of each meal to the hotel.¹⁵³

The Second Circuit disallowed the patent, but, contrary to subsequent popular belief, it did not hold that business methods are outside of the subject matter that can be awarded process patents. Instead, the court held that the "invention" was not "new and useful."¹⁵⁴ The court said: "The fundamental principle of the system is as old as the art of bookkeeping, i.e. charging the goods of the employer to the agent who takes them."¹⁵⁵ The court went on to say in dicta that "[i]f at the time of [the inventor's] application, there had been no system of bookkeeping of any kind in restaurants, we would be confronted with the question whether a new and useful system of cash-registering and account-checking is such an art as is patentable under the statute."¹⁵⁶

The court specifically left the question open to future cases. But for nearly ninety years it was believed that the answer to the question was negative because of one oft-quoted passage:

A system of transacting business disconnected from the means for carrying out the system is not, within the most liberal interpretation of the term, an art. Advice is not patentable.... "No mere abstraction, no idea, however brilliant, can be the subject of a patent irrespective of the means designed to give it effect."¹⁵⁷

Although this statement was dicta, it showed that the court was quite comfortable weighing in and judging patents on business methods to be inefficient and unneeded.¹⁵⁸

158. Lowe's Drive-In Theatres Inc. v. Park-In Theaters, Inc., 174 F.2d 547, 552 (1st Cir. 1949) (holding invalid a patent on drive-in theaters as obvious, but stating in dicta that "a system for the transaction of business, such, for example, as the cafeteria system for transacting the restaurant business, ... however novel, useful, or commercially successful is not patentable apart from the means

^{151. 160} F. 467 (2d Cir. 1908).

^{152.} See, e.g., Rinaldo Del Gallo, III, Are "Methods of Doing Business" Finally Out of Business as a Statutory Rejection?, 38 IDEA 403, 408–09 (1998) (citing Hotel Security for proposition that "all business systems were per se unpatentable," and stating that courts have followed this interpretation).

^{153.} *Hotel Sec.*, 160 F. at 467. The method involved assigning each waiter a number, and having the head waiter keep track of the food each waiter took from the kitchen. The waiters were also given slips of paper with their numbers on the paper, and they returned these, along with the payment for each meal, to the head cashier when the customer paid for his meal. By comparing the head waiter's list of food each waiter took from the kitchen with the slips and amounts each waiter gave to the head cashier, the hotel could discern when a waiter failed to pay the hotel the cost of all the meals he served to dining room customers. *Id.* at 467–68.

^{154.} *Id.* at 469 (holding that "[i]t cannot be maintained that the physical means described by [the inventor],—the sheet and the slips,—apart from the manner of their use, present any new and useful feature").

^{155.} Id.

^{156.} Id. at 472.

^{157.} Hotel Sec., 160 F. at 469 (quoting Fowler v. City of N.Y., 121 F. 747, 748 (2d Cir. 1903)).

Over the years confidence nevertheless grew that the dicta of various cases that spoke skeptically of the patentability of business methods had in fact made business methods unpatentable subject matter.¹⁵⁹ This became the accepted conventional wisdom until the Federal Circuit unequivocally held business methods to be patentable subject matter in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*¹⁶⁰ In that case the patent was on a system that kept track of the value of shares in a "hub and spoke" mutual fund arrangement. Various mutual funds ("spokes") pooled their resources together (the "hub") in order to gain economies of scale in investing and managing the portfolios. The system used a computer to keep track of the ownership and dollar values of the various funds and of the shares owned by those invested in the funds.¹⁶¹

The case was initially decided by a Massachusetts district court.¹⁶² The district court held that the system was unpatentable under the alternate rationales of either the mathematical algorithm exception or the business method exception.¹⁶³ Importantly, the district court also offered an economic efficiency rationale for its decision. The district court stated that allowing the patent would "foreclose virtually any computer-implemented accounting method necessary to manage this type of financial structure."¹⁶⁴ In reaching its decision, the district court clung to the physical transformation test and ignored the recent whittling away of the test by the Federal Circuit in the 1990s.¹⁶⁵ Instead, the

for making the system practically useful"). Likewise, close scrutiny reveals that other cases cited as holding business methods unpatentable largely made their statements about the patentability of business methods in dicta. *See, e.g.*, U.S. Credit Sys. Co. v. Am. Credit Indem. Co., 59 F. 139, 140, 142–43 (2d Cir. 1893) (noting that patentability of business systems is not at issue in current suit, and only holding that business recording sheets claimed as invention by would-be patentee lacked patentable novelty); *In re* Patton, 127 F.2d 324, 327–28 (C.C.P.A. 1942) (addressing issue of business methods unpatentability merely in relation to particular statute rather than holding business methods unpatentable per se).

For an excellent discussion of the inconclusiveness of the precedent supposedly holding business methods unpatentable subject matter per se, see Judge Newman's dissent in *In re Schrader*, 22 F.3d 290, 296–99 (Fed. Cir. 1994). Her analysis is supported by the work of several scholars, who note that the business method exception seems only to have appeared in dicta. *See* E. Robert Yoches & Howard G. Pollack, *Is the "Method of Doing Business" Rejection Bankrupt?*, 3 FED. CIR. B.J. 73, 76–80 (1993) (describing development of supposed "business method exception" and commenting that other cases supporting exception actually tend to address obviousness or novelty rather than subject matter patentability); George E. Tew, *Method of Doing Business*, 16 J. PAT. OFF. SOC'Y 607, 607 (1934) ("It is probably settled by long practice and many precedents that 'methods of doing business,' as these words are generally understood, are unpatentable, notwithstanding the absence in decided cases of any logical or statutory reason or rule why they are unpatentable.").

^{159.} See generally Del Gallo, supra note 152, at 405-11.

^{160. 149} F.3d 1368 (Fed. Cir. 1998), abrogated by In re Bilski, 545 F.3d 943 (Fed. Cir. 2008).

^{161.} State St. Bank, 149 F.3d at 1370-71.

^{162.} State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 927 F. Supp. 502 (D. Mass. 1996).

^{163.} Id. at 516.

^{164.} Id.

^{165.} See In re Alappat, 33 F.3d 1526, 1536, 1545 (Fed. Cir. 1994) (allowing patent on claim for producing smooth waveform display on screen and stating that general purpose computer programmed to carry out this function "in effect becomes a special purpose [machine] once it is programmed"), *abrogated by In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008); Arrhythmia Research Tech.,

district court relied on the sixteen-year-old Supreme Court case of *Diamond v*. *Diehr* to hold that an element of "physical transformation" was still necessary for patentability.¹⁶⁶

The Federal Circuit reversed,¹⁶⁷ holding that, regardless of whether the system was classified as process or machine, the mathematical algorithm exception did not bar patentability.¹⁶⁸ The court held that the mathematical algorithm test only refers to abstract ideas that are not useful, stating: "Unpatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not 'useful.'"¹⁶⁹ The Federal Circuit held that the district court's insistence on physical transformation was no longer applicable in light of *Chakrabarty, Diehr*, and the Federal Circuit's own case law.¹⁷⁰

The Federal Circuit went on to specifically overrule the business method exception.¹⁷¹ As can be seen by the above discussion of the case law, this holding was prefigured by the trend of ever-increasing subject matter patentability and the fact that the business method exception had never been more than dicta. The court brushed aside this century-old legal conventional wisdom with little discussion of the policies underlying the exception.¹⁷² Instead, the court spent a few paragraphs explaining that the decisions typically credited with having been decided on grounds of the business method exception could also be explained as having been decided on other grounds, like lack of novelty or nonobviousness.¹⁷³

167. State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 1369 (Fed. Cir. 1998), *abrogated by In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008).

Inc. v. Corazonix Corp. 958 F.2d 1053, 1059–60 (Fed. Cir. 1992) (holding patentable claim for converting analog electrocardiograph signals to digital and stating that "[t]hese claimed steps of 'converting', 'applying', 'determining', and 'comparing' are physical process steps that transform one physical, electrical signal into another"); Ford, *supra* note 10, at 78 (discussing Federal Circuit's "move away from physicality as the key to patentability").

^{166.} State St. Bank, 927 F. Supp. at 509. The district court said that the process in Diehr "involve[d] the transformation of an article . . . into a different state or thing.' This element of physical transformation, hinted at in Benson and Flook, was made explicit in Diehr." Id. (first alteration in original) (quoting Diamond v. Diehr, 450 U.S. 175, 184 (1981)). This is not to say that the court's position was without support in contemporary academic writing. See, e.g., Jur Strobos, Stalking the Elusive Patentable Software: Are There Still Diehr or Was It Just a Flook?, 6 HARV. J.L. & TECH. 363, 387 (1993) (interpreting Diehr to require "preemption" and "transformation" inquiries when determining patentability of software); Lawrence Kass, Comment, Computer Software Patentability and the Role of Means-Plus-Function Format in Computer Software Claims, 15 PACE L. REV. 787, 801 (1995) ("The Supreme Court elaborated on the Benson proscription against patenting pure mathematical algorithms in Parker v. Flook and Diamond v. Diehr, which collectively circumscribed what may be termed a 'physicality requirement' for processes that contain mathematical algorithms.").

^{168.} Id. at 1375, 1377.

^{169.} Id. at 1373.

^{170.} Id. at 1374.

^{171.} Id. at 1375.

^{172.} See State St. Bank, 149 F.3d at 1375 (stating that business method exception was result of "some general, but no longer applicable legal principle," without much elaboration).

^{173.} Id. at 1375-76.

The court dismissed the business method exception, stating that it was "tak[ing] this opportunity to lay this ill-conceived [business method exception] to rest."¹⁷⁴

The Federal Circuit barely addressed the district court's economic efficiency analysis. The Federal Circuit simply responded that "[w]hether the patent's claims are too broad to be patentable is not to be judged under § 101, but rather under §§ 102, 103, and 112. Assuming the [district court] to be correct, it has nothing to do with whether what is claimed is statutory subject matter."¹⁷⁵

Here then the Federal Circuit neared completion of its abandonment of any gatekeeping function as to subject matter patentability. The Federal Circuit disclaimed any role in analyzing whether it is efficient to grant patents on certain classes of subject matter. The result of the language in the Federal Circuit's *State Street Bank* decision was to require that virtually all inventions be examined as to novelty, nonobviousness, and the other sections of the Patent Act, and be allowed as patentable if they met those other requirements. In effect, after *State Street Bank* the Federal Circuit's position was that neither courts nor the PTO should engage in an analysis of whether a patent on a particular invention was needed to incentivize invention, and if so, whether the added incentive outweighed the deadweight loss of the patent grant for the particular type of invention.¹⁷⁶

3. The Federal Circuit Retreats Further

The positions taken by the Federal Circuit in *State Street Bank* were repeated and confirmed in subsequent rulings. A year later, in *AT&T Corp. v. Excel Communications, Inc.*,¹⁷⁷ the Federal Circuit again strictly limited the mathematical algorithm exception,¹⁷⁸ and re-emphasized its rejection of the physical transformation test.¹⁷⁹ The Court reiterated that the criterion for subject

177. 172 F.3d 1352 (Fed. Cir. 1999), abrogated by In re Bilski, 545 F.3d 943 (Fed. Cir. 2008).

178. The Federal Circuit reiterated that, "[b]ecause § 101 includes processes as a category of patentable subject matter, the judicially-defined proscription against patenting of a 'mathematical algorithm,' to the extent such a proscription still exists, is narrowly limited to mathematical algorithms in the abstract." AT&T Corp., 172 F.3d at 1356. The invention at issue claimed a process for adding a data field to call billing records used by long distance carriers, which allowed the identification of the long distance carrier with whom each call originated. *Id.* at 1352–54.

179. The Court emphasized that "physical transformation" is not "an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application." *Id.* at 1358.

^{174.} Id. at 1375.

^{175.} Id. at 1377.

^{176.} Some argue that when Congress enacted the defense of prior user rights in business methods in 35 U.S.C. § 273 the year after the *State Street Bank* decision, it ratified business method patents. *E.g.*, Risch, *supra* note 4, at 610 n.130. But this argument proves too much, especially given the concurrent congressional attempts to pass legislation limiting or banning business method patents. *See, e.g.*, Business Method Patent Improvement Act of 2000, H.R. 5364, 106th Cong. § 3(a) (detailing procedures to be followed upon determination that patent application is for "business method invention"); 146 CONG. REC. 20,655 (2000) (statement of Rep. Boucher) ("[F]ew issues in the 107th Congress will be more important than deciding whether, and under what conditions, the government should be issuing 'business method' patents.").

matter patentability is simply whether the process produces a "useful, concrete and tangible result."¹⁸⁰

The Board of Patent Appeals and Interferences followed the Federal Circuit's expansionist lead in *Ex parte Lundgren*.¹⁸¹ There the Board rejected the judicially created technological arts test of subject matter patentability that the CCPA developed in *Musgrave*. The technological arts test was originally devised by the CCPA to get around the mental steps exclusion for PSM so long as the inventions were within the broad field of the technological arts.¹⁸²

Even the very broad technological arts test could be used to prohibit patentability of some inventions, however, and the patent examiner in *Lundgren* made such a rejection.¹⁸³ At issue in *Lundgren* was a method of compensating a manager of a private firm in an oligopoly market so as to reduce incentives for collusion with other firms.¹⁸⁴ The claim at issue in *Lundgren* did not tie the claimed method to a computer or to any other implementing technology. Instead, the patent claimed a method of comparing the absolute performance of a firm against the average performance of the other firms in the oligopolistic market, so as to make a manager's compensation dependent on her firm's performance measured against the other firms in the market, rather than dependent on overall profitability.¹⁸⁵ The patent examiner rejected the patent

182. For a discussion of the technological arts test, see supra notes 102–05 and accompanying text.

183. Ex parte Lundgren, 76 U.S.P.Q.2d at 1386.

^{180.} *Id.* at 1359 (quoting State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 1374 (Fed. Cir. 1998)). Of course the Federal Circuit noted that the three exceptions to subject matter patentability set out by the Supreme Court in *Diehr* still apply—"laws of nature, natural phenomena, and abstract ideas." *Id.* at 1355. The Court also noted that the patent at issue did not preempt all uses of the mathematical principle it made use of and therefore did not run afoul of another problem that the supposed mathematical algorithm exception sought to prevent—the patenting of all uses of an algorithm, which would in effect be the patenting of an abstract idea. *AT&T Corp.*, 172 F.3d at 1357–58.

^{181. 76} U.S.P.Q.2d 1385 (B.P.A.I. 2005) (per curiam).

^{184.} Id. at 1385. Note that no firm in the oligopolistic market would want to use such a method, because if it worked it would eliminate potential oligopoly profits. Rather, the method would have to be imposed on the firms by some outsider, likely a government regulator. Thus, Lundgren (an economist working for the federal government) was attempting to patent a theory of economic regulation of oligopoly markets. Steve Seidenberg, The Lundgren Method, INSIDECOUNSEL, Jan. 2006, at 24, 24, available at http://www.insidecounsel.com/Issues/2006/January%202006/Pages/The-Lundgren-Method.aspx. Lundgren filed an amicus brief in the Microsoft Antitrust remedy hearings arguing that he should be allowed to participate in the remedy hearings in order to demonstrate that his patent pending method would be the best remedy for Microsoft's antitrust violations. As Lundgren adroitly noted in his reply brief, "Carl Lundgren would be prepared to argue that use of his invention would provide a better remedy in this case than would any other remedy. If Carl Lundgren should prevail in a fair contest to select the best remedy, he could earn a fortune." Reply by Carl Lundgren to the Parties' Responses to Motions Regarding Amicus Participation at 3, United States v. Microsoft Corp., No. 00-5212 (D.C. Cir. Oct. 30, 2000), available at http://www.usdoj.gov/atr/cases/ f223500/223523b.htm. Lundgren's attempt to patent theories of regulation and then have them imposed by court order suggests its own host of problems that space constraints prohibit investigating in this Article.

^{185.} Ex parte Lundgren, 76 U.S.P.Q.2d at 1385-86.

application as being outside of the technological arts.¹⁸⁶ The Board of Patent Appeals, however, rejected the notion that a technological arts test ever existed.¹⁸⁷ The Board stated that *Musgrave* never required an invention to be within the technological arts, and that, to the extent it did, it was contrary to the Supreme Court's later decision in *Benson*.¹⁸⁸

4. The Supreme Court Begins to Rouse: *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.*

The Federal Circuit continued dismantling barriers to patentable subject matter in *Metabolite Laboratories, Inc. v. Laboratory Corp. of America Holdings.*¹⁸⁹ In *Metabolite* the Federal Circuit upheld the validity of a two-step process patent claim that covered (1) using patented or unpatented methods to test for an elevated level of an amino acid called homocysteine in warm-blooded animals and (2) correlating an elevated level of total homocysteine with a deficiency in either of two vitamins, cobalamin or folate.¹⁹⁰ Metabolite argued that any total homocysteine tests that defendant LabCorp performed and reported back to doctors must infringe the patent claim because the relationship between homocysteine measurement doctors would automatically reach a conclusion about whether a vitamin deficiency existed.¹⁹¹ The jury found for Metabolite on this theory, and "[1]he court . . . enjoined LabCorp from performing any homocysteine-only test."¹⁹²

LabCorp appealed, arguing that upholding the patent would improperly give "a monopoly over a basic scientific fact rather than any novel invention."¹⁹³ The Federal Circuit rejected LabCorp's arguments and affirmed.¹⁹⁴ The court did not address the subject matter patentability question, but instead agreed with the lower court that because the correlation is now well-known, almost every doctor who ordered and read results of homocysteine tests was a direct infringer

^{186.} *Id.* at 1386 (stating that invention was "an economic theory expressed as a mathematical algorithm without the disclosure or suggestion of computer, automated means, apparatus of any kind" (internal quotation marks omitted)).

^{187.} Id. at 1387.

^{188.} Id.

^{189. 370} F.3d 1354 (Fed. Cir. 2004).

^{190.} *Metabolite*, 370 F.3d at 1358–59, 1366–68. The patent claim states in full: "A method for detecting a deficiency of cobalamin or folate in warm-blooded animals comprising the steps of: assaying a body fluid for an elevated level of total homocysteine; and correlating an elevated level of total homocysteine in said body fluid with a deficiency of cobalamin or folate." U.S. Patent No. 4,940,658 col.41 l.58 (filed Nov. 20, 1986).

^{191.} Metabolite, 370 F.3d at 1363.

^{192.} Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 130 (2006) (Breyer, J., dissenting).

^{193.} *Id.* at 131 (quoting Corrected Brief for Appellant Lab. Corp. of Am. Holdings at 41, Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, No. 03-1120 (Fed. Cir. Feb. 10, 2003)).

^{194.} Id.

and that LabCorp induced infringement by publishing continuing education articles.¹⁹⁵

The Supreme Court granted certiorari on the issue of whether such a claim is patentable subject matter, but later dismissed the writ of certiorari as improvidently granted.¹⁹⁶ Although the dissent to the dismissal of certiorari did not carry the day, one can see in it an attempt by three justices to return to a subject matter patentability gatekeeper role. Justices Stevens and Souter joined Justice Breyer's dissent from the dismissal of the writ of certiorari, which urged that the claim was an unpatentable attempt to patent a "natural phenomenon."¹⁹⁷ The dissent alternately referred to the process claimed in *Metabolite* as a "law of nature" and a "phenomenon of nature."¹⁹⁸ The dissent also acknowledged that drawing the line between patentable and unpatentable subject matter can be difficult and arbitrary.¹⁹⁹ But the dissent did not view this as a reason to abandon a gatekeeping role, and opined that the *Correlation* between homocysteine and vitamin deficiency set forth in claim 13 is a 'natural phenomenon."²⁰¹

To the extent the dissent found legitimacy in the historical tests for subject matter patentability on the basis of the tests' historical provenance rather than on the basis of their ability to prevent the granting of patents where there is no public goods problem, the dissent's focus was misplaced. Given the recent line of cases directly rejecting the historical tests, the dissent might have more profitably analyzed directly whether allowing patents on processes such as the one claimed in *Metabolite* causes more deadweight loss from the patent monopoly than increase in invention. That is the important question for which the historical tests are only a screen.

If such an analysis had been conducted, the *Metabolite* claim would have failed the economic litmus test. An examination of the process claimed in *Metabolite* shows that while the process does produce a useful result—the testing for homocysteine and correlation with vitamin deficiency is no doubt useful in medicine—giving a blanket monopoly over all uses of the correlation is much more incentive than is needed to encourage discovery of such correlations.²⁰² The dissent was correct that the other claims in the *Metabolite* patent, which covered the methods of testing for homocysteine that the inventors designed, should be sufficient to incentivize the discovery of scientific correlations such as the one at issue in the case.

^{195.} *Metabolite*, 370 F.3d at 1365.

^{196.} Metabolite, 548 U.S. at 124–25 (per curiam).

^{197.} Id. at 134 (Breyer, J., dissenting).

^{198.} Id. at 132, 137.

^{199.} Id. at 134.

^{200.} Id. at 135.

^{201.} Metabolite, 548 U.S. at 135 (Breyer, J., dissenting).

^{202.} *Cf. id.* at 126 (noting one reason for rejecting patent protections for such correlations is that it may impede progress).

If a doctor discovers a previously unknown medical correlation, then she is in the best position to be the first one to design and market a test for that correlation. That is likely all the incentive needed to efficiently encourage research and discovery of scientific correlations. To give the discoverer a patent monopoly over all uses of the correlation, both known and unknown, causes a large amount of deadweight loss that is likely to outweigh any increased incentive to invent.²⁰³ The ability of other scientists to "correlate" a scientific fact from observing some phenomenon is obviously critical to scientific progress. To give one person the ability to restrict the correlations another makes in her mind is to give a very broad monopoly indeed, and one that the courts have historically and quite rightly refused to give, whether by reason of the "natural phenomenon exception," the "laws of nature exception," or the "mental steps doctrine."

The *Metabolite* patent shows that merely determining whether a patent claim results in a "useful, concrete, and tangible result"²⁰⁴ is not enough to prevent the grossly inefficient granting of patents. The Federal Circuit's decision in *Metabolite* meant that once the correlation between elevated levels of the amino acid in question and vitamin deficiency became known, any test for the level of that amino acid—including tests that existed in the prior art, or new and more efficient tests later developed—infringe the patent.²⁰⁵ *Metabolite* seemed to represent the Federal Circuit's complete surrender of the gatekeeper role with regard to patentable subject matter.

5. Renewed Judicial Interest in Delimiting Patentable Subject Matter?

Perhaps as a response to the dissenting justices in *Metabolite*, the Federal Circuit in *In re Bilski* recently held that process claims must be tied to a machine or cause a physical transformation to qualify as patentable subject matter.²⁰⁶ But

^{203.} The incentive is particularly outsized in the case of discoveries in the fields of science and medicine because much of the research is already incentivized by government grants, as, indeed, was the research underlying the discovery in the *Metabolite* patent. *See* U.S. Patent No. 4,940,658 col.1 1.7 (filed Nov. 20, 1986) ("The research leading to this invention was partially funded by grants from the U.S. government.").

^{204.} State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 1373 (Fed. Cir. 1998), *abrogated by In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008).

^{205.} See Metabolite, 548 U.S. at 131–32 (Breyer, J., dissenting) (presenting LabCorp's appellate-level argument).

^{206.} In re Bilski, 545 F.3d 943, 956 (Fed. Cir. 2008), cert. granted sub nom. Bilski v. Doll, 129 S. Ct. 2735 (2009). The Federal Circuit began signaling its willingness to call some inventions beyond the limits of patentable subject matter in *In re* Nuijten, 500 F.3d 1346 (Fed. Cir. 2007). There the invention was a new method of "watermarking" signals. *Id.* at 1351. These signals might carry audio or any other type of information. *Id.* at 1348. Nuijten was granted claims for (1) the process of watermarking the signals, (2) structural means and machinery for encoding the signals, and (3) encoded signals stored in a storage medium. *Id.* at 1351. The PTO rejected Claim 14 (and dependent claims), which covered the encoded signal on its own, without reference to any storage medium. *Id.* The Federal Circuit held that Claim 14 was properly rejected as unpatentable subject matter. *In re Nuijten*, 500 F.3d at 1357. The Court held that a signal, being transitory and intangible, complies with none of the four categories for patentable subject matter under § 101 (process, machine, manufacture, or composition of matter). *Id.*

note that it is too early to tell whether the Federal Circuit meant this as a meaningful restriction. The Federal Circuit could easily rely on precedents holding that software on a disk is tied to a particular machine.²⁰⁷

At the time of this Article going to press, the Supreme Court has accepted certiorari in Bilski.²⁰⁸ The Federal Circuit has an opportunity to return its jurisprudence on patentable subject matter to a position that increases social welfare by denying patentability to subject matter that does not need the additional incentive of a patent grant to be produced at efficient levels. Ideally the Court would reclaim its role of crafter of section 101 common law. If it does so, the Court should proclaim that both Congressional intent and the fact that the Constitution grants Congress the patent power solely "To promote the Progress of Science and useful Arts"²⁰⁹ means that those subject matters that do not need the incentive of the patent grant are not eligible for patents under section 101.

IV. APPLICATION OF THE MODEL TO BUSINESS METHODS

With the courts' abdication of their historical gatekeeper roles and their adoption of a bare textualist reading of the Patent Act, nearly anything now qualifies as patentable subject matter. Can this possibly be efficient? Although I have just suggested that the answer is no in the above discussion of *Metabolite Laboratories, Inc. v. Laboratory Corp. of America Holdings*²¹⁰ and *In re Bilski*,²¹¹ I turn to another class of subject matter to provide a definitive answer to the question, for fear that *Metabolite* and *Bilski* may be labeled outliers by some.

This Part of the Article makes use of the categories set out in Part II, above, to evaluate whether business methods are most likely to correspond to the situation where patentability causes more deadweight loss to society than gain from increased invention (Figure 2), and thus should receive no patent protection, or to correspond to the situation where limited patentability

Likewise, in *In re* Comiskey, 499 F.3d 1365 (Fed. Cir. 2007), *superseded by* 544 F.3d 967 (Fed. Cir. 2009), the Court rejected claims to a method of arbitration that were not tied to any implementing system or machine. *Id.* at 1379. The Court held that claims tied to software were patentable subject matter. *Id.* at 1379–80.

^{207.} In *In re Beauregard*, the PTO dropped its opposition to a claim for software contained on a floppy disk. 53 F.3d 1583, 1583–84 (Fed. Cir. 1995). Thereafter, the PTO issued new guidelines for examining computer-related inventions in which it held that claims to software on a disk or tied to a processor are patentable subject matter so long as the patent specification contains adequate written description and enablement and the invention is useful. Examination Guidelines for Computer-Related Inventions, 61 Fed. Reg. 7478, 7481 (Feb. 28, 1996). In *Ex parte Bo Li*, Appeal 2008-1213 (B.P.A.I. 2008), the Board of Patent Appeals and Interferences held that *Beauregard* claims remain valid even after *Bilski. But cf. Ex parte* Becker, Appeal 2008-2064 (B.P.A.I. 2009) (holding claim for "method for maintaining a user profile" unpatentable for not tying invention to particular machine and thus not meeting *Bilski* machine or transformation test).

^{208.} Bilski v. Doll, 129 S. Ct. 2735 (2009).

^{209.} U.S. CONST. art. I, § 8, cl. 8.

^{210. 370} F.3d 1354 (Fed. Cir. 2004).

^{211. 545} F.3d 943, 956 (Fed. Cir. 2008), cert. granted sub nom. Bilski v. Doll, 129 S. Ct. 2735 (2009).

produces more welfare gain from increased invention than deadweight loss from the patent monopoly (Figure 3), and thus should receive limited patent protection.²¹²

Even if business methods correspond to Figure 2, where patentability is never efficient, it may still be efficient to grant patent protection. If business methods cannot practically be separated from other processes, such as software, society must analyze them together as one large class of general processes. In such a case, if the benefits from granting patent protections to the larger class outweigh the deadweight losses from granting business methods patent protection, society should grant the entire class patent protection. If the benefits from granting the larger class patent protection are less than the deadweight losses from granting business methods patent protection, society should deny the entire class patent protection.

There is strong reason to believe that business methods lie on Figure 2, where patenting is never efficient. Particularly in the case of business methods, the level of incentive to invent new and useful business methods is quite high without any patent protection, and costs should be relatively low.²¹³ Recall that an inventor's end goal (to say nothing of a businessperson's) is to maximize profits. A new business method increases profits by making a firm a more efficient producer, improving the quality of the firm's product, decreasing costs of production, or simply by more effectively marketing the product. The effect of the business method may be either to decrease costs (a more efficient business produces the same good at less cost), increase revenue (a firm that produces a better product can sell more goods and/or charge a higher price), or both.

In a highly competitive market, a firm that offers even a slight drop in price or improvement in service reaps large gains in extra sales, and thus large gains in revenue. While rivals will copy the method, they generally do not do so until the method has been proven successful. Further, it takes time to learn and institute a new method. Thus, in the short run (the time it takes for rivals to copy the new business method) the inventing firm receives exclusive benefits of the new method. Often, just this temporary increase in revenue will be enough to make the invention worthwhile (i.e., to outweigh the relatively low cost of invention in the field of business methods).²¹⁴

214. See Rochelle Cooper Dreyfuss, Are Business Method Patents Bad for Business?, 16 SANTA CLARA COMPUTER & HIGH TECH. LJ. 263, 275 (2000) (arguing that "lead time (the first mover advantage) goes a long way to assuring returns adequate to recoup costs and earn substantial profit").

^{212.} For the relevant diagrams, see supra Part II.B.

^{213.} Cf. FED. TRADE COMM'N, supra note 46, ch. 3, at 1 (2003) (citing evidence that "issues of fixed cost recovery, alternative appropriability mechanisms, and relationships between initial and follow-on innovation" differ by industry); Dan L. Burk & Mark A. Lemley, Policy Levers in Patent Law, 89 VA. L. REV. 1575, 1577–89 (2003) ("Recent evidence has demonstrated that this complex relationship [between patents and increased innovation] is . . . industry-specific at each stage of the patent process"); Jay Dratler, Jr., Does Lord Darcy Yet Live? The Case Against Software and Business-Method Patents, 43 SANTA CLARA L. REV. 823, 840 (2003) (arguing that because there is market risk but not technological risk associated with implementing business methods, and market risk is not typically avoided by monopoly, patenting business methods is inefficient).

Trade secret law provides a further incentive to invest in business methods,²¹⁵ in that it allows firms to extend their enjoyment of the revenue increases they can achieve in the "short run" for as long as they can keep their new business methods secret.²¹⁶ This increases revenue in the firm's profit equation, and thus increases the amount that a firm will be willing to spend on invention. A firm achieves trade secret status by implementing confidentiality and security requirements. In addition, firms make use of employee contracts that bind their employees to conceal confidential business methods from rivals, giving the firm exclusive use.²¹⁷ A firm thus quickly and cheaply achieves a form of monopoly protection without any foray into the patent application process.²¹⁸

The trade secret regime has a substantial efficiency advantage over patent law. Private parties are allowed to establish their own levels of protection for each trade secret.²¹⁹ The federal government does not have to evaluate each trade secret method to determine whether it should be patented and the breadth of claims that should be allowed.²²⁰ Instead, the trade secret regime puts the determination of the level of protection on the party with the most information about the value of the protection as opposed to its cost.²²¹ In other words, the inventing firm can obtain a higher level of trade secret protection by taking more

^{215.} Richard C. Levin et al., *Appropriating the Returns for Industrial Research and Development*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 794–95 (1987) (presenting results of survey indicating trade secrecy was considered "more effective than patents in protecting [business] processes").

^{216.} Actually, a firm must merely take the appropriate steps to keep its methods secret, and then courts will protect against and give remedies for unauthorized distribution of the methods in many cases. Of course, a competitor is always free to reverse engineer the trade secret method, if it can.

^{217.} Note that the level of trade secret protection varies from state to state, and is fairly weak in some states, like California, where a higher premium is placed on employee mobility and the free flow of information. See Christopher Rebel J. Pace, The Case for a Federal Trade Secrets Act, 8 HARV. J.L. & TECH. 427, 443–44 (1995) ("[D]espite this universal recognition and near-universal origin of trade secrets protection, states vary widely in their treatment of trade secret misappropriation. . . . For example, a number of states have not adopted the [Uniform Trade Secrets Act]'s central definition of 'trade secret.' California dropped the UTSA requirement that a trade secret not be 'readily ascertainable by proper means.'" (quoting CAL. CIV. CODE § 3426.1(d)(1) (West Supp. 1995))); Adam Gill, Note, The Inevitable Disclosure Doctrine: Inequitable Results Are Threatened But Not Inevitable, 24 HASTINGS COMM. & ENT. L.J. 403, 416 (2002) ("[T]he codification of [California Business and Professions Code 16600] and the related case law leave no doubt that California places a high value on and has a strong tradition of protecting employee mobility.").

^{218.} Some business methods may not be able to be kept secret if they are used. Amazon's 1-Click method of selling products, for instance, has to be publicized to be used. Amazon can, of course, both keep secret and copyright the underlying code, but the method of selling must be revealed to be utilized. On the other hand, in some instances the monopoly protection can be strong and long lasting. Coca-Cola has kept the formula for Coke a trade secret for over a century. David S. Levine, *Secrecy and Unaccountability: Trade Secrets in Our Public Infrastructure*, 59 FLA. L. REV. 135, 156 (2007) ("[T]he formula for Coca-Cola, which is not patented, is the most famous example of a trade secret and has existed as a trade secret for over 100 years.").

^{219.} See Jonathan R. Chally, Note, *The Law of Trade Secrets: Toward a More Efficient Approach*, 57 VAND. L. REV. 1269, 1279 (2004) (observing that "[t]rade secret protection leads to more efficient results [than patent law] because it allows market forces to limit the law's protection").

^{220.} Id. at 1270-71.

^{221.} Id.

steps to keep the information secret, or it may obtain a lower level of protection by expending less on precautions to keep the process secret.²²² Thus the trade secret regime places the evaluation of the costs and benefits of trade secret protection on the firms—those entities that have the lowest costs to gather the relevant information. The firms then internalize and weigh all the relevant factors discussed above. The inventing firm considers the costs of inventing, the increased rewards from using the new business method, and the costs of trade secret protection, and then decides whether to engage in the costs of inventing and the appropriate level of protection for the resulting process.²²³ Rival firms consider, and act to get in on, the economic profits being gained by the inventing firm. When rivals enter a single-player market and convert it to a competitive one, they divide up the would-be monopolist's profits until such point that enough rivals have entered the market to drive deadweight loss down to zero. If the economic profits (and corresponding societal deadweight loss) are high, rivals will likely invest enough to invent the new business methods on their own.²²⁴

In addition, the internal structure of many firms may provide further incentives to invent new business methods.²²⁵ Employees are promoted through the managerial ranks for improving a firm's efficiency. The prospect of promotion and a pay raise provides employees significant independent incentive to invent.²²⁶ Further, if firms face a low cost of invention, the free rider problem may not lead to underproduction of the invention.²²⁷

224. The resources the second firm spends inventing the same business method are economic waste. Therefore if business methods are expensive to invent, patent protection might be a less costly alternative than the regime of trade secret protection, because patent holders must disclose their inventions. Additionally, if some business methods are sufficiently nonobvious that other firms will not be able to invent them, then a twenty-year patent protection accompanied by disclosure would be less costly to society than allowing the inventing firm to have a perpetual monopoly.

It should be noted, however, that even though patent protection may be cheaper than trade secret protection for some inventions, allowing a firm to choose between the two options is likely the least efficient alternative. This is because firms will choose the option that has maximum anticompetitive effect each time, that is, the firm will opt for whichever option will provide the longest period of monopoly.

225. Dreyfuss, supra note 214, at 275.

226. However, some literature suggests that there is a general decrease in innovation within firms compared to without. *See, e.g.*, RICHARD N. FOSTER & SARAH KAPLAN, CREATIVE DESTRUCTION: WHY COMPANIES THAT ARE BUILT TO LAST UNDERPERFORM THE MARKET—AND HOW TO SUCCESSFULLY TRANSFORM THEM 106 (2001) (noting that "[i]ndustries are more innovative than the

^{222.} For instance, courts will give more protection to secrets when precautions are taken to strictly limit knowledge of them to those with a need to know, when physical security features are put in place, or when all materials having to do with the trade secret are clearly marked "confidential" or "top secret." *See, e.g.*, Rockwell Graphic Sys., Inc. v. DEV Indus., Inc., 925 F.2d 174, 179–80 (7th Cir. 1991) (noting that more money spent to protect secrets indicates that secrets have value worthy of legal protection).

^{223.} Firms will not automatically seek maximum trade secret protection. Employees do not like contract provisions that limit their ability to work for a competitor in the future, or that threaten to penalize them if they reveal secrets. The employer will have to raise wages to compensate employees for this inconvenience. Thus, the employer will choose the level of trade secret protection for which increased revenues outweigh increased wages and other costs.

The nature of business methods indicates that a low cost of invention is probable. When a pharmaceutical company attempts to synthesize a new drug, it must hire researchers for lengthy periods of time, and the overhead for research laboratories and product development is quite costly. In addition, it is expensive and time consuming to complete Food and Drug Administration trials and win approval to sell a new drug. Most new business methods, however, are developed in the normal course of business. Large independent labor expenditures are not needed to create them. Further, new business methods often simply increase efficiencies within the company. A firm has an incentive to closely tailor new methods to its structure. Rivals with different structures will find it more difficult

Even taking the above arguments at face value, however, there is reason to believe that while innovation may be a problem within certain market-leading firms, it is not a problem within the market as a whole. For while innovators within a firm may not reap the full benefit of their innovations, while reaping the full costs of mistakes, entrepreneurs outside the firms can generally receive the full benefit of their innovation upon entering a market. Indeed, Professor Christensen's work shows that outside innovators consistently enter the market to make innovative leaps forward. And note that Professor Christensen's study found this level of innovation before the advent of business method patents.

On the other hand, James Bessen and Michael J. Meurer argue that the most important innovation does occur within firms:

[S]ome people claim that almost all "breakthrough" inventions come from small inventors, and their interests should be paramount in debates about patent reform.... There are good reasons to think that small inventors make important inventions. This is not true of all types of small inventors, of course; many small inventors patent games, simple machines, and other low-tech inventions. Nevertheless, many small inventors do make important high-tech inventions. But there is no evidence to suggest that *most* breakthrough inventions come from small inventors. What limited evidence exists—for example, the characteristics of inventors nominated to the National Inventors Hall of Fame—suggests that most recent major inventions originated in large organizations, although a significant minority of important inventions are developed by independent inventors or inventors working in small firms.

JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 19–20 (2008).

227. Id. at 88-89.

companies in them"); Kim B. Clark, The Interaction of Design Hierarchies and Market Concepts in Technological Evolution, 14 RES. POL'Y 235, 238 (1985) (noting that, while corporate introspection can lead to innovation, competition among producers is required in order to explore customer preferences and desires). The literature argues that several factors converge to decrease innovation within a firm. First, while innovators generally do not capture the full benefit of their innovations, they may face the full brunt of the punishment for a risk gone bad. Second, managers often do not really know what potential innovators do and so do not do well in giving innovators resources and incentives to innovate. Third, Professor Clayton Christensen maintains that market players do especially poorly in coming up with innovation in the form of "disruptive technologies"-i.e., innovation that leads to disruption in the market or in the way a firm does business. CLAYTON M. CHRISTENSEN, THE INNOVATOR'S DILEMMA: WHEN NEW TECHNOLOGIES CAUSE GREAT FIRMS TO FAIL XV (1997). According to Professor Christensen, while leading firms outperform others in perfecting existing technology in the market, they consistently miss identifying and developing disruptive technologies. Id. at xii. The reason for this, according to Christensen, is that firms see it as rational to pursue continued revenue from providing customers with marginally improved technology, but see great risk in betting on a new and disruptive technology, and consistently decline to take that risk. Id. at xvii. According to Professor Christensen's study of the issue, it is outside firms that consistently are willing to bet their firms to enter the market and pursue the disruptive technologies. Id. at 209-10.

to copy the tailored methods, and the inventing firm thus will enjoy a longer period of exclusivity.

In addition, business method patents will often serve more to redistribute rents among existing parties than to enhance innovation. This is because many business methods are simply creative marketing techniques. They are not technological advances that increase society's productive capacity; they simply divert existing consumers from one purchase to another.

The case of *In re Maucorps*²²⁸ is illustrative. Here, patent protection was denied to "a computer-implemented model of a sales organization" that determined "the optimum number of times a sales representative for a business should visit each customer over a period of time[,] [t]he optimum number of sales representatives the organization should have, and the optimum organization of sales representatives."²²⁹ As the court stated, the ultimate effect was that the applicant "arrive[d] at the optimum business organization."²³⁰

Although the court denied patent protection under the mathematical algorithm exception, not the business method exception,²³¹ the case aptly illustrates why patents should be denied to such things as business marketing methods. It is doubtful that the applicant in *Maucorps* increased society's productive capacity much through his organization method: more likely he merely diverted some customers from rival firms to his own firm. It is difficult to see what interest society has in redistributing economic rents among private parties.

One might counter that while protections for marketing devices provide society little benefit, they likely produce little harm. After all, rents are merely reallocated among parties leaving aggregate social utility unaffected. But Louis Kaplow has described a general danger of patent misuse that applies in cases such as this. Kaplow shows that all patent protection in the business context carries the danger of decreasing social utility.²³² When competing businesses hold potentially conflicting patents, they may either sue one another for infringement, or they may settle their claims. Risk aversion will lead many competitors to reach a settlement under which each party grants a cross-license to the other even if the patents have questionable validity.

Kaplow shows that companies can utilize such cross-licensing agreements as court-enforceable controls for cartel pricing.²³³ Suppose, for example, that Amazon.com, Borders, and Barnes & Noble each hold a patent for a method of

^{228. 609} F.2d 481 (C.C.P.A. 1979).

^{229.} In re Maucorps, 609 F.2d at 482.

^{230.} *Id.* There is, of course, some cost savings to optimizing sales structures and efforts. Thus, some allocative efficiency may be created as firms optimize sales and free up resources.

^{231.} *Id.* at 485; *see also* State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 1376 (Fed. Cir. 1998) (reading *In re Maucorps* as rejecting patent claim under "mathematical algorithm exception, not the business method exception"), *abrogated by In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008).

^{232.} Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1824–25 (1984).

^{233.} Id. at 1860.

online book shopping. Suppose online book shopping is a market of three; these firms hold the only three patents for online book shopping. In a world with no cross licensing, they would be competitors. Efforts to form a cartel would likely fail as the rewards to cheating (increased market share) would be large, and cartel monitoring would be difficult. Through cross-licensing agreements, however, these competitors gain access to one another's accounting records. They can thus monitor output and pricing. Further, license fees could be raised to punish cartel cheaters. Thus, cross-licensing business methods could create additional monopolies wider in scope than the original patent protection intended, and create additional deadweight losses to society.²³⁴ This general danger of patent misuse is yet another reason to withhold patentability from subject matter areas in which there is not clear evidence that the benefits from patentability significantly outweigh the costs.²³⁵

It is important to remember that copying business rivals is not inherently bad. In fact, the functioning of a free market depends on it. Proponents of business method patents ignore the fact that business methods are among those things that we most want firms to be able to copy. The very basis of efficient markets is the ability of firms to see an economically profitable business opportunity and move into that market so as to drive economic profits down until all deadweight loss is squeezed out of the market and producer and consumer surplus is maximized in the aggregate. Whereas it may be necessary for firms to be granted patents on their new products in order to encourage the optimal amount of invention of new products, it is less likely that it is necessary to subsidize firms to figure out the best ways to market and sell their new products, or the best ways to run their business operations more efficiently so as to decrease costs and increase profits.²³⁶ Moreover, allowing some firms to

- Advertising Management
- Catalog Systems
- Incentive Programs
- Redemption of Coupon
- 3. Exchanging Money and Credit Before, During, and After the Business Transaction
 - Credit and Loan Processing Point of Sale Systems
 - Point of Sal
 - Billing
 - Funds Transfer

^{234.} Id. at 1860-61.

^{235.} Nevertheless, as Professor Merges notes, some commentators ignore the cost-benefit analysis of patentability of business methods and instead simply argue that business methods should be patentable because everything else is. Merges, *supra* note 29, at 587.

^{236.} Indeed, it is arguable that the four largest groupings of business method patent filings (Class 705) are for functions that firms are incentivized to constantly improve on their own simply by virtue of operating in competitive markets. The PTO White Paper on Business Methods sets out the following as the four largest groups for patent filings within Class 705:

^{1.} Determining Who Your Customers Are, and The Products/Services They Need/Want Operations Research - Market Analysis

^{2.} Informing Customers You Exist, Showing Them Your Products & Services, and Getting Them to Purchase

patent methods of doing business such that their rivals cannot organize themselves in the most efficient manner for a period of twenty years may have much larger costs in terms of deadweight loss to society than the granting of patents on particular products. When a firm is issued a patent on a product, its rivals cannot produce that product unless licensed to do so. When a firm is granted a patent on a method of doing business, however, it can prevent its rivals from using the more efficient method, and make the costs of *all* of its rivals' goods relatively more expensive, thus driving up deadweight loss across an industry instead of merely for a particular product.²³⁷ The benefits of the patent would have to be very great indeed to justify this result.

The preceding discussion suggests that incentives to create new business methods (either within firms or without) are already quite high without patent protection and that the increase in incentive from patent protection is therefore likely to be fairly small. Further, the extension of patent protection to business methods likely causes large deadweight loss to society. Thus, business methods likely correspond to Figure 2, where the amount of deadweight loss from each amount of patent protection is always greater than the invention corresponding to each amount of patent protection. This means that business methods as a class should be placed among those subjects, like natural phenomena and abstract ideas, that should be excluded from patent protection.

The only reason not to make business methods unpatentable subject matter is if the condition mentioned at the start of this section applies—if business methods cannot be reliably separated into their own subject matter category. The complete answer to this question is beyond the scope of this Article, but some initial thoughts can be offered.

Banking Clearinghouses Tax Processing Investment Planning 4. Tracking Resources, Money, And Products Human Resource Management Scheduling Accounting Inventory Monitoring

U.S. PATENT & TRADEMARK OFFICE, USPTO WHITE PAPER – AUTOMATED BUSINESS METHODS – SECTION III CLASS 705, http://www.uspto.gov/patents/resources/methods/afmdpm/class705.jsp (last visited Oct. 26, 2009); PTO BUSINESS METHODS WHITE PAPER, *supra* note 150, at 5. While arguments may exist as to whether firms are adequately incentivized to improve in all four of the above groups, it seems inarguable that prior to patent protection, firms are already incentivized to continually improve their business practices in groups one and two even in the absence of any patent protection.

237. Imagine the loss in utility if Federal Express's "hub and spoke" delivery method had been patented. Or the utility loss that would have occurred if Wal-Mart had exclusive rights to its "just-intime" warehousing and shipping method. Or consider the more severe losses to society if Adam Smith had been able to patent the division of labor method he instituted at his pen factory.

First, even though some difficult line drawing may sometimes be called for in deciding whether to classify an invention as a business method,²³⁸ in many cases the classification will not be difficult.

Second, the mere existence of some difficult line-drawing cases is not typically enough to turn a court away from an otherwise sensible distinction.²³⁹ Even though it may have become more difficult to draw the line between business methods and business processes due to the increased importance of computers, information, and services in the "new economy," the line between business methods and patentable processes has been drawn fairly successfully by courts for a century.²⁴⁰ Further, there has been no suggestion by the Federal Circuit that the duty of drawing lines between business methods and other processes has become so difficult as to be impossible, or even that uncertainty over where the line lay was causing an excessive number of appeals on the issue.²⁴¹

Third, the other types of patents that may be hard to distinguish from business method patents are software patents (in cases in which the business method is implemented through software or computers).²⁴² Even if some "business method" inventions are disguised as software or other process inventions in their patent applications,²⁴³ this does not augur against making business methods unpatentable. If claims for business methods are disguised as

^{238.} See Examination Guidelines for Computer-Related Inventions, 61 Fed. Reg. 7478, 7479 (Feb. 28, 1996) (noting that "[o]ffice personnel have had difficulty in properly treating claims directed to methods of doing business"). See generally Robert P. Merges, *The Uninvited Guest: Patents on Wall Street*, 88 FED. RES. BANK ATLANTA ECON. REV. 1 (2003) (discussing previous difficulties with line drawing and present needs of patent system).

^{239.} See, e.g., Campbell v. Acuff-Rose Music, Inc., 510 U.S. 569, 584–85 (1994) (recognizing difficulty in fair use determinations but deciding issue nonetheless); Nichols v. Universal Pictures Corp., 45 F.2d 119, 121 (2d Cir. 1930) (deciding copyright infringement issue even though with regard to idea/expression dichotomy "[n]obody has ever been able to fix that boundary, and nobody ever can").

^{240.} See supra Part III.B.2 for a discussion of courts analyzing business methods and patentable process.

^{241.} Instead, in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, the Federal Circuit simply abandoned any gatekeeping role or efficiency analysis and ruled that textually there is no statutory basis to exclude business methods from patentability. 149 F.3d 1368, 1375 (Fed. Cir. 1998), abrogated by In re Bilski, 545 F.3d 943 (Fed. Cir. 2008). Thus there has never been a congressional or judicial finding that the line would be more difficult to draw than the many difficult lines courts must draw in all areas of the law.

^{242.} Some business method patents will be obvious. *See, e.g., In re* Bilski, 545 F.3d 943, 949 (Fed. Cir. 2008) (describing "method of hedging risk in the field of commodities trading"), *cert. granted sub nom.* Bilski v. Doll, 129 S. Ct. 2735 (2009); *Ex Parte* Lundgren, 76 U.S.P.Q.2d 1385, 1388 (B.P.A.I. 2004) (describing patent for "method of compensating a manager"). Other business method patents that are implemented via computer may be hard to distinguish from software patents. *See, e.g., State St. Bank*, 149 F.3d at 1375 (examining important addition of business method to distinguish from software patent, despite reliance on software in business process).

^{243.} John R. Allison & Starling D. Hunter, On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods, 21 BERKELEY TECH. L.J. 729, 736 (2006) (noting that some patent applicants have avoided PTO business method review policies by filing their patents under classifications not subject to second-pair-of-eyes review program).

software patents, then each claim will at least be tied to a software implementation and therefore the breadth of the patent will be narrower than one claiming a pure business method.²⁴⁴ Additionally, even if some business methods are allowed to issue as patents under the guise of ordinary processes, many of the most troubling or socially useless business method patents—patents on business structure, organization, or marketing—will be among those inventions that are most easily identifiable as business methods, and therefore will not be patentable. In other words, even if there is some slippage on the periphery, the rule against business methods.

Fourth, if business methods remain patentable, then drawing the line between business method patents and other unpatentable subject matter may be equally or more difficult than drawing the line between unpatentable processes and business methods.²⁴⁵ Would music videos have been classified as patentable business methods if such patent protection had been available at the time of their invention? How about "junk" bonds? Would they be classified as patentable business methods or as unpatentable financing tools? Likewise, would Walter Lipton's invention of the "poison pill" in the 1980s be granted patent protection as a business method, or would it be classified as some sort of unpatentable shareholder self-governance? The slippery slope of patents for processes not resulting in physically changed products does not end with business methods, but rather may drop off even more precipitously thereafter.²⁴⁶

BESSEN & MEURER, supra note 226, at 56.

^{244.} In *In re Bilski*, the Federal Circuit did not declare business methods unpatentable, but it did revise its patentable subject matter jurisprudence to require that all process patents be tied to a particular machine or cause transformation of a particular article. 545 F.3d at 956. While this ruling reduces somewhat the scope of business method patents, it leaves many business methods patentable, thus decreasing net welfare. The Supreme Court is currently considering *Bilski*. Bilski v. Doll, 129 S. Ct. 2735 (2009).

^{245.} Indeed, patentable subject matter jurisprudence in the ten years since *State Street Bank* shows that allowing business method patents did nothing to make drawing the line between patentable and unpatentable subject matter easier. *See generally In re Bilski*, 545 F.3d 943; *In re* Comiskey, 499 F.3d 1365 (Fed. Cir. 2007), *superseded by* 544 F.3d 967 (Fed. Cir. 2009); *In re* Nuijten, 500 F.3d 1346 (Fed. Cir. 2007); Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354 (Fed. Cir. 2004).

^{246.} In addition, problems with determining patent boundaries may lead to even greater deterrence of innovation in fields subject to patenting. According to Bessen and Meurer:

[[]T]he hard fact is, innovators cannot quickly and easily obtain a reliable judgment on whether prospective technology infringes on others' patents. Perhaps in an earlier time, when technology was simpler, this was not such a serious problem because the ambiguity of patent claims was not so great. But . . . there are reasons to think that this ambiguity has been increasing substantially in recent years. In addition, changes made during the 1990s in the legal methods used to determine the boundaries of patents appear to have made the uncertainty even greater.

V. IMPLICATIONS AND SUGGESTED SOLUTIONS

A. Revival of the Gatekeeper Role

An obvious conclusion results: because it remains efficient to analyze classes of subject matter and exclude some classes from patentability, the gatekeeper role should be revived.²⁴⁷ Once this delegation is made, a systematic analysis of suspect classes of subject matter should be made, starting with business methods and likely continuing to software and beyond.

As has been shown, the federal courts' abandonment of the subject matter patentability gatekeeper role has decreased total social utility and PTO efficiency. Accordingly, if the courts do not take the role back upon themselves—which the Supreme Court could do,²⁴⁸ but probably will not to the extent needed, and which the Federal Circuit almost certainly will not do—then it makes sense for Congress to take up the role or to delegate it. While Congress could take on the role of determining efficient subject matter itself, it is probably not the body best suited to the task. Congress probably does not have the time or the ability to focus the extended attention necessary to come up with the best determinations of subject matter patentability. In addition, Congress suffers from the well-known problems of industry capture and susceptibility to lobbying.²⁴⁹

A better choice probably would be for Congress to delegate the gatekeeper role to an administrative agency. An administrative agency, such as the PTO, could devote the time and resources necessary for thorough analysis.²⁵⁰ An agency could hire or consult with economists, industry members, academics, and others, so as to have a much greater factual and analytical framework available to it in making its determination than a court would typically have available to it

^{247.} Cf. Peter S. Menell, A Method for Reforming the Patent System, 13 MICH. TELECOMM. & TECH. L. REV. 487, 502 (2007) (advocating reform of patent system based on both categorical and systemic reforms).

^{248.} See Anna Lumelsky, Diamond v. Chakrabarty: Gauging Congress's Response to Dynamic Statutory Interpretation by the Supreme Court, 39 U.S.F. L. REV. 641, 641–43 (2005) (arguing that U.S. Supreme Court has power to update meaning of § 101 of Patent Act).

^{249.} See Andrew E. Jankowich, Property and Democracy in Virtual Worlds, 11 B.U. J. SCI. & TECH. L. 173, 200 (2005) ("Congress has a poor history of crafting statutes to deal with technological and intellectual property issues and is likely to focus only on issues that are controversial or are raised by large organized lobbies."); Vincent R. Johnson, Regulating Lobbyists: Law, Ethics, and Public Policy, 16 CORNELL J.L. & PUB. POL'Y 1, 12 (2006) (commenting that distorted facts, favoritism, and unfair advantage associated with lobbying threaten proper government operation).

^{250.} An agency could also take into account the amount and likelihood of other invention incentives for a particular subject matter in making a determination of whether that subject matter should be patentable. For instance, an agency tasked with determining whether scientific correlations should be patentable subject matter could analyze how much of the research that leads to the discovery of such correlations is already incentivized by other means, such as the government grant that underwrote some of the research in the *Metabolite* patent. *See* U.S. Patent No. 4,940,658 col.1 1.7 (filed Nov. 20, 1986) ("The research leading to this invention was partially funded by grants from the U.S. government.").

from the submissions of the parties to a dispute.²⁵¹ In addition, the administrative rulemaking process is probably best adapted to making rules on patentable subject matter, because of the additional provisions for public comment.

Congress may want to specifically delegate to the rulemaking agency the authority to treat different classes of subject matter differently. For example, if it is not most efficient simply to disallow patentability for certain types of subject matter, it may make sense to grant certain subject matter shorter periods of patentability so as to maximize efficiency. For instance, an agency might find that it is more efficient to patent software for shorter periods of time, whereas twenty-year patents on drugs continue to make sense.²⁵² An additional advantage to delegating the role to an administrative agency is that the agency could more easily adjust the level of protection if it is found that the level selected by the agency is either inefficiently high or low. Once Congress has passed legislation on complex matters like patent coverage, it is less likely to soon retread that ground.²⁵³

B. Additional Complication of International Agreements

One factor that impacts Congress's ability to fully delegate determination of subject matter patentability and term is found in the Agreement on Trade-

^{251.} That the amount and forms of legal protection needed to incentivize innovation seem to vary by industry is an additional factor that points to the appropriateness of having an administrative agency determine patentable subject matter. *See* FED. TRADE COMM'N, *supra* note 46, ch. 3, at 1 (finding that "issues of fixed cost recovery, alternative appropriability mechanisms, and relationships between initial and follow-on innovation" differ by industry); Burk & Lemley, *supra* note 212, at 1588–89 (noting that "[e]ach distinct technology displays an idiosyncratic profile of technical and economic determinants for research, development, and return on investment" and arguing that legal incentives for innovation must therefore be adjusted accordingly).

^{252.} This idea is not new. In 2000, Jeff Bezos, CEO of Amazon.com, suggested that patents on Internet methods be limited to three to five years. Matt Richtel, *Chairman of Amazon Urges Reduction of Patent Terms*, N.Y. TIMES, Mar. 11, 2000 at C4. This might make sense for patents on business methods or software because for these subject matters costs of invention may be quite low, but not so low that a small amount of patent protection is inappropriate. Giving these subject matters, patent protection for a short duration may have a positive effect on the amount of invention that is not outweighed by the deadweight loss to monopoly. Thus, some small amount of patent protection—like a three to five year patent term—might give businesses an additional small incentive to invent without causing an equal or greater deadweight loss. Deadweight loss might in turn become greater than additional invention after three to five years, if the amount of invention does not increase much with the additional patent protection.

^{253.} This is exemplified by the fitful course of current patent reform legislation in Congress. See Charlene Carter, Conflicting Views Mire Patent Reform, ROLL CALL, June 19, 2008, at 19, available at http://www.rollcall.com/issues/53_155/news/26052-1.html; New BIO Study Concludes Patent 'Reform' Legislation Would Impose Significant Costs on Patent System and Could Undermine U.S. Innovation and Economic Growth, LIFE SCI. WKLY, Feb. 14, 2008, at 3894, 3894; Robert Pear, Patent Bill Is Bonanza to Lobbyists, N.Y. TIMES, Apr. 30, 2008, at C1; Sheila Riley, Proposed Bill to Stop 'Patent Trolls' Supported by Big Tech Companies, INV. BUS. DAILY, May 29, 2008; Seth Stern, Economic Worries and Manufacturing Interests Threaten Patent Overhaul, CONG. Q. TODAY, April 4, 2008; Nuala Moran, U.S. Patent Reforms Might Force Firms to Rely on Trade Secrets, BIOWORLD TODAY, June 23, 2008, http://www.tmcnet.com/usubmit/2008/06/20/3509949.htm.

Related Aspects of Intellectual Property Rights ("TRIPS").²⁵⁴ The TRIPS agreement states "patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application."²⁵⁵ The TRIPS agreement does not pose a problem for the exclusion of business methods from section 101 patentable subject matter, because business methods may reasonably be defined as not being within a "field of technology," and often are not capable of "industrial application" in any strict sense.²⁵⁶ No other country has as explicitly included business methods within its patentable subject matter.²⁵⁷ Thus the United States has broken from the practice in other nations by allowing the patenting of business methods, so forbidding them patent protection would bring the United States back into harmony with other countries.

When it comes to the patentability of other subject matter, such as software, for instance, the TRIPS agreement may have more of an impact. Currently, however, Europe and Japan do not interpret TRIPS to mandate coverage of software, so here too an agency could make determinations as to subject matter patentability without running afoul of TRIPS.

The issue of variable patent terms does directly conflict with the TRIPS agreement, however. The TRIPS agreement explicitly states that patent protection shall extend for at least twenty years from the date of filing the application.²⁵⁸ Accordingly, the TRIPS agreement would have to be amended to allow for this disparate treatment of different classes of subject matter. Unfortunately, the price of uniformity in international patent laws is a decreased ability to locally shape efficient patent protection. Thus, in order to allow

^{254.} Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Legal Instruments— Results of the Uruguay Round, 33 I.L.M. 1197 (1994) [hereinafter TRIPS].

^{255.} *Id.* art. 27(1); *see also id.* art. 27(1) n.5 ("For the purposes of this Article, the terms 'inventive step' and 'capable of industrial application' may be deemed by a Member to be synonymous with the terms 'non-obvious' and 'useful' respectively.").

^{256.} See id. art. 27(1) ("[P]atents shall be available and patent rights enjoyable without discrimination as to ... the field of technology").

^{257.} While the EU and Japan have refused to pass legislation allowing business method patents, their respective patent offices have issued patents that might seem to fall into the business method category. Even so, both countries approach business methods much more restrictively than the United States:

In practice, the European Patent Office (EPO) has followed a much more difficult, perhaps even tortured, path in distinguishing between patentable, innovative computer-implemented inventions and unpatentable software and business methods. The Japanese Patent Office's (JPO) path to increased recognition of the patentability of business method and software patents has been far less contentious. However, in neither case is there indication that these countries will duplicate the extremely liberal recognition of business method and software patents that exists in the U.S.

Robert E. Thomas & Larry A. DiMatteo, *Harmonizing the International Law of Business Method and Software Patents: Following Europe's Lead*, 16 TEX. INTELL. PROP. L.J. 1, 13–14 (2007).

^{258.} TRIPS, *supra* note 254, art. 33 ("The term of protection available shall not end before the expiration of a period of twenty years counted from the filing date.").

flexibility in patent terms the effort would have to be taken up both at the national and international levels.

VI. CONCLUSION

This Article has analyzed the historical role that federal courts have played as gatekeepers of subject matter patentability and why they eventually abandoned that role. The review of the courts' decisions showed that this abandonment was neither a single impetuous expansion of subject matter patentability nor a reasoned analysis of the efficiency of expansion. Rather, it was a slow and steady erosion that occurred as judges unsuccessfully attempted to adjust traditional tests for subject matter patentability to fit the contours of new technology and the Information Age. The increasing value of software programs pressured courts to protect software processes through the patent law. In order to do this, first the Federal Circuit, and then the Supreme Court, moved away from tests that used physical/nonphysical distinctions to determine the line between patentable subject matter and unpatentable abstract ideas. The courts thus struck down the physical transformation test, the mathematical algorithm exception, and, most recently, the business method exception.

This Article has shown how the courts' gradual abdication of their gatekeeper role has allowed the patentability of virtually every subject matter. The result has been a flood of new patents drawn to subject matter that formerly were unpatentable. This Article has explained that this approach is unnecessarily costly for society. Hopefully this analysis will be helpful as courts are even now reconsidering the law of patentable subject matter. Specifically, the Article's case study of business method patents provides a prime example of a type of subject matter for which allowing patentability makes society worse off. Accordingly, this Article recommends that either the courts or Congress revive the patentable subject matter gatekeeper role. If Congress takes up the task, this Article suggests that the role might profitably be delegated to an administrative agency that can perform the analyses necessary to determine the classes of subject matter for which it is utility enhancing to grant patentability, and for which classes it is not.