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Scary Patents

By Stephen McJohn*

¶1 There are plenty of scary patents out there.[1] Especially with subject matter like software and business methods, patents of uncertain scope and validity cast a shadow over innovation in new technologies.[2] Blackboard holds a patent with some inscrutable claims that might cover the basic use of a web page to serve a class.[3] Google has been sued for infringing a "stinky" patent issued on a "[d]istributed computer database system and method."[4] One issued patent could be interpreted to cover the wiki system used by such sites as Wikipedia.[5] A number of issued patents contain broad claims for methods that appear to do little more than take existing methods and put them in software, such as a "[m]ethod for minimizing reintroduction of participants at successive social events," an "[a]pparatus and method for perusing selected vehicles having a clean title history," or "[a] method for automated analysis of an essay."[6] The holder of a patent on an "[e]lectronic book security and copyright protection system" has filed an infringement action against Amazon.com, seller of the Kindle eBook reader.[7] Many issued software

* Professor of Law, Suffolk University Law School. I appreciate terrific research work by Jonas Jacobsen and Joseph Koipally.

[1] *See generally* JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 199, 256 (2008) (discussing many flaws with software and business method patents, which often have abstract patent claims that are unclear about what technology they cover, may be read to cover technologies that are unknown at the time the patent is filed, and use broad wording whose meaning might change over time, especially in the fast-moving fields of technology).

[2] *Cf.* Vincent Chiappetta, *Defining the Proper Scope of Internet Patents: If We Don't Know Where We Want to Go, We're Unlikely to Get There*, 7 MICH. TELECOMM. & TECH. L. REV. 289, 334 (2001) (arguing that patent applicants in new subject matter areas should be required to search and disclose preexisting publicly disclosed technology).

[3] U. S. Patent No. 6,988,138 (filed June 30, 2000).

[4] *See Northeastern U. Sues Google Over Stinky Patent*, PATNEWS INTERNET PAT. NEWS SERVICE (Gregory Aharorian, Belmont, Mass.), Nov. 12, 2007. PATNEWS provides information and incisive commentary on the problems with the patent system and intellectual property issues generally. It noted several likely weak spots in the litigation against Google: the patent's validity is suspect, because it very likely was obvious in light of earlier technology; key terms in the claims were undefined and appear indefinite in light of the written description; even if the claims were valid, Google did not engage in all the steps necessary to infringe (rather, other parties such as other web sites performed some of the steps, and infringement does not occur when no single party performs all the infringing steps—a plaintiff cannot sum up the acts of different defendants). On problems with software patents generally, see http://www.iplaw-quality.com/ (website of editor and publisher of the Internet Patent News Service). Google (along with Apple and Napster) are subject of suit for allegedly infringing a patented "system for managing and marketing digital media content." *See* Michael Madison, *Owning the Internet (Again)*, MADISIONIAN.NET, Jan. 3, 2007, http://madisonian.net/2007/01/03/owning-the-internet-again/.

[5] *See* U.S. Patent No. 6,052,717 (filed Oct. 23, 1996) (describing an interactive web book system).

[6] LawGeek, http://lawgeek.typepad.com/ (last visited June 21, 2009) (providing examples of patents dubious on other grounds, such as inventions that are unlikely to work, and therefore are unpatentable for lack of utility and enablement); *see, e.g.*, LawGeek, http://lawgeek.typepad.com/lawgeek/2005/11/pto_issues_pate.html (last visited June 21, 2009) (discussing patent issued for "Space Vehicle Propelled by the Pressure of Inflationary Vacuum State").

[7] *See, e.g.*, Greg Sandoval, *Discovery hits Amazon with Kindle Patent Suit*, CNET NEWS, Mar. 17, 2009,

patents are said to be little more than trivial variants of existing technology.[8] Such patents may be like landmines, because patent infringement may be innocent. One can infringe even without knowledge of the patent (let alone copying from the patented technology).[9] Such patents have caused widespread criticism of software patent scope and validity.[10] Every enterprise faces the risk that it will independently develop a product or business, and yet face an infringement action based on a patent that it was completely unaware of.[11]

¶2 Software and business method patents, perhaps more than patents for things like bridges or drugs, raise two particular problems.[12] They are often abstract and the previous work in the field is often difficult to locate.[13] A patent on a business method, such as managing inventory, marketing a product, hedging risks using derivatives, or servicing customer relationships, may apply in many different industries.[14] A software invention may likewise find application in many areas.[15] That would be true of such inventions as a method of sorting data, a method of controlling machinery, and an

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http://news.cnet.com/8301-1023_3-10198185-93.html?tag=mncol.

[8] *See, e.g.*, Richard Stallman, *The Anatomy of a Trivial Patent*, LINUX TODAY, May 26, 2000, http://www.linuxtoday.com/news_story.php3?ltsn=2000-05-26-004-04-OP-LF.

[9] A number of commentators have called for an independent creation defense in patent law. *See, e.g.*, Stephen M. Maurer & Suzanne Scotchmer, *The Independent Invention Defense in Intellectual Property*, 69 ECONOMICA 535 (2002) (arguing that independent creation defense would preserve incentives to invent, but also permit more efficient use of inventions), *available at* http://www.dklevine.com/archive/scotchmer-independent-invention.pdf; Stephen M. McJohn, *A New Tool for Analyzing Intellectual Property*, 5 NW. J. TECH. & INTELL. PROP. 101, 112 (2006) (arguing that an independent creation defense could "preserve the incentive for innovation while reducing the costs of invalid patents and uncertain claim interpretation"); Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 MICH. L. REV. 475 (2006) (arguing that independent creation defense would more optimally adjust economic effects of patent rights).

[10] *Cf.* Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 613-14 (1999); 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, 95, 123 (2006); Pamela Samuelson, *Why Reform the U.S. Patent System? Considering Three Important Reforms to Improve the Current System*, 47 COMM. ACM 19, 21-22 (2004).

[11] Other patents are scary in a more amusing sense. *See, e.g.*, U.S. Patent No. 6,754,472 (filed Apr. 27, 2000) (describing a method and apparatus for *Distributing Power and Data to Devices Coupled to the Human Body*). *See also* Top Five Scary Patents, http://will.state.wy.us/gowyld/scary.html (last visited June 21, 2009); U.S. Patent No. 748,284 (issued Dec. 29, 1903) (describing a *Method of Preserving the Dead*); U.S. Patent No. 1,123,683 (filed Sep. 20, 1913) (describing a *Process for Extracting Metals from Living Bodies*); U.S. Patent No. 1,256,594 (issued Feb. 19, 1918) (describing a *Safety Suit for Aviators*); U.S. Patent No. 1,204,437 (filed Apr. 7, 1915) (describing a *Means for Correcting the Human Hand for Musical Purposes*); U.S. Patent No. 3,216,423 (issued Nov. 9, 1965) (describing an *Apparatus for Facilitating the Birth of a Child by Centrifugal Force*).

[12] *See generally* BESSEN & MEURER, *supra* note 1; BEN KLEMENS, MATH YOU CAN'T USE: PATENTS, COPYRIGHT, AND SOFTWARE 131 (2006). *But see* John R. Allison & Ronald J. Mann, *Disputed Quality of Software Patents*, 85 WASH. U. L. REV. 297 (2007) (empirical study suggesting that quality of software patents is not worse than other fields, with respect to disclosure of prior art). *See generally* ADAM B. JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS, AND WHAT TO DO ABOUT IT (2004) (discussing many flaws in the existing patent system). Some have suggested that patent protection is inapt due to the nature of software. *See, e.g.*, Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM. L. REV. 2308, 2312 (1994) (proposing *sui generis* protection for software).

[13] *See* BESSEN & MEURER, *supra* note 1, at 199.

[14] *See* KLEMENS, *supra* note 12.

[15] *Id.*

implementation of a business method—such as software for managing inventory or administering a mutual fund. Terminology may often be abstract and meanings can change over time. Even a straightforward term like "frame" has changed meaning and therefore, the potential scope of patents involving framing technology.[16] Abstraction may result in granting patent protection for an invention far beyond the scope of the inventor's work.[17] In addition, it makes it much more difficult for potential infringers or licensees to know whether their activity falls within the claims of a patent.[18] Someone developing a drug may be able to search the relevant patents to see if the target molecule is already patented. But someone creating a business method or developing new software could not search for every patent they might be infringing because that would be tantamount to searching every business method and software patent (as opposed to our pharmaceutical inventor, who can restrict her search to a particular area of chemical patents). Software is a "widely-applied, general-purpose technology," so patents from one industry may be readily infringed by others in a completely different industry.[19] Most software patents are held not by software companies, but by firms in other industries that develop software as part of their business.[20] Indeed, even a typical software company, quite rationally, does not attempt to determine whether it is infringing the patents of others, even though it could attempt to search at least within the area of software inventions that are closest to its field.[21]

¶3 The second principal problem with software and business method patents is the "prior art" problem.[22] In theory, a patent should only issue if a claimed invention is new[23] and nonobvious in light of what others have already done.[24] But to make that determination correctly requires identifying relevant patents, publications, and products—the "prior art." With a drug, it might be relatively easy to identify the relevant prior art, such as patents in that field, relevant specialized scientific journals, and sources of industry information. But information about software and business methods is not so neatly categorized. A patent examiner or infringing defendant may not locate a piece of invalidating prior art if the publication is in a far different field from that of the invention. In addition, much software and many business methods are simply never described in publications. Software developers do not necessarily publish their code, and business methods are often not described in printed publications.

¶4 The Blackboard patent on "Internet-based education support system and methods" illustrates both issues. The patent claims are broad and abstract, but can be read to cover any system that provides instructors, students and administrators different levels of access

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[16] *See* BESSEN & MEURER, *supra* note 1, at 195-96.

[17] *See id.* at 256.

[18] *See id.* at 200 (explaining why the breadth of claims is unclear in many software patents).

[19] *See id.* at 190.

[20] *Id.*

[21] *Cf.* Mark A. Lemley, *What ifs and Other Alternative Intellectual Property and Cyberlaw Story: Ignoring Patents*, 2008 MICH. ST. L. REV. 19 (2008).

[22] Others have suggested that the prior art problem may not be worse with patents than in other areas. *See* Martin Campbell-Kelly & Patrick Valduriez, *A Technical Critique of Fifty Software Patents*, 9 MARQ. INTELL. PROP. L. REV. 249 (2005).

[23] 35 U.S.C. § 102 (2006).

[24] 35 U.S.C. § 103 (2006).

to online course material.[25] Locating all relevant prior art in order to determine whether the invention is new and nonobvious is difficult because the patent can cut across several fields, including education, software development, and communications. Not surprisingly, the patent is surrounded by uncertainty. In February 2008, a jury awarded Blackboard millions of dollars in damages against an alleged infringer.[26] Meanwhile, the patent office was reexamining the patent, and in March 2008 reversed itself and preliminarily rejected the patent claims.[27] The Federal Circuit subsequently held some of the patent claims invalid.[28] Pending further litigation, the validity and scope of the patent, and related patents held by Blackboard, remain undecided.[29]

¶5 The uncertainty created by such patents may be reduced by the Federal Circuit's recent restrictions on the scope of patentable subject matter. *In re Bilski*[30] announced a new test for patentable subject matter, reversing a decades-long trend that had broadened patent subject matter to include business methods[31] (even tax strategies[32] or methods to enforce patents[33]) and software.[34] The *Bilski* court announced a new test that could exclude many processes from patent protection: "A claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing."[35]

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[25] The first claim covers: "A course-based system for providing to an educational community of users access to a plurality of online courses, comprising: a) a plurality of user computers, with each user computer being associated with a user of the system and with each user being capable of having predefined characteristics indicative of multiple predetermined roles in the system, each role providing a level of access to a plurality of data files associated with a particular course and a level of control over the data files associated with the course with the multiple predetermined user roles comprising at least two user's predetermined roles selected from the group consisting of a student role in one or more course associated with a student user, an instructor role in one or more courses associated with an instructor user and an administrator role associated with an administrator user, and b) a server computer in communication with each of the user computers over a network, the server computer comprising: means for storing a plurality of data files associated with a course, means for assigning a level of access to and control of each data file based on a user of the system's predetermined role in a course; means for determining whether access to a data file associated with the course is authorized; means for allowing access to and control of the data file associated with the course if authorization is granted based on the access level of the user of the system." U.S. Patent No. 6,988,138 (filed June 30, 2000).

[26] *See* Doug Lederman, *Blackboard Loses on Appeal*, INSIDE HIGHER ED, July 28, 2009, http://www.insidehighered.com/news/2009/07/28/blackboard.

[27] *See* Michael Feldstein, *All 44 Blackboard Patent Claims Invalidated by USPTO*, E-LITERATE, Mar. 28, 2008, http://mfeldstein.com/all-44-blackboard-patent-claims-invalidated-by-uspto/.

[28] *See* Blackboard, Inc. v. Desire2Learn Inc., No. 2008-1548, slip op. at 26 (Fed. Cir. July 27, 2009).

[29] *See* Lederman, *supra* note 26.

[30] 545 F.3d 943 (Fed. Cir. 2008). , *cert. granted sub nom.* Bilski v. Doll, 129 S.Ct. 2735 (U.S. June 1, 2009) (No. 08-964)

[31] State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998).

[32] *Cf.* Andrew A. Schwartz, *The Patent Office Meets the Poison Pill: Why Legal Methods Cannot be Patented*, 20 HARV. J.L. & TECH. 333, 335 (2007).

[33] The Halliburton Corporation was evidently so bothered by the assertion of patents that it filed its own application for a patent on a method of "patent acquisition and assertion by a (non-inventor) first party against a second party." *See* Cory Doctorow, *Halliburton Tries to Patent Patent Trolling Itself*, BOING BOING, Nov. 11, 2008, http://www.boingboing.net/2008/11/17/halliburton-tries-to.html.

[34] *State Street,* 149 F.3d at 1368.

[35] *Id.* at 954.

¶6 This article analyzes the likely role that this machine-or-transformation test will play in the future of patent law. The Supreme Court has granted a petition for writ of certiorari to review the *Bilski* decision.[36] The Supreme Court, in recent years, has rejected rigid tests in patent law created by the Federal Circuit.[37] But if *Bilski* is read flexibly, its approach could prove useful in several areas of patent law. The Supreme Court could well affirm the result in *Bilski* and approve the emphasis on avoiding preemption of laws of nature, natural phenomena, and abstract ideas, while instructing the courts not to rigidly apply the machine-transformation test formulated in *Bilski*.

¶7 Part I discusses the development of the law leading up to the machine-or-transformation test, along with the parallel increase of the patentability of software and business methods. Part II analyzes *Bilski*, both its reading of Supreme Court precedent and the new test it announces. In addition, as a thought experiment, this article looks at great inventions of history to see how *Bilski* would apply. Part III suggests that, despite *Bilski*'s jurisprudential shortcoming, the test it announces will have a strong positive influence on the development of patent law. Although the *Bilski* test relies on vague terms and illusory distinctions, the same is true of the central test for the scope of copyright protection.

¶8 Ideas are not protected by copyright law.[38] Although the dichotomy in copyright law between ideas (which are not protected) and expressions (which are protected) is illusory, the analytical framework it provides has served well to adapt copyright to a broad range of subject matter and to new technologies, like software. The very vagueness of the test has permitted courts to develop case law that both provides guidance for parties about the scope of copyright protection and balances a number of competing policies. Indeed, the test has proved flexible enough to adapt to different subject matters areas from fiction, like *Groundhog Day*,[39] to fact-based works, like *Who Destroyed the Hindenburg*,[40] to functional works, like the menu command structure of a spreadsheet program.

¶9 Part III then turns to more modest patent law rules, suggesting that enablement, claim interpretation, and the definiteness requirement may, in practice, play a more important role than the limits on patentable subject matter. *Bilski* will have influence here, because courts can use those doctrines to work against the same hazard *Bilski* seeks to prevent—the risk that a patent could preempt a broader area of technology. This policy against preemption can supply a unifying principle to the recent case law on enablement, in which courts have held that a valid claim must be supported by disclosure.[41] The policy against preemption can likewise support a trend in the cases

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[36] *In re* Bilski, 545 F.3d 943 (Fed. Cir. 2008), *cert. granted sub nom.* Bilski v. Doll, 129 S.Ct. 2735 (U.S. June 1, 2009) (No. 08-964).

[37] *See* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007) (rejecting Federal Circuit's rigid teaching-suggestion-motivation test for obviousness); eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006) (rejecting Federal Circuit's rigid presumption for granting of injunctive relief).

[38] *See* 17 U.S.C. § 102(b) (2006).

[39] Arden v. Columbia Pictures Indus., Inc., 908 F. Supp. 1248 (S.D.N.Y. 1995).

[40] *See* Hoehling v. Universal City Studios, Inc., 618 F.2d 972 (2d Cir. 1980).

[41] *See* Ormco Corp. v. Align Tech., Inc., 498 F.3d 1307 (Fed. Cir. 2007); *In re* Reiffin, 199 F. App'x 965 (Fed. Cir. 2006).

toward more fully enforcing the requirement that patent claims be definite.[42] That rule, although rooted in claim drafting, can serve to prevent indefinite claims that can subsequently be read to apply to after-developed technology.

¶10 The remainder of Part III turns to claim interpretation. *Bilski* takes a top-down approach to patents by announcing limits on patent's territory. Claim interpretation takes a bottom-up approach, because the scope of every patent depends on how its particular claims are interpreted. Courts can use claim interpretation to limit the scope of the patent to the contribution of the inventor. To make claim interpretation more predictable, courts could also make greater use of two doctrines that have played little role in software and business method cases: the interpretation of transition phrases and the reverse doctrine of equivalents.

I. THE ROAD TO *BILSKI*: ATTEMPTS TO DEFINE THE PATENTABILITY OF SOFTWARE AND BUSINESS METHODS

¶11 Leading up to *Bilski*, a series of Supreme Court and Federal Circuit cases struggled to provide clear guidance on the proper scope of patentable subject matter. The general principles of patentable subject matter are easy to state: products of nature, abstract ideas, and pure mathematics are not patentable, but the application of a natural phenomenon, an abstract idea, or a mathematical principle is patentable.[43] Furthermore, "[p]henomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work."[44] But courts have not been able to define the distinction between ideas and their application.[45] This distinction proved the most troublesome with respect to abstract subject matter like software or business methods.[46] A computer program or a business process is somewhat abstract by nature, since it can usually be applied to more than one area of endeavor. The courts have tried to prevent overly broad patents, while leaving room for patents on specific applications. Early cases on patentable subject matter had broad language that seemed to make software generally unpatentable, while later cases opened the door for software and business patents generally (setting the stage for *Bilski*'s attempt to reconcile the two sets of cases).

¶12 In *Gottschalk v. Benson*,[47] the Supreme Court held unpatentable a method of programming a digital computer to convert signals from binary-coded decimal form ("BCD") into pure binary form. Although computers process numbers in binary format, numbers are frequently converted to BCD to make them easier to read. For instance, the number 53 is represented as 110101 in binary form.[48] In BCD, however, the number 53 is encoded as 0101 0011 (5 is encoded as 0101 and 3 as 0011, so 53 becomes 0101 0011

[42] *See, e.g.*, Aristocrat Techs. Austl. Pty Ltd. v. Int'l Game Tech., 521 F.3d 1328 (Fed. Cir. 2008).

[43] *See, e.g.*, Gottschalk v. Benson, 409 U.S. 63 (1972).

[44] *Id.* at 67.

[45] *See, e.g.*, Jeffrey M. Kuhn, *Patentable Subject Matter Matters: New Uses for an Old Doctrine*, 22 BERKELEY TECH. L.J. 89 (2007).

[46] *Cf.* Dana Remus Irwin, *Paradise Lost in the Patent Law? Changing Visions of Technology in the Subject Matter Inquiry*, 60 FLA. L. REV. 775 (2008).

[47] 409 U.S. 63 (1972).

[48] *Id.* at 66-67.

in BCD).[49] It is then often necessary to convert from BCD form to binary form, for example, to convert 0101 0011 to 110101. The patented invention was a method of programming a computer to perform that sort of conversion.[50] The particular method involved putting the BCD number into a shift register and performing a sequence of operations that would convert it into its binary equivalent.[51]

¶13 The *Benson* court held the algorithm unpatentable due to its inclusion in the group of scientific truths, abstract principles, fundamental truths, mental processes, abstract intellectual concepts, and hitherto unknown phenomenon of nature as opposed to patentable applications ("a novel and useful structure created with the aid of knowledge of scientific truth," or "an application of the law of nature to a new and useful end").[52] The key was that the algorithm was not tied to any particular application. Any future computer programmer, working in any area, would need permission if he or she wished to use that method of conversion. As the court stated,

> 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.[53]

The court made plain that patents should not apply to such "basic tools of scientific and technological work."[54]

¶14 *Parker v. Flook*,[55] the Supreme Court's next case on patentable subject matter, likewise held a software invention unpatentable. However, the process claimed in *Flook* was not as wide-ranging as *Benson*. *Flook* concerned a method for calculating updated alarm limits during catalytic conversion processes.[56] During such a conversion process,

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[49] *See id.* at 67.

[50] *See id.* at 66-67 (quoting earlier Supreme Court cases).

[51] The claimed method was: "The method of converting signals from binary coded decimal form into binary which comprises the steps of (1) storing the binary coded decimal signals in a reentrant shift register, (2) shifting the signals to the right by at least three places, until there is a binary '1' in the second position of said register, (3) masking out said binary '1' in said second position of said register, (4) adding a binary '1' to the first position of said register, (5) shifting the signals to the left by two positions, (6) adding a '1' to said first position, and (7) shifting the signals to the right by at least three positions in preparation for a succeeding binary '1' in the second position of said register." *Id.* at 73 (quoting patent application).

[52] *Id.* at 66-71.

[53] *Id.* at 68.

[54] *Id.* at 67.

[55] 437 U.S. 584 (1978).

[56] *Id.* at 585-86. The claimed process was: "A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of Bo+K wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises: (1) Determining the present value of said process variable, said present value being defined as PVL; (2) Determining a new alarm base B1, using the following equation: B[1]=Bo(1.0<v1>minF)+PVL(F)
where F is a predetermined number greater than zero and less than 1.0; (3) Determining an updated alarm limit which is defined as B1+GK; and thereafter (4) Adjusting said alarm limit to said updated alarm limit value." *Id*. at 596-97.

problems often develop if a variable (such as the temperature, pressure rate, or flow rate) exceeds a threshold—the alarm limit.[57] The alarm limits, however, can change during the process; for example, the temperature alarm limit at the start of the process could be 150 degrees, but later might change to 200 degrees.[58] The only novel feature of the method for calculating an alarm limit was a mathematical formula.[59] The Court held that "a claim for an improved method of calculation, even when tied to a specific end use, is unpatentable subject matter under § 101."[60] Although *Benson* and *Flook* stated that the mere use of a computer or an algorithm would not necessarily make an invention unpatentable,[61] the cases threw great doubt on the patentability of abstract subject matter such as software and business methods.

¶15 The Court's next opinion took a more expansive approach to patent subject matter, although in a much different field of endeavor. *Diamond v. Chakrabarty* addressed the issue of "whether a live, human-made micro-organism is patentable subject matter under 35 U.S.C. § 101."[62] *Chakrabarty* held that a genetically engineered oil-eating microorganism was patentable, which set the stage for the widespread patenting of biotechnology inventions and discoveries. The patent office had denied the application on two grounds: "(1) that microorganisms are 'products of nature,' and (2) that as living things they are not patentable subject matter under 35 U.S.C. § 101."[63] The Supreme Court reasoned that the micro-organism was not a "product of nature" because it did not occur naturally in that form, but rather represented a new organism created by the addition of genetic material to an existing micro-organism.[64] The Court also declined to exclude living things from patentable subject matter, reasoning that Congress intended (by drafting § 101 of the Patent Act to include broad categories, prefaced by the comprehensive word *any*) for patentable subject matter to "include anything under the sun that is made by man."[65] *Chakrabarty* did, however, repeat the rule from *Benson* and *Flook* that "the laws of nature, physical phenomena, and abstract ideas" are not patentable.[66]

¶16 Returning to software in *Diamond v. Diehr*,[67] the Court took a decidedly different approach than in *Benson* and *Flook* by holding that patentable subject matter included claims encompassing the use of a computer. *Diehr* concerned a process for curing rubber, which consisted of constantly measuring certain temperatures, then feeding that information into a computer, which would calculate when to terminate the curing process.[68]

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[57] *Id.* at 594-95.
[58] *Id.* at 594-95.
[59] *Id.* at 585.
[60] *Id.* at 595.
[61] *Flook*, 437 U.S. at 595.
[62] 447 U.S. 303, 305 (1980).
[63] *Id.* at 306.
[64] *Id.* at 310 ("Here, by contrast, the patentee has produced a new bacterium with markedly different characteristics from any found in nature.").
[65] *Id.* at 309 (quoting S. REP. NO. 82-1979, at 5 (1952); H.R. REP. NO. 82-1923, at 6 (1952).
[66] *Id.* at 309.
[67] 450 U.S. 175 (1981).
[68] The invention as claimed in Claim 1 of the application: "A method of operating a rubber-molding press for precision molded compounds with the aid of a digital computer, comprising: providing said computer with a data base for said press including at least, natural logarithm conversion data (ln), the

¶17 The *Diehr* court distinguished both *Benson* and *Flook* on the grounds that the claimed inventions in those cases were simply mathematical processes, not tied to any specific application.[69] In *Benson*, the

> sole practical application of the algorithm was in connection with the programming of a general purpose digital computer. We defined "algorithm" as a "procedure for solving a given type of mathematical problem," and we concluded that such an algorithm, or mathematical formula, is like a law of nature, which cannot be the subject of a patent.[70]

¶18 In *Flook*, the claimed invention, although used in connection with manufacturing, was a numerical process not tied to any particular use. An "alarm limit" is simply a number and the Court concluded that the application sought to protect a formula for computing this number. Using this formula, the updated alarm limit could be calculated if several other variables were known. The application, however, did not purport to explain how these other variables were to be determined, nor did it purport "to contain any disclosure relating to the chemical processes at work, the monitoring of process variables, or the means of setting off an alarm or adjusting an alarm system. All that it provides is a formula for computing an updated alarm limit."[71]

¶19 Since *Diehr* in 1981, the Supreme Court has not decided any cases on the scope of patent subject matter. In that vacuum, the United States Court of Customs and Patent Appeals (U.S.C.C.P.A), in a series of cases, formulated the Freeman-Walter-Abele test for the patentability of software: "(1) determining whether the claim recites an 'algorithm' within the meaning of *Benson*, then (2) determining whether that algorithm is 'applied in any manner to physical elements or process steps.'"[72] The Federal Circuit, which succeeded the U.S.C.C.P.A. as the federal appellate court with jurisdiction over patent cases, has continued to struggle with the issue of patentable subject matter.[73] Various cases relied on such requirements as a physical application, steps in addition to the algorithm, or a physical transformation.[74]

¶20 The Federal Circuit then took a much broader approach in *In re Alappat*.[75] The *Alappat* court abandoned the various complex requirements that previous cases had used

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activation energy constant (C) unique to each batch of said compound being molded, and a constant (x) dependent upon the geometry of the particular mold of the press, initiating an interval timer in said computer upon the closure of the press for monitoring the elapsed time of said closure, constantly determining the temperature (Z) of the mold at a location closely adjacent to the mold cavity in the press during molding, constantly providing the computer with the temperature (Z), repetitively calculating in the computer, at frequent intervals during each cure, the Arrhenius equation for reaction time during the cure, which is ln v equ CZ+x where v is the total required cure time, repetitively comparing in the computer at said frequent intervals during the cure each said calculation of the total required cure time calculated with the Arrhenius equation and said elapsed time, and opening the press automatically when a comparison indicates equivalence." *Id.* at 181 (quoting claim 1 of patent application).

[69] *Id.*

[70] *Id.* at 185-86.

[71] *Id.*

[72] *In re* Bilski, 545 F.3d 943, 958-59 (Fed. Cir. 2008) (citing test formulated in *In re* Freeman, 573 F.2d 1237 (C.C.P.A. 1978); *In re* Walter, 618 F.2d 758 (C.C.P.A. 1980); *In re* Abele, 684 F.2d 902, 905-07 (C.C.P.A. 1982)).

[73] *See*, *e.g.*, *In re* Grams, 888 F.2d 835, 838-39 (Fed. Cir. 1989).

[74] *Cf.* Arrhythmia Research Tech., Inc. v. Corazonix Corp., 958 F.2d 1053 (Fed. Cir. 1992).

[75] 33 F.3d 1526 (Fed. Cir. 1994) (en banc).

to mark the boundaries of patentable subject matter. Rather, the court looked to a much simpler test: whether the claimed invention produced a "useful, concrete and tangible result."[76] The invention at issue transformed a data set in order to configure electronic circuitry to convert the input data to an oscilloscope to a form that would give a smoother-looking image.[77] The court decided this process was indeed a "useful, concrete and tangible" result, and so within patentable subject matter.[78]

¶21 *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*[79] upheld a less tangible invention. The invention in *State Street* was a data processing system for implementing an investment structure for mutual funds.[80] By pooling their assets in a single investment portfolio, several mutual funds could save on administration expenses but retain tax advantages. [81] By necessity, the complex system was implemented by software.[82] *State Street* followed *Alappat* in holding that the system was patentable subject matter because it produced a "useful, concrete, and tangible result."[83] The court relied on the broad language of § 101: "The repetitive use of the expansive term 'any' in § 101 shows Congress's intent not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in § 101."[84] Although *State Street* applied the same test as *Alappat*, it applied the test more broadly. *State Street* included within patentable subject matter an invention with numbers as input and numbers as output, going beyond *Diehr* (in which the end result was cured rubber) and *Alappat* (in which the end result was a clearer picture on the oscilloscope screen).

¶22 The Federal Circuit stuck with the "useful, concrete, and tangible result" test in *AT&T Corp. v. Excel Communications, Inc.*[85] *AT&T* rejected the argument that the process at issue fell outside patentable subject matter because it consisted simply of using a logical process to determine the value of a number used in a billing method, and was simply an unpatentable mathematical algorithm.[86] *AT&T* held that as long as the claimed method produced a "useful, concrete and tangible result" it was patentable, even though it might simply consist of manipulating numbers.[87] The court held the application of the numerical process to be specific enough to be patentable: "AT&T's claimed process employs subscribers' and call recipients' PICs as data, applies Boolean algebra to those data to determine the value of the PIC indicator, and applies that value through switching and recording mechanisms to create a signal useful for billing purposes."[88]

¶23 The Supreme Court then appeared to take the reins from the Federal Circuit, granting certiorari in a case that promised to give guidance on the scope of patentable

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[76] *Id.* at 1544.
[77] *Id.* at 1543-45.
[78] *Id.* at 1544.
[79] 149 F.3d 1368 (Fed. Cir. 1998).
[80] *Id.* at 1370.
[81] *Id.*
[82] *Id.*
[83] *Id.* at 1373.
[84] *Id.*
[85] 172 F.3d 1352 (Fed. Cir. 1999).
[86] *Id.* at 1358-59.
[87] *Id.* at 1355 ("Since the process of manipulation of numbers is a fundamental part of computer technology, we have had to reexamine the rules that govern the patentability of such technology.").
[88] *Id.* at 1358.

subject matter, *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.*[89] *Metabolite* was not a software or business method case, but it presented a nice issue about the distinction between claiming a law of nature and claiming an application of the law of nature.[90] The patent in question claimed a method of "correlating an elevated level of total homocysteine in . . . body fluid with a deficiency of cobalamin or folate"; in other words, diagnosing a vitamin deficiency (of folate and cobalamin) by checking the level of a correlated amino acid.[91] The inventors discovered that a high level of the amino acid in a person's blood corresponds to low levels of the vitamins in the person's system.[92] The method would seem to encompass natural phenomena: if there was a correlation between the vitamin level and the level of the amino acid, then that correlation could be used to diagnose the vitamin deficiency from the low level of the amino acid.[93] Metabolite, however, made inventive arguments that granting a patent on the diagnostic method still left open other uses of the natural phenomenon.[94] As Metabolite argued in its briefs, one could use the principle the other way around. If there is a correlation between high levels of the amino acid and low levels of Vitamin B, then one could reduce levels of the amino acid by taking Vitamin B. This would have health benefits, because high levels of that particular amino acid can have a deleterious effect.

¶24 After taking briefs and hearing oral arguments, the Supreme Court did not decide the case on the merits.[95] Rather, it dismissed the certiorari petition as improvidently granted, apparently taking the view that the patentability issue, which had not been fully addressed in the lower courts, was not ripe for review on the limited record before the Court.[96] Justice Breyer, joined by Justices Stevens and Souter, dissented from the dismissal, taking the position that the Court should have decided the case and should have ruled that the claim was beyond the scope of patentable subject matter.[97] Justice Breyer conceded that the "category of non patentable '[p]henomena of nature,' like the categories of 'mental processes' and 'abstract intellectual concepts,' is not easy to define."[98] Yet, Justice Breyer noted, intellectual property law is replete with key distinctions that have difficult borders.[99] In particular, he quoted Judge Learned Hand for the proposition that the fundamental distinction in copyright law between copyrightable expression and noncopyrightable ideas "wherever it is drawn, will seem arbitrary."[100] Justice Breyer would have held the invention unpatentable, because it merely required someone to think about the results of an unpatented test, by correlating the results of the amino acid test to the scientific discovery about the relationship between those results and vitamin B levels: "Claim 13's process instructs the user to (1) obtain test results and

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[89] 548 U.S. 124 (2006).
[90] *Id.*
[91] *Id.*
[92] *Id.*
[93] *Id.*
[94] *See* Brief for Respondents at 75, Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124 (2006) (No. 04-607).
[95] 548 U.S. 124 (2007).
[96] *Id.*
[97] *Id.* at 134-38 (Breyer, J., dissenting).
[98] *Id.* at 134.
[99] *Id.*
[100] *Id.* (quoting Nichols v. Universal Pictures Corp., 45 F.2d 119, 122 (2d Cir. 1930) (L. Hand, J.)).

(2) think about them."[101] Breyer noted that the claim might have met the Federal Circuit's test for patentable subject matter, whether the process produces a "useful, concrete and tangible result." But, he leveled a broadside at the test: the Supreme Court "has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary."[102]

¶25 To sum up, the Supreme Court issued two opinions, *Benson* and *Flook*, holding that particular software inventions were not patentable, while carefully stating that some computer-implemented inventions could be patentable. *Chakrabarty* held that a genetically engineered micro-organism was patentable, using broad language. *Diehr*, on facts not greatly different from *Flook*, held a software invention to be patentable. The lower courts next took up the cause, first struggling to form the Freeman-Walter-Abele test: (1) determining whether the claim recites an "algorithm" within the meaning of *Benson*, then (2) determining whether that algorithm is "applied in any manner to physical elements or process steps."[103] The Federal Circuit then abandoned that restrictive approach, deciding instead, under *State Street* and *AT&T*, that an invention included patentable subject matter if it yielded a "useful, concrete and tangible result."[104] Under this approach, the key to patentability was not the subject matter requirement, but rather the substantive requirements that an invention be novel and nonobvious. The Supreme Court passed up the opportunity to clarify matters in *Metabolite*, but several members of the court expressed great skepticism that the open door of *State Street* was consistent with the earlier Supreme Court cases.

¶26 The skepticism expressed in *Metabolite* about *State Street*'s broad approach to patentable subject matter reflected increasing skepticism about software and business method patents among academics, engineers, industry, and beyond. Software patents have been criticized on many grounds. Unlike industries like pharmaceuticals, where patents may be necessary to finance the millions required to bring a drug through research, development, and FDA approval, a software or business invention may be relatively inexpensive to develop.[105] As noted above, software business patents have also been criticized because their claims are often abstract and hence, difficult to interpret and apply, and because the prior art in relevant fields can be difficult to locate, making it difficult to determine if the application represents a patentable innovation.

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[101] *Id.* at 136.

[102] *Id.*

[103] *In re* Bilski, 545 F.3d 943, 958-59 (Fed. Cir. 2008) (citing test formulated in *In re* Freeman, 573 F.2d 1237 (C.C.P.A. 1978); *In re* Walter, 618 F.2d 758 (C.C.P.A. 1980); *In re* Abele, 684 F.2d 902, 905-07 (C.C.P.A. 1982)).

[104] State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 1375 (Fed. Cir. 1998).

[105] *See, e.g.*, *In re* Bilski, 545 F.3d 943, 1005-06 (Fed. Cir. 2008) (Mayer, J., dissenting) ("Although patents are not a prerequisite to business innovation, they are of undeniable importance in promoting technological advances. For example, the pharmaceutical industry relies on patent protection in order to recoup the large sums it invests to develop life-saving and life-enhancing drugs . . . Business method patents, unlike those granted for pharmaceuticals and other products, offer rewards that are grossly disproportionate to the costs of innovation. In contrast to technological endeavors, business innovations frequently involve little or no investment in research and development.") (citing Jay Dratler, Jr., *Alice in Wonderland Meets the U.S. Patent System*, 38 AKRON L. REV. 299, 313-14 (2005)).

II. BILSKI: THE MACHINE-OR-TRANSFORMATION TEST

¶27 The Federal Circuit, sitting en banc in *In re Bilski*,[106] announced a test intended to prevent a patent from preempting a "fundamental idea," meaning a law of nature, a natural phenomenon, or an abstract idea.[107] The claimed invention was a method of hedging risks in the commodities field using derivative contracts.[108] Under *State Street* and *AT&T*, such a method would be patentable if it yields a useful, concrete and tangible result.[109] The Federal Circuit in *Bilski* stated that the "useful, concrete and tangible" test was "inadequate."[110] Rather, the court formulated a test drawn from language in *Benson*, *Flook*, and *Diehr*. Under *Bilski*, a process is patentable only if "(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing."

¶28 This section looks at *Bilski* from two angles, legal reasoning and future effects. *Bilski*'s analysis is hardly iron-clad, and the opinion seems result-oriented. It reads as though the Federal Circuit had determined its destination (announcing the newly applicable test) and treated the analysis as an obstacle course. The opinion gives little weight to the very statute it is interpreting or to the facts of the relevant Supreme Court cases, and it develops a test that heeds some, but not all of the language of those cases. Concededly, in a common law system, a landmark case must sometimes extract itself from the established precedent. As precedent for patent law going forward, *Bilski* (despite its analytical shortcomings), holds great promise. The test it formulates gives the courts a formidable tool to limit the scope of patents. Although *Bilski*'s doctrinal impact is limited to patentable subject matter, its influence may be even greater in other areas of patent law that, taken together may play a greater role in limiting the scope of questionable patent claims.

A. Bilski's Legal Analysis

¶29 *Bilski*'s principal concern was preventing overly broad patents: "The question before us then is whether Applicants' claim recites a fundamental principle and, if so, whether it would pre-empt substantially all uses of that fundamental principle if allowed."[111] The court looked to the idea of preemption to distinguish *Benson*, where the

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[106] 545 F.3d 943 (Fed. Cir. 2008).

[107] *Id.* at 951-52 n.5.

[108] The text of the claim at issue: "A method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of: (a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate based upon historical averages, said fixed rate corresponding to a risk position of said consumer; (b) identifying market participants for said commodity having a counter-risk position to said consumers; and (c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions." *In re* Bilski, 545 F.3d at 949 (citing claim 1 of U.S. Patent Application Serial No. 08/833,892).

[109] *See Bilski*, 545 F.3d at 959. State Street held "that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a patent-eligible invention because it produces 'a useful, concrete and tangible result.'" *See id.* (quoting *State Street*, 149 F.3d at 1373).

[110] *Id.* at 959-60.

[111] *Id.* at 954.

claimed conversion algorithm would be useful in many areas of computer programming, from *Diehr*, where the use of an algorithm was limited to curing rubber.[112] Ideas and principles are not patentable; applications of ideas and principles are patentable. *Bilski* sought to draw the line by requiring that the process be applied specifically, by being tied to a particular machine or by transforming something particular. The *Bilski* court reached that test only after navigating a number of objections.

¶30 The first impediment was the governing statute. The statute defines "process" in broad terms: "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material."[113] That definition contains none of the restrictions that the court's new test included. But the court dismissed the statutory definition: "this provision is unhelpful given that the definition itself uses the term 'process.'"[114] Courts often struggle to interpret statutory definitions, to fit the language of the statute to the legislative history or underlying purpose of the statute or the governing case law. But, for the court simply to dismiss the governing legal rule as "unhelpful" is quite unusual. Substantively, it is a weak objection that the definition of "process" is unhelpful because it uses the word "process" within the definition itself. Such a recursive[115] definition occurs in other parts of the patent statute, such as the immediately preceding definition: "The term 'invention' means invention or discovery."[116] Recursive definitions are widely used in mathematics and software – so the court's dismissal of such definitions in a case central to software patents is ironic.

¶31 The court also declined to discuss the applicability of its most recent case on patentable subject matter, *In re Nuijten*,[117] on the ground that "that decision primarily concerned whether a claim to an electronic signal was drawn to a patent-eligible manufacture."[118] So although the statute was not guiding, recent precedent could be ignored because it interpreted a slightly different provision of the same statute. Although *Nuijten* technically addressed a different phrase (in the same sentence), the underlying policy issues are the same—how broad patentable subject matter should extend—and simply ignoring recent precedent is again an unusual move for a court in such an important case.

¶32 The *Bilski* court next made some fine maneuvers in order to characterize the machine-or-transformation test as one drawn from Supreme Court precedent. The language drawn from *Flook* was placed in a footnote and offered up tentatively at best: "An argument can be made [that the Supreme] Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a 'different state or thing.'"[119] *Benson* had referred to the machine-or-transformation inquiry only as "the clue to the patentability of a process claim."[120]

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[112] *Id.* at 953-54.
[113] 35 U.S.C. § 100(b) (2006).
[114] *Bilski*, 545 F.3d at 951 n.3.
[115] Lorie Graham & Stephen McJohn, *Cognition, Law, Stories*, 10 MINN. J. L. SCI. & TECH. 255 (2009) (discussing recursive reasoning).
[116] 35 U.S.C. § 100(b) (2006).
[117] 500 F.3d 1346 (Fed. Cir. 2007).
[118] *Bilski*, 545 F.3d at 951.
[119] *Id.* at 954 (quoting Parker v. Flook, 437 U.S. 584, 589 n.9 (1978)).
[120] *Id.* (quoting Gottschalk v. Benson, 409 U.S. 63, 70 (1972)).

¶33 More directly, the Court stated in *Benson* that it was not holding that the machine-or-transformation inquiry was the exclusive test for patentability of processes:

> It is argued that a process patent 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.[121]

¶34 In *Flook*, the Court again stated that it assumed that meeting the machine-or-transformation inquiry was not necessarily a requirement for patentability of processes.[122] But the *Bilski* court placed great weight on the fact that this qualification was not repeated in *Diehr*, when it quoted *Benson*'s language about the machine-or-transformation inquiry being "the clue" to patentability.[123] But the fact that the Court did not repeat that reasoning a third time, in a case where the question did not arise, did not imply that the Court had abandoned it.

¶35 The *Bilski* court also specifically declined to reason about the facts of the Supreme Court cases on point:

> Analogizing to the facts of *Diehr* or *Benson* is of limited usefulness because the more challenging process claims of the twenty-first century are seldom so clearly limited in scope as the highly specific, plainly corporeal industrial manufacturing process of *Diehr*; nor are they typically as broadly claimed or purely abstract and mathematical as the algorithm of *Benson*.[124]

¶36 The facts of Supreme Court cases are likewise rarely so pointedly ignored. The distinction again is hardly robust. The process claim at issue in *Bilski* was hardly a cutting edge 21st-century technology. Rather, the application had been made in 1997, for a method of hedging risk[125]—a type of business method that preceded by centuries the software inventions in the Supreme Court cases.

B. Evaluation of the Machine-or-Transformation Test

¶37 In short, the Federal Circuit in *Bilski* chose to adopt a rule that the Supreme Court had specifically declined to make a general rule, chose to ignore the facts of the Supreme Court cases and its own most recent case on point, and chose to set aside the statute's definition of the word that governed the case. It can at least be said, however, that the court did not hide its footprints. It took these steps explicitly, even though *Bilski*'s doctrinal footing may be weak. Most importantly, *Bilski* was addressing an issue—the governing test for patentable subject matter—that has defied courts and commentators for decades. Time has only made clearer what a patent treatise author described in 1986 as "the awkward distinctions and seemingly irreconcilable results of the case law since *Benson*, including the Supreme Court's decisions in *Parker v. Flook* and *Diamond v.*

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[121] *Id.* at 956 (quoting *Benson*, 409 U.S. at 71).
[122] *Id.* (quoting *Flook*, 437 U.S. at 589 n.9).
[123] *Id.* (quoting Diamond v. Diehr, 450 U.S. 175, 184 (1981)).
[124] *Id.* at 954.
[125] *Id.* at 949.

Diehr."[126] A little analytical weakness will not undermine the case, if the court has fashioned a test that can meet the challenge.

¶38 The *Bilski* test does not provide straightforward guidance. Although it sets out an apparently clear structure, much interpretation will be needed to define the key terms it uses. But, although the test will not necessarily enable courts to easily decide future cases, it may give them better guidance than previous tests by providing a firm policy framework.

¶39 As *Bilski* put it, the governing test for patentability of processes is whether "(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing."[127] The test seeks to prevent preemption of fundamental principles by limiting the scope of patent claims, requiring that the claim be limited either to use on a particular machine or to a use that transforms a particular thing.[128] The test seeks to exclude such abstract inventions as pure software, mental processes, or abstract business methods with applications in many fields of endeavor. The words of the test, however, will not draw the lines sought.

¶40 The first limit is that the invention be tied to "a particular machine or apparatus."[129] That formulation did not address a key question – whether a general purpose computer would qualify as "a particular machine." Rather, *Bilski* left that thorny question open for future cases. If a general purpose computer qualifies as "a particular machine," then the potential set of patentable software inventions is nearly limitless, because any software could be claimed as long as it could run on a general purpose computer. *Bilski* did note that in *Benson* the conversion algorithm was not patentable although it was claimed for use on a general purpose computer. [130] That was not a limitation, on the theory that the algorithm had no practical use other than on a computer, so the tie to a computer was not limiting. [131] But that leaves little guidance for when limiting the invention to use on a general purpose computer would be sufficient – or whether it would be sufficient to limit it to a particular type of use on a computer, or use in part of the computer, such as on a specialized mathematics processor.

¶41 Beyond leaving open that well-known question, the limit to "a particular machine" fails as a literal matter even with more abstract claims. For example, it is generally agreed that pure mental processes are not patentable.[132] But one could draft a patent claim on a mental process that is tied to a particular machine—the human brain. After all, the brain is a machine[133] – the most complex machine known.[134] A diagnostic method, a calculating process, a method of determining how to hedge risk, the conversion algorithm in *Benson*—any abstract unpatentable process could be drafted as a process

[126] Donald S. Chisum, *The Future of Software Protection: The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 961 (1986).

[127] *Bilski*, 545 F.3d at 954.

[128] *Id.* at 954-56.

[129] *Id.* at 954.

[130] *Id.* at 955.

[131] *Id.* at 953-54 (discussing *Benson*).

[132] *See, e.g.*, *In re* Comiskey, 2009 U.S. App. LEXIS 400, 89 U.S.P.Q.2d 1641 (Fed. Cir. Jan. 13, 2009).

[133] *See, e.g.*, NORMAN DOIDGE, The BRAIN THAT CHANGES ITSELF 12, 13, 47, 250 (Penguin 2007) (describing view of brain as complex machine, made of parts that perform specific functions and exist in genetically predetermined or hardwired location).

[134] "The brain, as the most complex machine on the planet, remained unexplored in the computational sense." Igor Aleksander, *A Brain in the Hand*, 432 NATURE 18 (Nov. 4, 2004).

performed with a human brain. Of course, no court would hold the process patentable, but only if the literal term in the *Bilski* test ("a particular machine") is interpreted in light of the underlying rationale behind the test. An application for a patent on a process performed with a human brain will be held unpatentable not because the brain is not a machine, but rather because it is not the *sort* of machine envisioned by the machine-or-transformation test. This means that to determine the scope of the machine-or-transformation test requires differentiating between different machines based on the underlying policy – avoiding preemption of fundamental principles.

¶42 What constitutes a "machine" for purposes of the machine-or-transformation test will likewise require considerable interpretation with respect to biotech patents. A cell of a plant or animal is a "machine" for patent law purposes.[135] A cell, like such classic machines as a steam engine, consumes fuel and performs work. If a cell is a machine for purposes of the *Bilski* test, then it would be easier for inventions covering biological processes to qualify. Diagnostic processes, which might be considered as unpatentable abstract ideas, could be drafted as tied to particular categories of cells.

¶43 The other prong of the machine-or-transformation test will likewise require considerable interpretation before its extent is at all clear. A process, even if not tied to a particular machine, may be patentable if "it transforms a particular article into a different state or thing."[136] This raises a thorny question: what constitutes a "transformation"? To take again an extreme example, this could be read to make patentable any software invention. Computers exist only to change into different states. The classic conception of a general purpose computer is the Turing machine, "a mathematical model of a device that changes its internal *state* and reads from, writes on, and moves, a potentially infinite tape, all in accordance with its present *state*."[137] Computer programming, at its core, uses computer instructions to change the state of the memory, registers and other devices to perform tasks. "State" is so central to computing that the word has taken on related vernacular meanings: to ask a hacker "What's your state?" means 'What are you doing?' or 'What are you about to do?'[138] Software is the art of transforming one state to another (often many times in succession)—so even the most abstract software invention would also literally meet the second prong of the *Bilski* test.

¶44 The word "transform" seems much simpler than it would be in application to actual inventions. The *Bilski* court gave little clue as to what would constitute the requisite "transformation" (as opposed to a more modest "change"). The machine-or-transformation test, on its face, requires a determination of whether there is a transformation or not. This is a binary determination, but patent law could learn a lesson

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[135] *See* Amgen Inc. v. U.S. Int'l Trade Comm'n, 902 F.2d 1532, 1537 (Fed. Cir. 1990).

[136] *Bilski*, 545 F.3d at 954.

[137] IBM DICTIONARY OF COMPUTING 710 (10th ed. 1993).

[138] The definition of "state" from the New Hacker's Dictionary:

1. Condition, situation. "What's the state of your latest hack?" "It's winning away." "The system tried to read and write the disk simultaneously and got into a totally wedged state." The standard question "What's your state?" means "What are you doing?" or "What are you about to do?" Typical answers are "about to gronk out", or "hungry". Another standard question is "What's the state of the world?", meaning "What's new?" or "What's going on?". The more terse and humorous way of asking these questions would be "State-p?". Another way of phrasing the first question under sense 1 would be "state-p latest hack?". 2. Information being maintained in non-permanent memory (electronic or human).

NEW HACKER'S DICTIONARY 425 (3d. ed. 1996), *available at* http://www.ccil.org/jargon/jargon_34.html.

here from copyright law, that the concept of transformation is more complex. Under the copyright law, a transformative use of a protected work is likely to qualify as a "fair use" that does not infringe the author's rights.[139] A parody version of the song *Pretty Woman* qualified for fair use largely because the use was held "transformative," a use that "adds something new, with a further purpose or different character, altering the first with new expression, meaning, or message."[140] But the Supreme Court has indicated that, in copyright, determination of whether a use is transformative is not an all-or-nothing question. Rather, there is a spectrum: "the more transformative the new work, the less will be the significance of other factors, like commercialism, that may weigh against a finding of fair use."[141] The fluid nature of "transformation," however, has made it a tool rather than an obstruction. Courts are given flexibility to implement the underlying polices of fair use, such as balancing the interests of copyright holders against the expressive interests of other creators interested in building on or criticizing their works.[142] Indeed, courts have held uses to be "transformative" even when they do not really change the nature of the copyrighted work.[143] Thumbnail versions of photographs displayed by Google to users searching for images were held transformative[144]—but not because there was creativity in making the small, low-resolution, and purposefully inferior images. Rather, the use was transformative because the images were used for a different purpose than what the original author intended.[145] The thumbnail images were used in order to facilitate searching for images online—a "transformative" use only in the sense that Google made a productive use of the images that was so different than the copyright holder's use that it did not threaten the market for the copyrighted work.[146] Similarly, putting student papers into a database used for detecting plagiarism was held to be a "transformative" use.[147] The papers themselves were not transformed; no new creative elements were added. But the use was sufficiently different that the "transformative" label was held applicable.[148] As courts apply the same term in the different context of the machine-or-transformation test, the meaning of "transform" may come to depend not literally on whether changes were made to the relevant subject matter, but rather whether granting patent protection on the claimed invention would hazard preemption of a fundamental principle.

¶45 The interpretation of "transformation" will play an important role in the scope of patentable subject matter. The answer will be particularly important in biotechnology, where there are many processes that do not make physical changes, but have important secondary effects. Not long after *Bilski*, the Federal Circuit decided a case raising precisely this issue, *Classen Immunotherapies, Inc. v. Biogen Idec*.[149] The patented

[139] *See* 17 U.S.C. § 107 (2006); Campbell v. Acuff-Rose Music, 510 U.S. 569, 579 (1994).
[140] *Campbell*, 510 U.S. at 579.
[141] *Id.*
[142] *Id.*
[143] *See* A.V. v. iParadigms, LLC, 562 F.3d 630 (4th Cir. 2009); Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146, 1165 (9th Cir. 2007).
[144] *See Perfect 10*, 508 F.3d at 1165.
[145] *See id.*
[146] *Id.*
[147] See *iParadigms*, 562 F.3d at 640.
[148] *Id.*
[149] 304 F. App'x. 866 (Fed. Cir. 2008).

invention comprised immunizing mammals in a treatment group of mammals and comparing the incidence of various disorders.[150] Such a broad claim would seem to be unpatentable as embracing an abstract idea, rather than its application. But, reaching that conclusion in the terms of the machine-or-transformation test is not so straightforward, because there was arguably a transformation involved: immunizing the animals would change them. The court did not analyze the question, but instead summarily affirmed the case without discussing how the machine-or-transformation test applied.[151] That summary treatment may reflect not how straightforward the machine-or-transformation test is to apply, but rather how complex, meaning that although the panel agreed on the result, they did not agree on the reasoning leading to the result. As noted shortly thereafter, the "short opinion may well be the only consensus reached amongst the panel."[152] Provided that courts approach the machine-or-transformation test as a guide to implement policy, rather than as a rigid rule, it may prove a formidable tool in an area that has defied attempts by courts and commentators to create a uniform rule.[153]

III. ECHOES OF LEARNED HAND: THE FORCE OF THE ANTI-PREEMPTION POLICY ON PATENT SCOPE

¶46 The *Bilski* test, while concise, will require considerable interpretation in its application to particular cases, and may well apply differently in different fields of technology, such as mechanical engineering, software applications, and biotechnology. That indefiniteness and variability, however, may prove to be a considerable advantage.

A. Comparison to Copyright's Idea/Expression Rule

¶47 Justice Breyer, in dissenting from the dismissal of certiorari in *Metabolite*, had urged the Court to address the boundaries of patentable subject matter.[154] He quoted *Flook* for the proposition that "[t]he line between a patentable 'process' and an unpatentable 'principle' is not always clear."[155] He then quoted Judge Learned Hand for the proposition that line-drawing in copyright is likewise elusive: "[W]e are as aware as

[150] The relevant claim: "A method of determining whether an immunization schedule affects the incidence or severity of a chronic immune-mediated disorder in a treatment group of mammals, relative to a control group of mammals, which comprises: immunizing mammals in the treatment group of mammals with one or more doses of one or more immunogens, according to said immunization schedule, and comparing the incidence, prevalence, frequency or severity of said chronic immune-mediated disorder or the level of a marker of such a disorder, in the treatment group, with that in the control group." U.S. Patent No. 5,723,283, at [Claim 1] (filed May 31, 1995).

[151] Classen Immunotherapies, Inc. v. Biogen Idec, 304 F. App'x 866 (Fed. Cir. 2008).

[152] Dennis Crouch, *Federal Circuit Invalidates Immunization Patent for Lack of Patentable Subject Matter*, PATENTLY-O, Dec. 19, 2008, http://www.patentlyo.com/patent/2008/12/federal-circu-2.html.

[153] The Federal Circuit's opinion read, in its entirety: "In light of our decision in *In re Bilski,* 545 F.3d 943 (Fed. Cir. 2008) (en banc), we affirm the district court's grant of summary judgment that these claims are invalid under 35 U.S.C. § 101. Dr. Classen's claims are neither 'tied to a particular machine or apparatus' nor do they 'transform[] a particular article into a different state or thing.' Id. at 954. Therefore we *affirm*." Classen Immunotherapies, Inc., v. Biogen Idec, 304 F. App'x 866 (Fed. Cir. 2008).

[154] Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. at 134-35 (Breyer, J., dissenting from dismissal of cert. petition).

[155] *Id*. at 134.

anyone that the line [between copyrightable expressions and non-copyrightable ideas], wherever it is drawn, will seem arbitrary."[156]

¶48 It is well-established that copyright does not protect ideas, but rather the expression of ideas.[157] However, there is no bright line between ideas and expression. Rather, courts used the "abstractions" analysis set out by Learned Hand.[158] The key factor is "whether giving protection to the copied element would reduce the ability of others to create works, or whether others are left with plenty of alternatives."[159] This underlying policy is quite similar to the underlying policy for patentable subject matter in *Bilski*: whether patent protection for the claim would *preempt* a fundamental principle or is simply one application of the principle, leaving other applications free for others to use.[160]

¶49 The idea/expression distinction, although vague, has proved of great value in copyright law. The flexibility of the test permits it to apply to the broad range of works that are subject to copyright protection. When analyzing creative works (which receive a high level of copyright protection) courts can distinguish between idea and expression at a relatively high level of abstraction. When analyzing functional or factual works (which receive less, if any, protection), courts draw the line at a lower level. It was not copyright infringement to copy many specific elements from a book about a historical event, the Hindenburg disaster, "such as the age and birthplace of the saboteur, various specific pertinent details about the airship and its crew, a warning letter from a Mrs. Rauch, Germany's ambassador discounting threats of sabotage, even the smuggling of monkeys aboard another zeppelin in the fleet."[161] Likewise, for functional works like computer software, copyright permits copying at a much closer level than would be permitted for such creative works as novels or movies.[162]

¶50 By focusing the policy analysis on preemption, *Bilski* could likewise allow for appropriate differentiation between different subject matter areas. Commentators have found that attempts to apply uniform rules across patent law can lead to perverse results.[163] Attempts to create "a unified patent system that provides technology-neutral protection to all kinds of technologies" can actually create "conceptual shackles."[164]

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[156] *Id*. at 134 (quoting Nichols v. Universal Pictures Corp., 45 F.2d 119, 122 (2d Cir. 1930).

[157] 17 U.S.C. § 102(b) (2006) ("In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.").

[158] *See Nichols,* 45 F.2d 119 (2d Cir. 1930); Sheldon v. Metro-Goldwyn Pictures*,* 81 F.2d 49 (2d Cir. 1936).

[159] STEPHEN MCJOHN, COPYRIGHT: EXAMPLES AND EXPLANATIONS, Chapter 5 (3d ed. Aspen Pub. 2009).

[160] *See* discussion, *supra*, at notes 98-102.

[161] MCJOHN, *supra* note 159, at 84 (discussing Hoehling v. Universal City Studios, Inc., 618 F.2d 972, 979 n.6 (2d Cir. 1980)).

[162] *See, e.g.*, Computer Assocs. Int'l, Inc. v. Altai, Inc., 982 F.2d 693 (2d Cir. 1992).

[163] Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575 (2003). *See also* Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1 (2001).

[164] Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155, 1157 (2002) (suggesting that standards in biotech and software should be tailored to relevant policies). *See also id.* at 1156 ("In biotechnology cases, the Federal Circuit has bent over backwards to find biotechnological inventions nonobvious, even if the prior art demonstrates a clear plan for producing the invention. On the other hand, the court has imposed stringent enablement and written description

Making preemption a key part of the application of patent subject matter requirement allows courts to take into account the varying policies in different fields. In biotech, for instance, the hazards of preemption are most likely to arise where an inventor has discovered a scientific fact, and the invention may preempt applications of that fact (as was true of the diagnostic process in *Metabolite*[165]). In software, by contrast, the preemption risk is more likely to be that someone develops a process with applications in many different fields (like the BCD-to-binary conversion method at issue in *Benson*).

¶51 Under *Bilski,* some issued patents may be invalid, and pending applications may be denied, where they claim only pure processes.[166] This could cut back on patents in such subject matter as software (which is built from processes), business methods (like the method of hedging risks with derivatives in *Bilski*), and biotech (such as methods of diagnosis and treatment dealing with genetic information). On the other hand, many software, business method, and biotech inventions will be patentable, because they are linked to a machine or transform something. Not long after *Bilski,* the Federal Circuit held that a method for marketing a product was not patentable subject matter.[167] A trial court held a claimed method of fulfilling orders for a product to be an unpatentable idea because what it boiled down to was "if at first you don't succeed, try, try again."[168] For many inventions, however, the effect of *Bilski* will be not to bar patent protection, but rather limit the scope of the claims. Patent lawyers will take great care to include either a machine or transformation in their process claims.

¶52 But *Bilski*'s greatest effect will likely go beyond the issue of patentable subject matter. Even with *Bilski*'s restrictions, patentable subject matter remains very broad. The machine-or-transformation test will be relatively easily satisfied for most inventions. As a thought experiment, one could look back at some of history's most important innovations[169] and ask whether a patent lawyer could have drafted a claim that satisfied the machine-or-transformation test. Some would not, such as the number zero. But, such innovations as farming, the printing press, and the computer would meet the test—and so would have been patentable. But the key question would have been the scope of the patent. The inventor of a printing press would not have been able to enforce a patent against all other means of printing; only ones that fell within the scope of the patent claims. There are plenty of patent law doctrines that can function to limit patent protection to reasonable breadth.

¶53 The machine-or-transformation test, in this light, jibes well with the changes in the law on patentability. An invention is patentable only if it is not obvious.[170] But showing obviousness has sometimes been difficult with software and business method patents because prior art in such generally applicable areas is often not as readily

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requirements on biotechnology patents that do not show up in other disciplines. In computer software cases, the situation is reversed. The Federal Circuit has essentially excused software inventions from compliance with the enablement and best mode requirements, but has done so in a way that raises serious questions about how stringently it will read the nonobviousness requirements.").

[165] Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124 (2006).

[166] *Cf.* Ben Klemens, *The Rise Of The Information Processing Patent*, 14 B.U. J. SCI. & TECH. L. 1 (2008) (advocating using patentable subject matter to bar pure software patents).

[167] *In re* Ferguson, 558 F.3d 1359 (Fed. Cir. 2009).

[168] *See* Perfect Web Tech. Inc. v. InfoUSA Inc., 2008 WL 6153736 (S.D. Fla. 2008).

[169] For the opinions of a wide range of scientists and other thinkers on the most important innovations, see THE GREATEST INVENTIONS OF THE PAST 2,000 YEARS (John Brockman, ed.) (2000).

[170] 35 U.S.C. § 103 (2006).

searchable as in more narrow, defined fields like chemistry. Various efforts have been made to collect examples of prior art to prevent the issuance or enforcement of software patents that do not represent a genuine innovation.[171] The difficulty of finding prior art fueled the debate over software patents. The Electronic Frontier Foundation identified a number of patents issued that apparently covered quite basic internet technology.[172] The Supreme Court provided courts flexibility with respect to prior art in *KSR International Co. v. Teleflex Inc*.[173] Under *KSR*, a patent may be held obvious with a specific "teaching, suggestion, or motivation" identified in the prior art. In addition, such factors as market conditions, technology trends, and the knowledge of someone skilled in the art may support a determination that an innovation was not sufficiently inventive to be patentable. *KSR* has given courts and the patent office more scope to address the prior art problem with respect to software patents and business methods.[174] One examiner rejected a business method claim by relying, in part, on a description of business methods described in the Bible as practiced by the Pharaoh.[175] The machine-or-transformation test could provide a similar tool, directed not at the prior art problem, but at the problem of abstractness, which applies especially to software and business method patents.

¶54 The machine-or-transformation test will bar patent protection only for claims in the most abstract terms. But the underlying policy behind the machine-or-transformation test – preventing preemption of fundamental principles – can also be implemented in other areas of patent law. The next sections attempt to show that *Bilski*'s most lasting effect may be to solidify an increasing trend in patent law, and help craft patent law doctrine that more specifically guards against preemption of fundamental principles.

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[171] Even the patent office has enlisted volunteers to identify prior art relevant to software patent applications. *See* Beth Simone Noveck, *"Peer to Patent": Collective Intelligence, Open Review, and Patent Reform*, 20 HARV. J.L. & TECH. 123, 151-52 (2006).

[172] *See* Jason Schultz, Staff Attorney, Electronic Frontier Foundation, The Patent Busting Project, http://w2.eff.org/patent/EFF_Patent_Busting_Project.pdf (last visited Aug 5, 2009) ("Every year numerous illegitimate patent applications make their way through the United States patent examination process without adequate review. The problem is particularly acute in the software and Internet fields where the history of prior inventions (often called 'prior art') is widely distributed and poorly documented." The patents include One-click online shopping (U.S. Patent No. 5,960,411); Online shopping carts (U.S. Patent No. 5,715,314); The hyperlink (U.S. Patent No. 4,873,662); Video streaming (U.S. Patent No. 5,132,992); Internationalizing domain names (U.S. Patent No. 6,182,148); Pop-up windows (U.S. Patent No. 6,389,458); Targeted banner ads (U.S. Patent No. 6,026,368); Paying with a credit card online (U.S. Patent No. 6,289,319); Framed browsing; (U.S. Patent Nos. 5,933,841 & 6,442,574); and Affiliate linking (U.S. Patent No. 6,029,141)).

[173] 550 U.S. 398 (2007).

[174] See Friskit, Inc. v. RealNetworks, Inc., 306 F. App'x 610, 618 (Fed. Cir. 2009) (inventor merely predicted a profitable business trend and did not contribute any technical innovation); MuniAuction, Inc. v. Thomson Corp., 532 F.3d 1318, 1326 (Fed. Cir. 2008) (method of conducting municipal bond auctions simply added use of internet browsers to existing methods of using software to conduct such auctions); Asyst Techs., Inc. v. Emtrak, Inc., 544 F.3d 1310, 1315 (Fed. Cir. 2008) (simply substituting computer communications in existing method is obvious under KSR); see also Commonwealth Scientific & Indus. Research Org. v. Buffalo Tech. (USA), Inc., 542 F.3d 1363, 1374 (Fed. Cir. 2008) (holding claimed invention, a local wireless area network, was obvious under KSR). But see Eisai Co. Ltd. v. Dr. Reddy's Labs., Ltd., 533 F3d 1353, 1359 (Fed. Cir. 2008) (active ingredient in ulcer drug Aciphex was not obvious, where known structurally similar compound was not shown to lead to invention).

[175] *See* Dennis Crouch, *GO GO GO JOSEPH, Reject That Business Method*, PATENTLY-O, Nov. 6, 2006, http://www.patentlyo.com/patent/2006/11/go_go_go_joseph.html.

B. Enablement

¶56 Past Federal Circuit decisions have been criticized as essentially excusing software inventors from the enablement requirement, the requirement that the patent application provide sufficient disclosure for others to make and use the invention.[176] In particular, several decisions upheld broad software claims, even though the application provided only rather general information about how to implement the claim.[177] Rather, the courts stated that putting the general invention into specific software was a task that could simply be undertaken by a competent software developer:

> The computer language is not a conjuration of some black art, it is simply a highly structured language. . . . the conversion of a complete thought (as expressed in English and mathematics, i.e., the known input, the desired output, the mathematical expressions needed and the methods of using those expressions into the language a machine understands is *necessarily a mere clerical function to a skilled programmer.*[178]

¶57 Even where the application did not provide flow charts or block diagrams or other information to suggest even in outline form how to implement the invention, the court stated that general disclosure was sufficient, where a skilled programmer could figure out how to write code that put the invention to work.[179] Similarly, general descriptions of structural elements were held sufficient. A claim that included a "timing means" was upheld, even where the inventor did not disclose the firmware that he used as a timing means.[180]

¶58 More recent decisions, however, reflect an underlying concern with abstract patent claims and have applied the enablement requirement more stringently.[181] The

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[176] 35 U.S.C. §112 (2006). One key role of the patent system is to obtain disclosure of technology. *Cf.* Dan L. Burk, *The Role of Patent Law in Knowledge Codification*, 23 BERKELEY TECH. L.J. 1009 (2008).

[177] *See* N. Telecom, Inc. v. Datapoint Corp., 908 F.2d 931 (Fed. Cir. 1990); *In re* Sherwood, 613 F.2d 809 (C.C.P.A. 1980).

[178] *Sherwood*, 613 F.2d at 817 n.6 (emphasis added).

[179] *Northern Telecom,* 908 F.2d at 941.

[180] *In re* Hayes Microcomputer Prods., Inc. Patent Litig., 982 F.2d 1527 (Fed. Cir. 1992); *see also* Fonar Corp. v. Gen. Elec. Co., 107 F.3d 1543, 1349 (Fed. Cir. 1997) ("Thus, flow charts or source code listings are not a requirement for adequately disclosing the functions of software. Here, substantial evidence supports a finding that the software functions were disclosed sufficiently to satisfy the best mode requirement."); Robotic Vision Sys., Inc. v. View Eng'g, Inc., 112 F.3d 1163, 1166 (Fed. Cir. 1997) (When "disclosure of software is required, it is generally sufficient if the functions of the software are disclosed, it usually being the case that creation of the specific source code is within the skill of the art."); *In re* Dossel, 115 F.3d 942, 946 (Fed. Cir. 1997) (disclosure sufficient where it was implicit that computer would be means used).

[181] *See* Ormco Corp. v. Align Tech. Inc., 498 F.3d 1307, 1318 (Fed. Cir. 2007) (invalidating patent claim covering "automatic computer determination of the finish positions of teeth" where inventor did not disclose specific method and had not succeeded in routinely practicing such a method), *cert. denied*, 128 S.Ct 2430 (U.S. May 12, 2008) (No. 07-1070); *In re* Reiffin, 199 F. App'x 965, 967 (Fed. Cir. 2006) ("[B]ecause Reiffin's application is without any description as to how to implement his lexical analyzer, the above claims necessarily require 'undue experimentation' in order for one of ordinary skill in the art to make or use them."); Union Pac. Res. Co. v. Chesapeake Energy Corp., 236 F.3d 684, 691 (Fed. Cir. 2001) ("[T]he patent does not explain that stretching and squeezing of the borehole log, as well as significant trial and error, are necessary to correlate (*i.e.*, 'compare' and 'rescale') the logs. Nor does the patent describe how to select sections of the borehole log to stretch or squeeze, or how to select points to correlate.").

Federal Circuit has emphasized that "the full scope of the claimed invention must be enabled."[182] Most recently, the Federal Circuit held that broad claims that open new fields require correspondingly broad disclosure.[183] The inventors claimed a method of reducing the activity of NF-κB, a transcription factor, which acts as an "all-purpose cellular paramedic."[184] When cells suffer injury, NF-κB triggers the expression of genes that produce molecules such as cytokines. Those molecules can repair injury, but also injure the cell if produced in excess. The inventors had discovered all this, and claimed the method of reducing NF-κB activity, which would have the therapeutic effect of reducing unnecessary cell damage.[185] Although the inventors had discovered a valuable potential treatment method, their patent application did not disclose specifically how to implement that method.[186] They also claimed the invention in broader terms, rather than limiting their claim to the methods of reduction that they had achieved. By claiming more than their disclosure enabled, the patent was held invalid. As the court put it, "The motto, 'beware of what one asks for,' might be applicable here."[187]

¶59 Similar reasoning could be applied to abstract patents such as software and business methods.[188] A claim to a method that has broad application would not be enabled if the written description did not provide sufficient disclosure to practice the invention as broadly as the claims required.[189] This would prevent an inventor from preempting all application of an idea, as opposed to the applications that fell within the scope of what her disclosure actually enabled.[190] The inventor would also be limited to the reasonable scope of her invention.[191] This limit on the scope of abstract patents is especially apt for software, where patent claims often use vague terms with meanings that change over time and in different applications.[192]

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[182] Sitrick v. Dreamworks, LLC, 516 F.3d 993, 999 (Fed. Cir. 2007); Pharm. Res., Inc. v. Roxane Labs., Inc., 253 F. App'x 26, 30 (Fed. Cir. 2007) ("surfactant" not enabled with just 3 working examples, where the claims are broad in scope and the nature of the invention unpredictable); Auto. Techs. Int'l, Inc. v. BMW of N. Am., 501 F.3d 1274, 1283 (Fed. Cir. 2007). *See also* Sean B. Seymore, *The Enablement Pendulum Swings Back*, 6 NW. J. TECH. & INTELL. PROP. 278 (2008).

[183] Ariad Pharms., Inc. v. Eli Lilly & Co., 560 F.3d 1366, 1376 (Fed. Cir. 2009) ("The '516 patent discloses no working or even prophetic examples of methods that reduce NF-κB activity, and no completed syntheses of any of the molecules prophesized to be capable of reducing NF-κB activity. The state of the art at the time of filing was primitive and uncertain, leaving Ariad with an insufficient supply of prior art knowledge with which to fill the gaping holes in its disclosure.").

[184] *Id.* at 1369.

[185] *Id.* at 1370-71.

[186] *Id.* at 1371-72.

[187] *Id* at 1377. *See also* Lizardtech, Inc. v. Earth Res. Mapping, Inc., 424 F.3d 1336, 1344 (Fed. Cir. 2005) (disclosure did not support broad reading of claim).

[188] *See* BESSEN & MEURER, *supra* note 1, at 239 (calling for stricter enforcement of the enablement requirement for software patents).

[189] *Cf.* Robert M. Hunt, *Economics and the Design of Patent Systems*, 13 MICH. TELECOMM. & TECH. L. REV. 457 (2007) (suggesting that empirical analysis of software and business method patents supports revisions to patent process that limit firm to rights to what it has in fact invented).

[190] *See* Martin Campbell-Kelly & Patrick Valduriez, *A Technical Critique of Fifty Software Patents*, 9 MARQ. INTELL. PROP. L. REV. 249 (2005) (arguing that the fifty most cited software patents generally represented genuine innovations and were not too broadly drafted, but that the level of disclosure was deficient).

[191] The claim scope could still cover after-developed technologies, although some have questioned whether that is appropriate in some areas of technology. *See* Robin Feldman, *Rethinking Rights in Biospace*, 79 S. CAL. L. REV. 1 (2005) (proposing such a rule for biotechnology patents).

[192] Robert P. Merges, *Software and Patent Scope: A Report from the Middle Innings*, 85 TEX. L. REV.

¶60 Closely related to the enablement requirement is the requirement of definiteness.[193] Recent decisions have stringently applied the requirement that the applicant "distinctly" claim the invention. Several decisions have invalidated claims for indefiniteness, where under past case law the claims would likely have survived. One example found a claim fatally invalid where it did not define the structure to implement a "game control means."[194] The specification section of the patent application did state that the function could be performed by a gaming machine using a programmed microprocessor.[195] However, the specification did not describe the algorithm or software necessary to control the microprocessor.

¶61

C. Claim Interpretation

¶62 Patent law is quite different from copyright and trademark in one key respect. The inventor defines the scope of her intellectual property protection. If an author writes a book, she has a copyright in the book. Her copyright does not protect many elements in the book (ideas, functional elements, unoriginal elements), but she is not required to define which elements of her work are not protected by copyright. Rather, those questions would be addressed later by a court in an infringement action.

¶63 In patent law, however, an inventor must submit an application distinctly pointing out and claiming her invention. She may (and usually does) amend the claims during the prosecution process. When the patent issues, the patent claims—not her actual invention—determine the scope of her patent protection, and in deciding whether the patent is valid, the court looks to the claims, not the actual invention. Abstract patent claims create two problems.[196] First, overly broad readings "reward patentees for inventions they do not invent."[197] Second, "software patents may be particularly prone to strategic use of vague language by applicants to gain underserved scope."[198] By using vague language such as "point of sale location" (which could mean retail outlets, or could include the home where a consumer places an order online), a patent applicant can seek to make her claim read on technology far beyond her actual invention.[199] Claim interpretation can provides an important safeguard against overly broad patents.[200]

1627, 1627 (2007) ("[T]he legal system is integrating software into the fabric of patent law, and software firms are integrating patents into the competitive fabric of the industry. Proper application of enablement principles will help insure reasonable scope for software patents and thus assist this process of normalization."). *See also* Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539 (2009) (arguing for improvements on disclosure in patents).

[193] 35 U.S.C. § 112 (2006).

[194] *See* Aristocrat Techs. Australia Pty Ltd. v. Int'l Gaming Tech., 521 F.3d 1328, 1329 (Fed. Cir. 2008), *cert. denied*, 129 S.Ct. 754 (U.S. Dec. 8, 2008) (No. 08-446). *But see* MIT v. Abacus Software, 462 F.3d 1344 (Fed. Cir. 2006) (holding that claim term "aesthetic correction circuitry" denoted sufficient structure that it did not require further definition in the written specification).

[195] *Aristocrat Techs.*, 521 F.3d at 1333.

[196] *See* BESSEN & MEURER, *supra* note 1, at 199-200.

[197] *Id.* at 199.

[198] *Id.* at 200.

[199] *Id.*

[200] Craig Allen Nard, *A Theory of Claim Interpretation*, 14 HARV. J. L. & TECH. 1 (2000) (differentiating between "hypertextualism" and "pragmatic textualism").

¶64 *Bilski*'s emphasis on the policy of avoiding preemption of fundamental principles is quite consistent with recent cases that have interpreted software claims narrowly, in a way that avoids granting broad coverage. A claim covering a general purpose computer would not be infringed by one using the method on an RISC processor.[201] A process including a step of "providing a communications link through equipment of the third party" required that the infringer be an internet service provider.[202] A claim on a method of routing telephone calls, using a database of assigned locations, was not interpreted to cover a later-developed method that could assign location in real-time as the call was made.[203]

¶65 The machine-or-transformation test will bar some software and business method inventions from patent protection, but will leave the majority within patentable subject matter. Such patents may still suffer the greatest hazard of abstract patents. Because language is so flexible, patent claims may be broadly interpreted to apply to after-developed technologies that were independently created. Claim interpretation can provide a powerful tool to implement patent policy. As some commentators have noted, claim interpretation has often been used to limit the scope of software patents, but on a rather ad hoc basis.[204] That approach does not provide predictability, and so hurts both patent holders and others who wish to use the technology. In short, "[i]f you can't tell the boundaries, then it ain't property."[205] By identifying preemption as a central policy issue, *Bilski* may play an important role in providing some regularity to the claim interpretation process.

¶66 Sometimes a patent can be limited simply by enforcing its literal terms, and not interpreting them with leeway toward likely applications. A patented method of arbitration, for example, required the steps of "receiving a plurality of demands [and] a plurality of settlement offers."[206] A practical reading would apply this to use where only one demand or settlement offer was involved, as long as the method was capable of dealing with multiple demands and offers.[207] By limiting the scope of the patent to its literal claims, the court effectively prevented early patents from being extended to other practices. Likewise, where a bingo game patent claimed a "progressive predetermined winning combination," it was not infringed by a bingo game where the winner was determined when balls were drawn—even if the two games were substantially similar.[208]

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[201] Hutchins v. Zoll Med. Corp., 492 F.3d 1377, 1381 (Fed. Cir. 2007).

[202] *See* Netcraft Corp. v. eBay, Inc., 549 F.3d 1394, 1397 (Fed. Cir. 2008).

[203] *See* 800 Adept, Inc. v. Murex Sec. Ltd., 539 F.3d 1354, 1362-63 (Fed. Cir. 2008) (patent claim on method of routing telephone calls interpreted not to cover assignments made during the call, as opposed to assignments made before the call by constructing data base), *cert. denied*, 129 S.Ct. 1373 (U.S. Feb. 23, 2009) (No. 08-859). *See also* Mangosoft, Inc. v. Oracle Corp., 525 F.3d 1327 (Fed. Cir. 2008) (holding that "local" means directly attached to computer, not just on the same network).

[204] *See* BESSEN & MEURER, *supra* note 1, ch. 9, *available at* http://www.researchoninnovation.org/dopatentswork/dopat9.pdf ("Even though judges may often (but not always!) take a pragmatic approach and interpret such claims narrowly—as they seem to do often with software patents—the uncertainty about boundaries makes clearance difficult and subjects inventors to risk of inadvertent infringement.").

[205] BESSEN & MEURER, *supra* note 1, at 46.

[206] Cybersettle, Inc. v. Nat'l Arbitration Forum, Inc., 243 F. App'x 603, 605 (Fed. Cir. 2007).

[207] *See id.*

[208] Planet Bingo, LLC v. GameTech Int'l, Inc., 472 F.3d 1338, 1345 (Fed. Cir. 2006).

¶67 Claim interpretation can work hand in hand with the disclosure requirements. In determining how broadly a claim should be read, a court can refer to the patentee's description of the invention and how much enabling disclosure she has provided. Here, courts must be careful not to run afoul of other patent law policies. In particular, claim interpretation should favor disclosure. Some past decisions risk penalizing patentees for disclosure. If claims were interpreted mechanically to apply only to the embodiments of the invention disclosed by the inventor, then the inventor would lose her legitimate right to enforce the claims against improvements or alternative embodiments of her actual invention, where those fall within the reasonable scope of the claims. Patent applicants will react to such "gotcha" interpretation by providing vague and general disclosure.[209] Claim interpretation should reward, not punish disclosure.

¶68 Courts can also use more specific rules to limit patent scope appropriately. A potential tool would be interpretation of transition phrases. A patent claim can use an open transition phrase, such as "comprising." This means the claim covers a device or process with additional elements not listed in the claim.[210] So, a claim on a process "comprising steps A, B, and C" would cover a process with steps A, B, C and D. By contrast, a closed transition phrase, such as "consisting of," means that the claim covers only the elements claimed, and not a device or process with additional elements. A claim on a process "consisting of steps A, B, and C" would not cover a process with steps A, B, C and D, only a process limited to steps A, B, and C. Closed transition phrases are most often used in areas involving physical elements. An inventor may develop a new molecule that contains a structure that already appears in larger molecules. In order to claim something new, the inventor limits her claim to the new molecule, and excludes larger molecules that contain that structure but also other elements.

¶69 But, transition phrases could also be used to limit software or business method inventions to the reasonable scope of the invention. If a software process were claimed with an open transition phrase, and so read on software inventions that went well beyond the scope of the original invention, then it could be held to be overly broad. By the same token, a claim that was limited by a closed transition phrase would be valid—but would not be infringed by technology with additional elements.[211]

¶70 The reverse doctrine of equivalents is another specific doctrine that courts have not used much, and could also be used to police claim scope (and so reduce the risk of preemption). Under the reverse doctrine of equivalents, a patent claim may be interpreted to read less narrowly than its literal language, where appropriate to avoid the claim reaching beyond the equitable scope of the invention.[212] Although the doctrine has

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[209] *See* Stephen McJohn, *Patents: Hiding from History,* 24 SANTA CLARA COMPUTER & HIGH TECH. L.J. 961, 963 (2008).

[210] MCJOHN, *supra* note 169. *See, e.g.*, AFG Indus., Inc. v. Cardinal IG Co., Inc., 239 F.3d 1239 (Fed. Cir. 2001).

[211] *Cf.* Duncan Greenhalgh, Patentability of Expressed Sequence Tags: A Tempest in a Teacup? 34 (Apr. 16, 1998) (unpublished manuscript, on file with author) (suggesting that controversy over patenting gene fragments could be resolved by limiting such patent claims to closed transition phrases, which would limit patent protection to the fragment alone, rather than the sequences containing the fragment).

[212] Roche Palo Alto LLC v. Apotex, Inc., 531 F.3d 1372, 1377 (Fed. Cir. 2008) ("[W]here a device is so far changed in *principle* from a patented article that it performs the same or similar function in a *substantially different way*, but nevertheless falls within the literal words of the claim, the reverse doctrine of equivalents may be used to restrict the claim and defeat the patentee's action for infringement." (quoting Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 608-609 (1950)).

played a small role in patent law,[213] it could be a useful tool when appropriate to limit the scope of software or business methods patents. Because such patents sometimes use vague and abstract language that can take the claims far beyond the scope of the original invention, the reverse doctrine of equivalents may sometimes be appropriate to prevent the abstract language from reading on technology that is actually quite different in principle from the underlying invention (as opposed to the claim language in the patent).

IV. CONCLUSION

¶71 *Bilski* transforms one of the hazards of patent law into a jurisprudential benefit. Patent law must always struggle with the difficulty of capturing technology within the words of patent claims. The machine-or-transformation test announced by *Bilski* cannot escape that difficulty, but uses the flexibility of language advantageously. "Machine" and "transform" are vague words, but the test provides a tool for courts to implement a key patent law policy, according an inventor patent rights measured to her invention, without preempting fundamental principles.

[213] *Roche*, 531 F.3d at 1378 ("The reverse doctrine of equivalents is rarely applied, and this court has never affirmed a finding of non-infringement under the reverse doctrine of equivalents.").