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Physicality and the Information Age: A Normative Perspective on the Patent Eligibility of Non-Physical Methods

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PHYSICALITY AND THE INFORMATION AGE:
A NORMATIVE PERSPECTIVE ON THE PATENT ELIGIBILITY OF NON-
PHYSICAL METHODS

Ben McEniery*

Abstract

There has been much conjecture of late as to whether the patentable subject matter standard contains a physicality requirement. The issue came to a head when the Federal Circuit introduced the machine-or-transformation test in *In re Bilski* and declared it to be the sole test for determining subject matter eligibility. Many commentators criticized the test, arguing that it is inconsistent with Supreme Court precedent and the need for the patent system to respond appropriately to all new and useful innovation in whatever form it arises. Those criticisms were vindicated when, on appeal, the Supreme Court in *Bilski v. Kappos* dispensed with any suggestion that the patentable subject matter test involves a physicality requirement. In this article, the issue is addressed from a normative perspective: it asks whether the patentable subject matter test should contain a physicality requirement. The conclusion reached is that it should not, because such a limitation is not an appropriate means of encouraging much of the valuable innovation we are likely to witness during the Information Age. It is contended that it is not only traditionally-recognized mechanical, chemical and industrial manufacturing processes that are patent eligible, but that patent eligibility extends to include non-machine implemented and non-physical methods that do not have any connection with a physical device and do not cause a physical transformation of matter. Concerns raised that there is a trend of overreaching commoditization or propertization, where the boundaries of patent law have been expanded too far, are unfounded since the strictures of novelty, nonobviousness and sufficiency of description will exclude undeserving subject matter from patentability. The argument made is that introducing a physicality requirement will have unintended adverse effects in various fields of technology, particularly those emerging technologies that are likely to have a profound social effect in the future.

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Introduction

The scope of patentable subject matter, insofar as it relates to the patent eligibility of non-physical inventions, received an injection of certainty from the United States Supreme Court in 2010 when it handed down its much-anticipated decision in *Bilski v. Kappos*.¹

Prior to the Supreme Court weighing in, the question of whether the patentable subject matter standard contains, or should contain, a physicality requirement had been an area of some confusion and disagreement. The principal issue the Supreme Court considered in *Bilski v. Kappos* was whether an invention must either be tied to a machine or apparatus, or transform an article into a different state or thing to be statutory subject matter. The Supreme Court heard *Bilski v. Kappos* on appeal from the United States Court of Appeals for the Federal Circuit (“Federal Circuit”). The Federal Circuit in *In re Bilski*,² introduced its machine-or-transformation test, describing it as the sole test for determining patent eligibility.³

In a much-anticipated decision, the Supreme Court ruled unanimously that the Federal Circuit’s machine-or-transformation test is not the sole test for determining patent eligibility. Instead, the Court held that the test is “an important and useful clue” that indicates the existence of patentable subject matter, rather than a prerequisite to patentability.⁴ In doing so, the Court dispensed with the notion that the patentable statutory matter inquiry contains a physicality requirement. The Supreme Court also considered for the first time whether business methods are an excluded category of subject matter. It held that they are not, thus confirming, albeit by the narrowest of margins, that there is no business method exception to patentability.⁵ In so ruling,

¹ 130 S. Ct. 3218 (2010).

² 545 F.3d 943 (Fed. Cir. 2008) (*en banc*) cert. granted sub nom. *Bilski v. Doll*, 129 S. Ct. 2735 (2009).

³ *Id.* at 959-60.

⁴ *Bilski*, 130 S. Ct. at 3226.

⁵ The patent eligibility of business methods was split in favour of a slender 5-4 majority. The majority, consisting of Justice Kennedy, Chief Justice Roberts, and Justices Thomas, Alito and Scalia, were of the view that business

the Court confirmed that taking a category-based approach to determining whether an invention lies within the scope of statutory subject matter is not what the courts intended.

The significance of this decision for the patent system as it moves forward into the Information Age cannot be understated. Determining whether patent law contains a physicality requirement is integral to deciding whether much of the valuable innovation we are likely to witness, in what are likely to be the emerging areas of technology in the foreseeable future, will receive the same encouragement as industrial and manufacturing advances of previous times. The question is whether traditional expectations as to what the patent system is to protect are to survive the onslaught of new technologies that are emerging at the inception of the “knowledge economy” of the Information Age, or whether they are to be displaced by a broader notion that accommodates all new non-physical technological developments, will be determined by the law’s understanding of the concept of invention.

Even though the Supreme Court ruled unanimously that there is no physicality requirement in patent law, there will undoubtedly remain opposition to the patenting of many new forms of innovation that the patent system has not traditionally recognized as being patent eligible subject matter. This is particularly so given the Court’s divided views on the continuing patent eligibility of business method patents. On the one hand, are those who take the view that allowing patents over non-physical inventions inappropriately removes the patent system from its industrial, chemical and mechanical roots, making it a different proposition all together from what the founding fathers envisaged when drafting the Constitution. On the other, are those who argue that a physicality requirement is an inappropriate fetter on the scope of patentable subject matter that is inconsistent with existing Supreme Court precedent and the purpose of the patent system to encourage all new and unpredictable innovation in whatever form it arises.

The argument made in this article is that the Supreme Court in *Bilski v. Kappos* was correct to dispense with the Federal Circuit’s physicality requirement. By holding that the machine-or-transformation test is not the sole test for patent eligibility, the Court left open the possibility that the patent system will continue to encourage the development and commercialization of many new and useful non-physical inventions. The view put forward in this article is that the Supreme Court’s decision is supported on both doctrinal and normative grounds, and is consistent with the purpose of the patent system to provide incentives to encourage inventors to create new and useful products and processes, regardless of the field of technology or the manner in which they manifest themselves. The decision is an appropriate forward-looking one is consistent with the Supreme Court’s previous pronouncements on the scope of patentable subject matter. The author argues that a technology-neutral subject matter test is the appropriate standard in an age where new advances in information technology and information management are likely to become increasingly important in the economy in the 21st century.

The article is structured in the following way. Part II lays out patent law’s constitutional and legislative framework. Part III analyses the *In re Bilski* and *Bilski v. Kappos* decisions of the Federal Circuit and Supreme Court. In Part IV, the implications of *Bilski v. Kappos* are addressed

methods are not a category of excluded matter. The minority, consisting of Justices Stevens, Ginsburg, Breyer and Sotomayor, held that they are excluded from the scope of patentable subject matter.

from a normative perspective. There it is argued that physicality is not a desirable limitation on the scope of patentable subject matter because it will have a detrimental effect on the rate of innovation and technological progress in the Information Age. This part also addresses concerns raised in regard to allowing patents over non-physical inventions that are not chemical, mechanical or otherwise industrial in nature. Part V continues this inquiry by examining the effect that introducing a physicality requirement would have on various fields of technology, particularly emerging technologies that are likely to have a profound social and economic impact on life, as we know it. Conclusions are drawn in Part VI.

I. Constitutional and Legislative Framework

A. *The “Intellectual Property Clause” of the United States Constitution*

The United States Constitution endows the Congress with legislative power to make laws with respect to patents by virtue of the “intellectual property clause.” It empowers the Congress:

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries⁶

The intellectual property clause embodies a balance between the need to encourage innovation and the avoidance of monopolies, which stifle competition without any related advance in the “Progress of Science and useful Arts.”⁷ The clause not only gives legislative authority; it also limits the scope of that authority such that Congress may only make laws with respect to patents for inventions that promote “useful arts.”⁸ The clause is drafted as a “balanced sentence” in which a distinction is drawn between “science,” which is the domain of the “writings” of “authors,” and “useful arts,” which is the domain of the “discoveries” of “inventors.”

While there is little historical evidence of what is meant by the term, “useful arts,” it appears that it was intended to refer to “arts” used in industry and the production of goods, or the practical works of artisans.⁹ Arguably, the “useful arts” are what were considered to be “useful

⁶ U.S. CONST. art. I, § 8, cl. 8.

⁷ *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 146 (1989).

⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 5-6 (1966) (Clark, J). (“At the outset it must be remembered that the federal patent power stems from a specific constitutional provision. . . . Article I, Section 8, Clause 8 is both a grant of power and a limitation. This qualified authority, unlike the power often exercised in the sixteenth and seventeenth centuries by the English Crown, is limited to the promotion of advances in the ‘Useful arts.’ It was written against the backdrop of the practices—eventually curtailed by the *Statute of Monopolies*—of the Crown in granting monopolies to court favorites in goods or businesses which had long before been enjoyed by the public. . . . The Congress in the exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose.”) (emphasis added) (citation omitted); *Bonito Boats*, 489 U.S. at 146; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007) (reaffirming that patents are designed to promote “the progress of Useful arts”); *In re Shao Wen Yuan*, 188 F.2d 377, 380 (C.C.P.A. 1951) (“It is interesting to note that this particular grant is the only one of the several powers conferred upon the Congress which is accompanied by a specific statement of the reason for it.”); *In re Comiskey*, 554 F.3d 967, 976 (Fed. Cir. 2009).

⁹ Robert I. Coulter, *The Field of the Statutory Useful Arts: Part II*, 34 J. PAT. OFF. SOC’Y 487, 493-500 (1952); Alan L. Durham, “*Useful Arts*” in the Information Age, 1999 BYU L. Rev. 1419, 1431-37). [hereinafter Durham, “*Useful Arts*”].

arts” in 1789 when the Constitution was adopted and encompasses the modern equivalents of those practices.¹⁰ It has been argued that the present day equivalent of the term “useful arts” is the “technological arts,” meaning that the “useful arts” embody technological advances.¹¹ It is against this Constitutional backdrop that the statutory requirements for patentability must be understood.

B. The Patentable Subject Matter Standard: 35 U.S.C. § 101

To be patentable, an invention must fall within one or more of the four categories of patentable subject matter enumerated in 35 U.S.C. § 101, be new,¹² novel,¹³ non-obvious¹⁴ and useful.¹⁵ The invention claimed must also be described in sufficient detail and enabled so that one with ordinary skill in the subject matter of the patent can make and use the invention.¹⁶

The patentable subject matter standard in § 101 provides that all new and useful processes, machines, manufactures, and compositions of matter are patent eligible.

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.¹⁷

The four categories of § 101 statutory subject matter are a threshold or gateway through which an alleged invention must pass before the other requirements of patentability need be assessed.¹⁸

¹⁰ Richard H. Stern, *Being Within the Useful Arts as a Further Constitutional Requirement for U.S. Patent-Eligibility*, 31 EUR. INTEL. PROP. REV. 6, 15 (2009). [hereinafter Stern, *Being Within the Useful Arts*].

¹¹ *Comiskey*, 554 F.3d at 976-77 (Fed. Cir. 2009) (en banc) (quoting *Paulik v. Rizkalla*, 760 F.2d 1270, 1276 (Fed. Cir. 1985)); *In re Musgrave*, 431 F.2d 882, 893 (C.C.P.A. 1970) (citing no authority for the proposition that the “technological arts” and “Useful arts” are equivalent, while the court itself being cited as authority for the proposition in subsequent opinions); *In re Waldbaum*, 457 F.2d 997, 1003 (C.C.P.A. 1972) (“The phrase ‘technological arts,’ as we have used it, is synonymous with the phrase ‘Useful arts’ as it appears in Article I, Section 8 of the Constitution.”). See also John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1140 (1999) [hereinafter Thomas, *Liberal Professions*]; Malla Pollack, *The Multiple Unconstitutionality of Business Method Patents: Common Sense, Congressional Consideration, and Constitutional History*, 28 RUTGERS COMPUTER & TECH. L.J. 61 (2002) [hereinafter Pollack, *Multiple Unconstitutionality*]; Karl B. Lutz, *Patents and Science: A Clarification of the Patent Clause of the U.S. Constitution*, 18 GEO. WASH. L. REV. 50, 54 (1949-1950).

¹² 35 U.S.C. § 101.

¹³ 35 U.S.C. § 102.

¹⁴ 35 U.S.C. § 103.

¹⁵ 35 U.S.C. §§ 101, 112.

¹⁶ 35 U.S.C. § 112. The disclosure requirement facilitates the public’s learning of the technology disclosed and delimits the scope of protection afforded by the patent.

¹⁷ 35 U.S.C. § 101. Language setting forth categories of patentable subject matter has existed throughout the history of American patent law. The first federal patent statute, the *Patent Act* of 1790 § 4, 1 Stat. 109, 111 (1790), permitted a patent on “any art, manufacture, engine, machine or device.” Shortly thereafter, Congress changed the language to allow a patent for “any new and Useful art, machine, manufacture or composition of matter” in the *Patent Act* of 1793 § 1, 1 Stat. 318, 319 (1793). The next substantial amendment to the patent laws left this statutory language unchanged in the *Patent Act* of 1836 § 6, 5 Stat. 117, 119 (1836). This language has largely persisted, with the exception that when the patent laws were recodified in 1952, Congress amended the provision to replace the word “art” with the word “process,” which has been defined as “process, art or method.”

¹⁸ *Diamond v. Diehr*, 450 U.S. 175, 188 (1981). The Federal Circuit has recently said that although § 101 is a “threshold inquiry,” if a patent application can be easily struck out for lack of novelty, non-obviousness or

In interpreting this provision, the Supreme Court has recognized that the scope of statutory subject matter is broad.¹⁹ In *Diamond v. Chakrabarty*, it said that:

In choosing such expansive terms as “manufacture” and “composition of matter,” modified by the comprehensive “any,” Congress plainly contemplated that the patent laws would be given wide scope.²⁰

The court went on to famously say that patentable subject matter comprises “anything under the sun that is made by man.”²¹

Of the four enumerated categories of subject matter in § 101, only “process” is defined in the statute. Section 100(b) defines “process” as “process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.” The circular nature of this definition means it is of limited use.²²

While no explicit exclusions follow the broad language of § 101,²³ the Supreme Court has identified general categories of excluded matter, namely discoveries of laws of nature, abstract ideas and natural phenomena.²⁴ Natural laws and phenomena can never qualify for patent protection because they cannot be invented. Abstract ideas are not eligible because they are not “useful” and must be applied to a practical use before they can be patented. These recognized categories of excluded matter are one of the means by which patent law ensures that subject matter that rightfully remains within the public domain is not privatized. They ensure that fundamental principles and abstract ideas remain “free for all to use”.²⁵ While these exceptions are not expressed in the legislation, they are arguably consistent with the wording of § 101, which states that a patentable process must be both “new and useful.”

insufficient description, then it can be struck out without the need to consider § 101.” *Bilski*, 545 F.3d at 950 n.1. This interpretation of “threshold” is properly construed as being a barrier to be crossed, but not necessarily the first barrier to be crossed.

¹⁹ *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09 (1980); *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 130 (2001).

²⁰ 447 U.S. at 308. According to the Supreme Court, the Act embodied Jefferson’s “philosophy that ingenuity should receive a liberal encouragement.”

²¹ *Id.* at 309 (citing the Committee Reports accompanying the Patent Act of 1952: S. Rep. No. 82-1979, at 5 (1952); H.R. Rep. No. 197982-1923, at 6 (1952)); *Diehr*, 450 U.S. at 182. The interpretive value of this oft-cited phrase is dubious. The full sentence in the Committee Reports reads, “A person may have ‘invented’ a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of [this] title are fulfilled.” S. Rep. No. 82-1979, at 5; H.R. Rep. No. 82-1923, at 6. When viewed in its entirety, it can be seen that the language refers only to manufactures and machines, and makes no mention of processes. It is therefore doubtful that the words used can be interpreted to mean that Congress intended that “anything under the sun” is patentable.

²² *Bilski v. Kappos*, 130 S. Ct. 3218, 3237-38 (2010) (Stevens, J., concurring).

²³ Congress has declined to follow the practice adopted in some other countries that expressly exclude medical procedures, mathematical methods, computer software, plant or animal varieties, and inventions that are contrary to morality.

²⁴ *Chakrabarty*, 447 U.S. at 308-09; *Diehr*, 450 U.S. at 185 (citing *Parker v. Flook*, 437 U.S. 584, 589 (1978) and *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). That these forms of subject matter are excluded from patentability is a principle that dates back more than 150 years to *Le Roy v. Tatham*, 55 U.S. 156, 175 (1852) and *O’Reilly v. Morse*, 56 U.S. 62 (1854).

²⁵ *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 151 (1989).

In summary, patentable subject matter comprises any “new and useful” invention in the “useful arts” that falls within the four categories of § 101 subject matter, but lies outside the recognized categories of excluded matter.²⁶

Both courts and the patent office have found it difficult to decide whether this test allows patents to be granted for non-physical methods for two reasons. Firstly, prior to *Bilski v. Kappos*, the courts had very little experience assessing claims to non-physical methods. Secondly, the lack of certainty in the Supreme Court’s previous pronouncements in patentable subject matter decisions provides little guidance to inform decision making when patents of this nature are litigated.

In relation to the Supreme Court’s lack of experience with patents for non-physical methods, while the court has made clear that “[a]n idea of itself is not patentable,”²⁷ what its precedents lack is an explanation of what distinguishes an unpatentable abstract idea from a practical application of an idea that is patent eligible. This failure appears to be due largely to the fact that, for the most part, the Supreme Court has had before it easy cases that have involved claims to physical devices or methods that are physically transformative in nature,²⁸ and has not had significant exposure to claims that are not.²⁹ Given the lack of clear guidance from the

²⁶ That this is the correct test for determining whether an invention is patent eligible is evident from the Supreme Court decisions on the issue in: *Benson*, 409 U.S. at 63; *Flook*, 437 U.S. at 584; *Chakrabarty*, 447 U.S. at 309; and *Diehr*, 450 U.S. at 182, 185. It is also evident from the Federal Circuit decisions in: *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), cert. denied 525 U.S. 1093 (1999), *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994), and *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352 (1999). Further, it is evident in *In re Schrader*, 22 F.3d 290 (Fed. Cir. 1994) (Newman, J., dissenting), *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc), and *In re Ferguson*, 558 F.3d 1359 (Fed. Cir. 2009).

²⁷ *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874).

²⁸ Richard S. Gruner, *In Search of the Undiscovered Country: The Challenge of Describing Patentable Subject Matter*, 23 SANTA CLARA COMPUTER & HIGH TECH. L.J. 395, 400 (2007) [hereinafter Gruner, *Undiscovered Country*]. For “easy cases,” see, e.g., *Corning v. Burden*, 56 U.S. 252, 267 (1854) (confirming the patent eligibility of the “arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores”); *Burr v. Duryee*, 68 U.S. 531, 566 (1863) (“a new and Useful improvement in the machine for making hat-bodies”); *Rubber-Tip Pencil*, 87 U.S. at 507; *Cochrane v. Deener*, 94 U.S. 780 (1876) (process for manufacturing flour so as to improve its quality); *Tilghman v. Proctor*, 102 U.S. 707, 721 (1880) (process of “manufacturing fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure”); *Dolbear v. Am. Bell Tel. Co. (The Telephone Cases)*, 126 U.S. 1 (1888) (method of using electricity to transmit speech); *Expanded Metal Co. v. Bradford*, 214 U.S. 366 (1909) (process for expanding metal); *Smith v. Snow*, 294 U.S. 1 (1935); *Taxham v. Smith*, 294 U.S. 20 (1935) (process for setting eggs in staged incubation and applying mechanically circulated currents of air to the eggs); *Flook*, 437 U.S. at 584 (method of “updating alarm limits” used in the catalytic conversion of hydrocarbons, which the court held to not be patentable subject matter); *Diehr*, 450 U.S. at 175 (process for operating a computer-controlled rubber mould in which the sole new design elements were innovative information processing features); *Chakrabarty*, 447 U.S. at 303 (live, artificial, human-made, genetically engineered micro-organisms).

²⁹ *O’Reilly v. Morse*, 56 U.S. 62 (1854) (holding that Morse’s claim 5, which involved “the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated, for telegraphic purposes” (Morse code) “for a process of using electromagnetism to produce distinguishable signs for telegraphy,” was patentable as an “art”); but cf. *Benson*, 409 U.S. at 63 (holding that a method for converting binary-coded decimal numbers into pure binary numbers was not patentable).

Supreme Court, it is not surprising that the Federal Circuit would seek to establish a test to fill the void.

In relation to the second point, as Chisum aptly demonstrated, the uncertainty and disagreement that exists regarding the scope of patentable subject matter stems from the Supreme Court's failure to articulate clear principles for distinguishing patentable inventions from unpatentable abstract ideas in the 1972 *Gottschalk v. Benson* decision (which was followed in *Parker v. Flook*).³⁰

It is against this uncertainty that the Supreme Court was asked to determine the patent eligibility of a non-physical invention in *Bilski v. Kappos*.

II. An Overview of *Bilski*: To Machine-or-Transformation and Back Again

A. *The Subject Matter at Issue: A Method of Hedging Risk*

The subject matter in *In re Bilski* is undoubtedly a controversial and distinctly contemporary attempted use of the patent system. *Bilski*³¹ sought a patent for a method for managing (or hedging) the consumption risks associated with selling a commodity at a fixed price. This is a non-machine-implemented and purely non-physical method. It is also a business method. It allows for a commodity to be sold to consumers at a fixed price based on historical averages by identifying market participants that can act in counter-risk positions to offset the risks of fluctuations in supply and demand. The method can be used for energy commodities, such as natural gas, electricity and coal, but is not limited to this field. Its utility as a method is its ability to compensate for the risk of consumption fluctuations caused by abnormal weather conditions, such as unusually cold winters (which require more heating) or unusually hot summers (which require more cooling).³²

Claims 1 and 4 are representative of the invention. Claim 1 recites a series of steps describing a method of hedging risk. Claim 4 expresses the concept recited in claim 1 as a mathematical formula. Claim 1 consists of the following steps:

- (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 consumers;
- (b) identifying market participants for said commodity having a counter-risk position to said consumers; and

³⁰ *Benson*, 409 U.S. at 63; *Flook*, 437 U.S. at 584; Donald S. Chisum, *The Future of Software Protection: The Patentability of Algorithms*, 47 U. PITT. L. REV. 959 (1986) [hereinafter Chisum, *Patentability of Algorithms*]. See also Gruner, *Undiscovered Country*, *supra* note 28.

³¹ Although there were two applicants for the invention in question, Bernard L Bilski and Rand A Warsaw, for the purposes of brevity, the applicants will be referred to simply as "Bilski."

³² U.S. Patent Application No. 08/833,892 (filed Apr. 10, 1997) ("Energy Risk Management Method").

(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.

The remaining claims describe means by which claims 1 and 4 can be applied to allow energy suppliers and consumers to minimize the risks resulting from fluctuations in market demand for energy.

Attempts to patent non-industrial processes such as these represent a movement on the part of innovators in commerce to the expand the bounds of what has traditionally been considered patentable, so that they may share in the patent rewards that ordinarily have been awarded to engineers and industrial manufacturers.

B. The Federal Circuit's Machine-or-Transformation Test: The Introduction of a Physicality Requirement in United States Patent Law

In *In re Bilski*³³ the Federal Circuit sought to clarify the standards applicable in determining whether a non-physical method constitutes patent eligible subject matter. It sought to create a test that could be applied to determine whether a patent applicant has made claims that pre-empt the use of a fundamental principle or an abstract idea or whether those claims cover only a particular application of a fundamental principle or abstract idea. It did so by introducing a physicality requirement it called the “machine-or-transformation test.”³⁴ In so holding, the Federal Circuit overruled its earlier *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*³⁵ decision to the extent that it deemed its own “useful, tangible and concrete result” test to be an “inadequate” proxy test under which to determine whether an alleged invention recites patent eligible subject matter.³⁶

The Federal Circuit held by majority that the sole test for determining subject matter eligibility for a claimed process under § 101 is that it is: (1) tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing.³⁷ It described this test as a bright line delineation between patentable subject matter and the recognized categories of excluded matter. The Federal Circuit held *Bilski*'s claims to be unpatentable, on the grounds that they fail to satisfy the machine-or-transformation test.

³³ 545 F.3d 943 (Fed. Cir. 2008) (*en banc*). The matter was heard before Chief Judge Michel, and Judges Newman, Mayer, Lourie, Rader, Schall, Bryson, Gajarsa, Linn, Dyk, Prost, and Moore. The case was decided by a 9-3 majority. Chief Judge Michel wrote on behalf of the majority, in which Judges Lourie, Schall, Bryson, Gajarsa, Linn, Dyk, Prost, and Moore joined. A supplementary concurring opinion was filed by Judge Dyk, in which Judge Linn joined, addressing some of the issues raised in the dissenting opinions. Judges Newman, Mayer and Rader filed dissenting opinions. Of the three dissenting opinions, only Judge Newman found patentable subject matter in *Bilski*'s claims. *In re Bilski* came before the Federal Circuit on appeal from the United States Patent and Trademark Office (USPTO) Board of Patent Appeals and Interferences, *Ex parte Bilski*, Appeal No. 2002-2257, 2006 WL 4080055 (B.P.A.I. Sept. 26, 2006) (non-precedential).

³⁴ *Bilski*, 545 F.3d at 954.

³⁵ 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied* 525 U.S. 1093 (1999).

³⁶ *Bilski*, 545 F.3d at 959-60.

³⁷ *Id.* at 954.

In a powerful dissenting opinion, Judge Newman criticized the majority, arguing that the machine-or-transformation test is not supported by the statutory language of § 101, is not consistent with existing Supreme Court precedent, fails to keep up with changes in new technologies, and ties patent eligibility to technologies of a bygone era. Instead, Judge Newman expressed the view that the scope of patentable subject matter is broad, such that all new and useful inventions that fall within the four categories of § 101 subject matter, but which do not fall within the recognized categories of excluded matter, are patent eligible.³⁸

While the Federal Circuit unveiled and named its machine-or-transformation test in *In re Bilski*, it had earlier relied upon an equivalent physicality requirement to reject claims in the earlier cases of *In re Comiskey*³⁹ and *In re Nuijten*.⁴⁰

C. The Supreme Court's Response: Fundamentals of Patentable Subject Matter Restored in Bilski v. Kappos

In its first review of the patentable subject matter standard since 1981, where it confirmed the patentability of computer software programs in *Diamond v. Diehr*,⁴¹ the Supreme Court, on appeal, affirmed that *Bilski's* hedging method is not patentable subject matter. In doing so, the Court ruled that the Federal Circuit's machine-or-transformation test is not the sole test for deciding whether an invention is a patent eligible process, thereby dispensing with any suggestion that the patentable subject matter test involves a physicality requirement.⁴²

As was to be expected, the decision in *Bilski v. Kappos* falls on the interpretation of the Supreme Court's earlier patentable subject matter cases, *Gottschalk v. Benson*,⁴³ *Parker v. Flook*,⁴⁴ and *Diamond v. Diehr*. In particular, *Bilski v. Kappos* turns on how those cases interpreted the court's 1876 decision in *Cochrane v. Deener*.⁴⁵

The Court's decision in *Bilski v. Kappos* contains three separate opinions. The linkages between the opinions are complicated, particularly as to Scalia J's position.⁴⁶ Five observations can be drawn from a reading of the court's opinions in *Bilski v. Kappos*.

³⁸ *Id.* at 976-77 (Newman, J., dissenting).

³⁹ 554 F.3d 967 (Fed. Cir. 2009). The applicant in *Comiskey* claimed a mental process of resolving a legal dispute between two parties affecting wills and contracts by an allegedly novel way of a human arbitrator using a form of mandatory arbitration. This is both a business method and a legal method useful in resolving legal problems. A contentious aspect of the method is that it does not merely involve procedural steps, but also requires human decision making.

⁴⁰ 500 F.3d 1346 (Fed. Cir. 2007), *cert. denied* sub nom. *Nuijten v. Dudas*, 129 S. Ct. 70 (2008). The issue before the Federal Circuit in *Nuijten* was whether a watermarked signal encoded in a particular manner is patentable subject matter. The three judges hearing the case held, by a 2-1 majority, that it is not.

⁴¹ 450 U.S. 175 (1981).

⁴² *Bilski v. Kappos*, 130 S. Ct. 3218, 3226-27 (2010).

⁴³ 409 U.S. 63 (1972).

⁴⁴ 437 U.S. 584 (1978).

⁴⁵ 94 U.S. 780 (1876).

⁴⁶ Justice Kennedy delivered the majority opinion, in which Chief Justice Roberts, and Justices Thomas and Alito, joined in full; Justice Scalia joined the opinion except as to two parts dealing with the application of the patentable subject matter standard to new and emerging technologies of the Information Age. Thus, Justice Kennedy's opinion is the majority opinion, except as to those two parts. Justices Stevens and Breyer both wrote concurring opinions, in which they agreed with the decision of the court, but differed as to the reasons. Justice Stevens wrote a lengthy

1. The Supreme Court unanimously rejected the view that the machine-or-transformation test is the sole test for determining whether an alleged invention is patentable subject matter (thereby rejecting the Federal Circuit's machine-or-transformation test physicality requirement).
2. The court recognized that the scope of patentable subject matter comprises any "new and useful" invention that falls outside the recognized categories of excluded matter. The court confirmed that those recognized categories are laws of nature, physical phenomena and abstract ideas.
3. The court was less than unanimous on the question of whether business methods are patentable, the issue being split in favor of a slender 5-4 majority. Five of the nine judges were of the view that business methods are not an excluded category of subject matter. The remaining four took of the view that they are.
4. The court, by a slender 5-4 majority, held that *Bilski's* claims are unpatentable because they are "abstract" (without, as Justice Stevens noted in his concurring opinion, explaining why). Writing on behalf of the remaining four judges, Justice Stevens preferred to reject the claims on the basis that they invoke a business method, and are unpatentable on that basis. Had he garnered a majority, Justice Stevens would have added business methods to the recognized categories of excluded matter.
5. Four of the judges did not endorse the controversial *State Street* "useful, concrete, and tangible result" test,⁴⁷ while a majority of five rejected it outright.⁴⁸ The Federal Circuit below had also rejected this formulation as being inappropriate to determine patent eligibility.

1. Machine-Or-Transformation is Not the Sole Test for Patent Eligibility

In dispensing with the Federal Circuit's finding that the machine-or-transformation test is the sole test for determining the patent eligibility of process claims, the Supreme Court noted that it has never endorsed such a view and that the courts should not read into the Patent Act limitations it does not contain.⁴⁹ Although the court in 1876 in *Cochrane v. Deener*⁵⁰ described the process category in terms similar to the machine-or-transformation test, this was mere dictum and never intended as an exclusive test.⁵¹

concurring opinion, issued the day of his retirement from the Supreme Court, in which Justices Ginsburg, Breyer and Sotomayor joined. Justice Breyer, even though he joined Justice Stevens' opinion, wrote an additional and separate concurring opinion, in which Justice Scalia joined in part. Justice Breyer, seemingly in an attempt to create some degree of certainty from the court's disparate views, sought to highlight the consistencies between the various judgments in this additional opinion.

⁴⁷ *State Street*, 149 F.3d at 1373.

⁴⁸ Justice Kennedy, Chief Justice Roberts, and Justices Thomas and Alito did not endorse the *State Street* test, while Justice Stevens, along with Justices Ginsburg, Breyer and Sotomayor, Breyer and Scalia rejected it outright.

⁴⁹ *Bilski*, 130 S. Ct. at 3226.

⁵⁰ 94 U.S. 780 (1876).

⁵¹ *Bilski*, 130 S. Ct. at 3226.

The Supreme Court in *Bilski v. Kappos* instead rightly took the view that the machine-or-transformation test is “a useful and important clue, an investigative tool, for determining whether some claimed inventions are processes under §101”.⁵² The court noted that limiting the definition of “process” in §100(b) to processes involving machines or other physical devices, or to physically-transformative processes does not conform to any “ordinary, contemporary, common meaning” of the statutory definition.⁵³

2. Scope of Patentable Subject Matter

Possibly the most important aspect of the *Bilski v. Kappos* decision, outside the rejection of the physicality requirement, is the Court’s description of the recognized categories of excluded matter. The majority affirmed that the scope of patentable subject matter under §101 comprises any “new and useful” invention that falls within the four enumerated categories, but outside the recognized categories of excluded matter, laws of nature, physical phenomena and abstract ideas.⁵⁴ It specifically noted that, although the recognized categories of excluded matter are not expressly listed in the statutory text, they “are consistent with the notion that a patentable process must be “new and useful.””⁵⁵ The majority wrote that these exceptions have been established as a matter of precedent for 150 years. It also confirmed that these are the only categories of excluded matter that have been recognized to date and that the Court has “more than once cautioned that courts ‘should not read into the patent laws limitations and conditions which the legislature has not expressed.’”⁵⁶ It is worth noting that the recognized categories of excluded matter articulated in *Bilski v. Kappos* do not include the “mental steps” included in *Gottschalk v. Benson* and *Parker v. Flook*, but omitted from the list in *Diehr* and *Chakrabarty*.⁵⁷

Affirming that the scope of patentable subject matter is limited only by the three recognized categories of excluded matter requires an acknowledgement that the § 101 inquiry is only a threshold test that is not a substitute for a complete patentability analysis. Concerns that potentially vague or trivial patents are being granted are to be addressed by applying the other requirements for patentability. While § 101 provides a valuable hurdle threshold test, it is the strictures of novelty, nonobviousness, sufficiency of written description, and enablement, that are the main tools for eliminating undeserving patents. As the Supreme Court in *Bilski v. Kappos* noted:

⁵² *Id.* at 3227.

⁵³ *Id.* at 3226.

⁵⁴ That this is the correct test for determining whether an invention is patent eligible is evident from the Supreme Court decisions in: *Gottschalk v. Benson*, 409 U.S. 63 (1972); *Parker v. Flook*, 437 U.S. 584 (1978); *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980); and *Diamond v. Diehr*, 450 U.S. 175, 182, 185 (1981). It is also evident from the Federal Circuit decisions in: *State Street*, 149 F.3d at 1368; *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994); and *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352. Further, it is evident in the dissenting opinion of Judge Newman in *In re Schrader*, 22 F.3d 290 (Fed. Cir. 1994), *In re Bilski*, 545 F.3d 943, and *In re Ferguson*, 558 F.3d 1359 (Fed. Cir. 2009).

⁵⁵ *Chakrabarty*, 447 U.S. at 309 (quoting S. Rep. 82-1979, at 5 (1952)).

⁵⁶ *Diehr*, 450 U.S. at 182 (quoting *Chakrabarty*, 447 U.S. at 308) (internal quotation marks omitted).

⁵⁷ *Id.* at 182, 185; *Chakrabarty*, 447 U.S. at 309.

Even if an invention qualifies as a process, machine, manufacture, or composition of matter, in order to receive the Patent Act's protection the claimed invention must also satisfy "the conditions and requirements of this title."⁵⁸

First, proper enforcement of the novelty and nonobviousness requirements in §§ 102 and 103 will prevent patents that claim old and well-known processes being awarded.⁵⁹ Second, § 101 is not intended to protect against overbroad claims. That is the role of § 112, which demands that the inventor clearly describe and distinctly claim the invention. The existing requirements for patentability properly applied are better suited than the machine-or-transformation test to prevent vague or trivial patents being granted.

This view of patentable subject matter is clearly inconsistent with the recognition of additional categories of excluded matter. The Supreme Court rejected any categorical limitations to patent eligibility, in part because, "adopting categorical rules ... might have wide-ranging and unforeseen impacts."⁶⁰

Unlike the other enumerated classes of subject matter in § 101, the process category is arguably to only one that is not cast in terms of physical embodiment. The Supreme Court was clear in holding that the ordinary meaning of process does not require a machine or a transformation of matter.

3. Business Methods Are Not An Excluded Category of Subject Matter

The patentability of business methods remains a somewhat uncertain proposition even after *Bilski v. Kappos*. Only the five judges who constituted the majority took the view that § 101 "precludes the broad contention that the term 'process' categorically excludes business methods." Thus, the majority took the view that business methods are not an excluded category of subject matter.

The majority saw the enactment of § 273 as Congress giving its imprimatur to business method patents. Citing § 273(b)(1), the majority noted that, "federal law explicitly contemplates the existence of at least some business method patents."⁶¹ It explained that "what §273 does is clarify the understanding that a business method is simply one kind of 'method' that is, at least in some circumstances, eligible for patenting under §101" and that "[a] conclusion that business methods are not patentable in any circumstances would render §273 meaningless."⁶² However, to muddy the waters, the majority concluded that, "[f]inally, while §273 appears to leave open the possibility of some business method patents, it does not suggest broad patentability of such claimed inventions." What this means for the patent eligibility of business methods is unclear.

⁵⁸ *Bilski*, 130 S. Ct. at 3225.

⁵⁹ *In re Bergy*, 563 F.2d 952, 960 (C.C.P.A. 1979). Since the decision in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 420-21 (2007), it is now clear that §103 bars patents for improvements that result from mere "common sense" or "ordinary creativity."

⁶⁰ *Bilski*, 130 S. Ct. at 3229.

⁶¹ *Id.* at 3228.

⁶² *Id.*

By contrast, Justice Stevens would have added business methods to the list of recognized categories of excluded matter. Justice Stevens, the author of *Flook* and the dissenting opinion in *Diehr*, argued that the court should “restore patent law to its historical and constitutional moorings.”⁶³ He took of the view that business methods are not patentable in light of “strong historical evidence that a method of doing business does not constitute a ‘process’ under § 101.”⁶⁴

Justice Stevens addressed the majority’s argument that a business method exclusion would render § 273 meaningless on the grounds that § 101 lies within one statute, the 1952 Act, and § 273 lies in another, the 1999 Act, and that these two statutes were not passed as a whole.⁶⁵ Justice Stevens described § 273 as a technically unnecessary response to confusion about patentable subject matter, which appeared necessary in 1999. He speculated that the 1999 Congress would not have enacted § 273 if it had foreseen that the Supreme Court would rely on the provision as a basis for concluding that business methods are patentable.⁶⁶

Justice Stevens disagreed with the majority’s view that the terms used in § 101 must be viewed in light of their ordinary, contemporary, common meaning. Writing one of his final judgments before retiring, he opined that it would be absurd to say that, “[a]nything that constitutes a series of steps would be patentable so long as it is novel, nonobvious, and described with specificity.”⁶⁷ Instead, Justice Stevens took the view that the term, process, must be interpreted in a way that recognizes that the statute is one which contains “complex terms of art developed against a particular historical background.”⁶⁸

Indeed, the approach would render §101 almost comical. A process for training a dog, a series of dance steps, a method of shooting a basketball, maybe even words, stories, or songs if framed as the steps of typing letters or uttering sounds – all would be patent-eligible. I am confident that the term “process” in §101 is not nearly so capacious.⁶⁹

Consistent with this view, Justice Stevens also confirmed that the reliance in *Chakrabarty* on the phrase, “anything under the sun” does not indicate that any series of steps is a patentable process.⁷⁰

4. Bilski’s Claims Are “Abstract” and Therefore Unpatentable

⁶³ *Id.* at 3232 (Stevens, J., dissenting).

⁶⁴ *Id.* at 3249-50 (Stevens, J., dissenting).

⁶⁵ *Id.* at 3250-52 (Stevens, J., dissenting).

⁶⁶ *Id.* at 3252 (Stevens, J., dissenting) (“Section 273 is a red herring; we should be focusing our attention on § 101 itself.”).

⁶⁷ *Id.* at 3235 (Stevens, J., dissenting).

⁶⁸ *Id.* at 3238 (Stevens, J., dissenting).

⁶⁹ *Id.*

⁷⁰ The full sentence in the Committee Reports reads: “A person may have ‘invented’ a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of [this] title are fulfilled.” S. Rep. No. 82-1979, at 5 (1952); H.R. Rep. No. 82-1923, at 6 (1952).

A slender 5-4 majority held *Bilski*'s claims to be unpatentable because they are "abstract," without, as Justice Stevens noted in his concurring opinion, explaining why. It is difficult to understand why Justice Kennedy and those who concurred in his judgment deemed *Bilski*'s claimed invention to be abstract. On this point, Justice Kennedy says little more than that the hedging method is analogous to patents the Supreme Court has previously rejected in cases such as *Gottschalk v. Benson* and *Parker v. Flook*:

Even though petitioners' application is not categorically outside of §101 under the two broad and atextual approaches the Court rejects today, that does not mean it is a "process" under §101. Petitioners seek to patent both the concept of hedging risk and the application of that concept to energy markets. Rather than adopting categorical rules that might have wide-ranging and unforeseen impacts, the Court resolves this case narrowly on the basis of this Court's decisions in *Benson*, *Flook*, and *Diehr*, which show that petitioners' claims are not patentable processes because they are attempts to patent abstract ideas. Indeed, all members of the Court agree that the patent application at issue here falls outside of §101 because it claims an abstract idea.⁷¹

The majority based this finding on pre-emption, stating that:

[a]llowing petitioners to patent risk hedging would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea."⁷²

Justice Kennedy's categorization of the claims as "abstract" is unsatisfactory because it does not explain how this conclusion was reached. This may be the case for *Bilski*'s claim 1, which was broadly drafted to claim the concept of hedging. However, later claims, such as claim 4, do describe a series of steps a person should take to achieve a particular useful result. It is difficult to envisage how these might be correctly described as abstract. If Justice Kennedy took the view that the claims were described with such a lack of particularity so as to constitute only abstract ideas, then he should have said so.

Justice Stevens noted this in his concurring opinion:

The Court, in sum, never provides a satisfying account of what constitutes an unpatentable abstract idea. Indeed, the Court does not even explain if it is using the machine-or-transformation criteria. The Court essentially asserts its conclusion that petitioners' application claims an abstract idea. This mode of analysis (or lack thereof) may have led to the correct outcome in this case, but it also means that the Court's musings on this issue stand for very little.⁷³

His Honor explained the problems with the majority's analysis, one being that:

⁷¹ *Bilski*, 130 S. Ct. at 3229-30.

⁷² *Id.* at 3231.

⁷³ *Id.* at 3236 (Stevens, J., dissenting).

The Court construes petitioners' claims on processes for pricing as claims on "the basic concept of hedging, or protecting against risk," and thus discounts the application's discussion of what sorts of data to use, and how to analyze those data, as mere "token postsolution components." In other words, the Court artificially limits petitioners' claims to hedging, and then concludes that hedging is an abstract idea rather than a term that describes a category of processes including petitioners' claims. Why the Court does this is never made clear.⁷⁴

In his minority opinion, Justice Stevens, on behalf of the remaining four justices, rejected the patent because it claims a business method:

[P]etitioners' claim is not a "process" within the meaning of §101 because methods of doing business are not, in themselves, covered by the statute. In my view, acknowledging as much would be a far more sensible and restrained way to resolve this case. Accordingly, while I concur in the judgment, I strongly disagree with the Court's disposition of this case.⁷⁵

He argued passionately that patenting business methods removes patent law from its historical roots. He noted that few if any business methods were patented in England during the 17th and 18th centuries.⁷⁶

Justice Stevens argued against business method patents on the basis that they are overly broad grants of monopoly rights that are likely to stifle innovation and harm competition.⁷⁷

Even if a business method patent is ultimately held invalid, patent holders may be able to use it to threaten litigation and to bully competitors, especially those that cannot bear the costs of a drawn out, fact-intensive patent litigation. That can take a particular toll on small and upstart businesses. Of course, patents always serve as a barrier to competition for the type of subject matter that is patented. But patents on business methods are patents on business itself. Therefore, unlike virtually every other category of patents, they are by their very nature likely to depress the dynamism of the marketplace.⁷⁸

In the end, this argument failed to carry the day by one vote.

5. *State Street* Test Rejected

After more than a decade of uncertainty, the Federal Circuit in *In re Bilski* did an about face and retired the "useful, concrete, and tangible result" formula Judge Rich applied to the subject matter inquiry in *State Street*,⁷⁹ finding it "insufficient to determine whether a claim is

⁷⁴ *Id.* at 3235 (Stevens, J., dissenting) (citation omitted).

⁷⁵ *Id.* at 3257 (Stevens, J., dissenting).

⁷⁶ *Id.* at 3241 (Stevens, J., dissenting).

⁷⁷ *Id.* at 3239-50 (Stevens, J., dissenting).

⁷⁸ *Id.* at 3257 (Stevens, J., dissenting).

⁷⁹ 149 F.3d at 1373; *AT&T Corp. v. Excel Commc'ns, Inc.*, 172 F.3d 1352, 1360 (Fed. Cir. 1999) (endorsing *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied* 525 U.S.

patent-eligible under § 101.”⁸⁰ The Federal Circuit contended that the “useful, concrete and tangible result” was a proxy test that “was certainly never intended to supplant the Supreme Court’s test” for determining patent eligibility.⁸¹ The Supreme Court in *Bilski v. Kappos* did not disturb this finding on appeal.

A majority of five judges rejected the controversial *State Street* “useful, concrete, and tangible result” test outright,⁸² while the remaining four did not endorse the test.⁸³

Justice Stevens stated his objections to the *State Street* formulation most forcefully when he wrote in a footnote that, “it would be a grave mistake to assume that anything with a ‘useful, concrete and tangible result,’ ... may be patented.”⁸⁴ Similarly, Justice Kennedy said “[n]othing in today’s opinion should be read as endorsing interpretations of §101 that the Federal Circuit has used in the past.”⁸⁵ Justice Breyer, denigrated the *State Street* decision as having heralded “the granting of patents that ‘ranged from the somewhat ridiculous to the truly absurd.’”⁸⁶ However, although the Supreme Court judges were consistently critical of the formulation, it is difficult to see from their opinions how they would have decided *State Street* differently had they had the opportunity to do so.

III. Reflections on the Law Post-*Bilski*: Implications of the Decision

A. Certainty As to Physicality, But Not Abstract Ideas and Business Methods

As matter of law, the Supreme Court arguably got the physicality issue right. The court confirmed that its earlier precedents demonstrate, albeit not clearly, that the patentable subject matter inquiry does not contain a physicality requirement, and that physicality is not the dividing line that separates patentable subject matter and the recognized categories of excluded matter. Rather, the presence of a machine or transformation is merely an indication, or “clue,” that an invention is patent eligible.

Although the Court clearly rejected the physicality requirement, it provided little guidance as to how the difficult cases involving completely intangible or non-physical subject matter are to be resolved, or what the reach of the “abstract” category of excluded matter is. Further, the disparate judgments create uncertainty as to whether business methods are to be included as a recognized category of excluded matter in the future. The vagaries of the decision means the task of describing how the contours of the patentable subject matter standard are to be applied to new technologies is left to lower courts to be determined on a case-by-case basis.

1093 (1999)). While the “Useful, concrete, and tangible result” test is generally associated with the *State Street* decision, Judge Rich first applied the test in *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) (en banc).

⁸⁰ *In re Bilski*, 545 F.3d 943, 959 (Fed. Cir. 2008). From the oral hearings in the appeal, the court seemed to admit that it did not understand its own “Useful, concrete, and tangible result” test.

⁸¹ *Id.*

⁸² *State Street*, 149 F.3d at 1373.

⁸³ Justice Kennedy did not endorse the test; Justice Stevens, along with Justices Breyer and Scalia rejected the test outright.

⁸⁴ *Bilski*, 130 S. Ct. at 3232 n.1 (Stevens, J., dissenting).

⁸⁵ *Id.* at 3231.

⁸⁶ *Id.* at 3259 (Breyer, J., concurring).

Another piece of the puzzle the Supreme Court's decision in *Bilski v. Kappos* does not shed light on is the connection between the four categories of subject matter in § 101 and the "useful arts" that are the foundation of the intellectual property clause of the *Constitution*. Is it the case that patentable subject matter under § 101 comprises any "new and useful" invention that lies within the "useful arts," but falls outside the recognized categories of excluded categories of excluded matter? That is, does the reference in the *Constitution* to "useful arts" impose an additional, and potentially significant, requirement for patent eligibility, or is it simply the case that the "useful arts" are coextensive with the set of inventions that fall into the four categories of § 101 subject matter, but not within the recognized categories of excluded matter? Given that the majority favored a binary distinction between the § 101 categories and the recognized categories of excluded matter, it would seem that the latter is the case. However, it is difficult to say this with any authority, as it is not an issue the court explicitly resolved.

B. *The Scope of Patentable Subject Matter After Bilski v. Kappos*

The Supreme Court's decision in *Bilski v. Kappos* confirms that patentable subject matter comprises any "new and useful" invention in the "useful arts" that falls within the four categories of § 101 subject matter, but lies outside the recognized categories of excluded matter.⁸⁷ It also confirms that creating a special test for the "process" category is inconsistent with the plain language of § 101. The language of § 101 does not extend patent protection to some processes but not others, and does not allow for the courts to place additional limits on patent eligible subject matter that have not been expressed by Congress.⁸⁸

The court's majority confirmed that the recognized categories of excluded matter are fundamental principles of nature, natural phenomena and abstract ideas.⁸⁹ The court made clear that there is no recognized exclusion of processes that involve or wholly consist of mental steps,⁹⁰ or processes that do not involve a physical aspect. While the scope of the recognized categories of excluded matter has yet to be explained in significant detail by the courts, it is clear that patent eligibility hinges on the distinctions between discoveries and the application of human ingenuity, and between the abstract and what has been reduced to practice. This is necessarily a dull line delineation, not a bright line test.

C. *Section 101 and State Street: Did Judge Rich Get it Right?*

The patentable subject matter test is, arguably, as Judge Rich described it in the controversial 1998 *State Street* decision.⁹¹ *State Street* marked a seismic shift in the uses to which the patent system has been put. For that it has been criticized. *State Street* opened the door to business method patents. In a decision written by the extremely well respected and experienced Judge Rich, the Federal Circuit held a machine-implemented data processing system

⁸⁷ *Id.* at 3225.

⁸⁸ *Id.* at 3226.

⁸⁹ *Id.* at 3225.

⁹⁰ *Diamond v. Diehr*, 450 U.S. 175, 182, 185 (1981); *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

⁹¹ *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied* 525 U.S. 1093 (1999). The case was heard before a three judge panel of Judges Rich, Plager and Bryson. Judge Rich filed an opinion on behalf of the court.

that used a mathematical algorithm to implement a financial investment structure in computer software to be patentable subject matter.

Judge Rich, on behalf of a three-judge Federal Circuit panel, wrote that Congress's intent was not to place restrictions on the subject matter inquiry that do not specifically appear in § 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 and the other parts of Title 35. Indeed, the Supreme Court has acknowledged that Congress intended § 101 to extend to “anything under the sun that is made by man.” Thus, it is improper to read into § 101 limitations as to the subject matter that may be patented where the legislative history does not indicate that Congress clearly intended such limitations.⁹²

In so doing, Judge Rich relied on the test he had created in *In re Alappat* and held that an invention will be patentable if it produces a “useful, concrete, and tangible result,”⁹³ a test he and the Federal Circuit left undefined. He found that, although the patent involves the use of a mathematical algorithm, it had not claimed an abstract idea, but claimed a programmed machine that produces a “useful, concrete and tangible result.”⁹⁴ In upholding the validity of the patent, he famously said:

Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces “a useful, concrete and tangible result” -- a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.⁹⁵

According to Judge Rich, the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it non-statutory subject matter, where it produces a “useful, concrete and tangible result.” Thus, the invention in *State Street* was patentable since it achieved a useful result, even though it did not accord with traditional expectations that patents involve machines or methods that transform physical objects from one state to another. Judge Rich in *State Street* emphasized that the question of whether or not an algorithm lacks physical embodiment was not of importance and declared that the physicality doctrine known as the *Freeman-Walter-Abele* test was inconsistent with the decisions in *Diehr* and *Chakrabarty*.⁹⁶

⁹² *Id.* at 1373 (citing *Chakrabarty*, 447 U.S. at 308, 309); *Diehr*, 450 U.S. at 182.

⁹³ *State Street*, 149 F.3d at 1373.

⁹⁴ *Id.* (quoting *In re Alappat*, 33 F.3d 1526, 1544 (Fed. Cir. 1994)).

⁹⁵ *State Street*, 149 F.3d at 1373.

⁹⁶ *Id.* at 1373-74 (“After *Diehr* and *Chakrabarty*, the *Freeman-Walter-Abele* test has little, if any, applicability to determining the presence of statutory subject matter”).

The main criticism of *State Street* and *AT&T v. Excel*⁹⁷ is that they changed the law to allow too wide a scope of patent eligible subject matter.⁹⁸ In response to the decision, one Federal Circuit judge remarked that, as a consequence of *State Street*, “virtually anything is patentable.”⁹⁹ Arguably, though, *State Street* does not represent a change in the law, but reveals what the existing law actually allows.¹⁰⁰

Despite the criticism, the “useful, concrete and tangible result” test must be understood for what it is. While it is clear that the expression is the Federal Circuit’s creation and not wording the Supreme Court has ever embraced,¹⁰¹ the test as applied in *State Street* and *AT&T* is not inconsistent with prior precedent. It does not appear that Judge Rich intended the three adjectives, “useful,” “concrete” and “tangible,” to be interpreted individually as distinct elements. That is, this is not a new test. Rather, the expression is a shorthand label to name the principle enunciated in *Diehr*, that while a claim to a fundamental principle is unpatentable, “an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”¹⁰² *State Street* is not authority for the proposition that practical utility is the sole criterion of patent eligibility. It merely demonstrates that patent eligibility is satisfied where a “new and useful” invention that lies within useful arts, but not within the recognized categories of excluded matter, is disclosed. Thus, the essence of the decision is that reduction to a specific practical application is what separates patentable inventions from the recognized categories of excluded matter. In 1999, the United States Supreme Court impliedly endorsed Judge Rich’s approach when it allowed the *State Street* decision to remain the law of the land when it denied certiorari.¹⁰³

The importance of *State Street* lies in the rejection of the business method exception, the refusal to exclude mathematical algorithms as a class, and most importantly, the demonstration of how the Supreme Court precedent in *Diehr* is to be applied to information processing inventions. *State Street* did much to clarify the ambiguity surrounding the patentability of algorithms that arose as a consequence of *Benson*. It also clarified that contrary to traditional expectations, physicality is not relevant to the subject matter inquiry.

⁹⁷ 172 F.3d 1352 (Fed. Cir. 1999).

⁹⁸ Leo J. Raskind, *The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 61 (1999) (voicing concern over the broad sweep of patent eligibility under the *State Street* test); Rochelle Cooper Dreyfuss, *Are Business Method Patents Bad for Business?*, 16 SANTA CLARA COMPUTER & HIGH TECH. L.J. 263 (2000) [hereinafter Dreyfuss, *Are Business Method Patents Bad for Business?*]; Pollack, *supra* note 11; Thomas, *Liberal Professions*, *supra* note 11; John R. Thomas, *The Post-Industrial Patent System*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 3 (1999) [hereinafter Thomas, *The Post-Industrial Patent System*]; Julia Alpert Gladstone, *Why Patenting Information Technology and Business Methods Is Not Sound Policy: Lessons from History and Prophecies for the Future*, 25 HAMLIN L. REV. 217 (2002); Julia Alpert Gladstone, *An Argument against Business Method Patents Demonstrating That Algorithms Are Abstract and Business Methods Are Obvious*, 12 J.L. INFO. & SCI. 8 (2001).

⁹⁹ *Hughes Aircraft Co. v. United States*, 148 F.3d 1384, 1385 (Fed. Cir. 1998) (Clevenger, J., dissenting) (citing *State Street*, 149 F.3d at 1368).

¹⁰⁰ The opposite view is taken by Dreyfuss, *Are Business Method Patents Bad for Business?*, *supra* note 98, at 266, who describes these as changes to the law.

¹⁰¹ *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124, 136 (2006) (Breyer, J., dissenting) (“But this Court has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary.”).

¹⁰² *Diehr*, 450 U.S. at 187 (emphasis in original).

¹⁰³ *State Street*, 149 F.3d at 1368.

Arguably, the 2010 Federal Circuit and Supreme Court misunderstood Judge Rich's intentions that the "useful, concrete and tangible result" expression was not intended as a proxy test. While rejecting the label because it confused the law (and added nothing of value) was a sensible step to take, the substantive reasons for the decisions in *Alappat*, *State Street* and *AT&T* are of continuing importance because they recognize that the focus of the subject matter inquiry is practical utility, not category-based exclusions.

IV. Physicality and the Information Age

In this Part, the physicality issue is addressed from a normative perspective: it asks whether the patentable subject matter test should contain a physicality requirement. The conclusion reached is that it should not, because a physicality requirement is not an appropriate means of encouraging much of the valuable innovation we are likely to witness during the Information Age. In addition, it is argued that concerns raised that there is a crisis in patent law caused by a trend of overreaching commoditization or propertization, where the boundaries of patent law have been expanded too far, are unfounded since the strictures of novelty, inventiveness and sufficiency of description exist to exclude undeserving subject matter from patentability. While concerns exist that these strictures are not adequately enforced, these are administrative concerns that are separate and distinct from issues of patentable subject matter.

A criticism made of the Federal Circuit's decision in *In re Bilski* is that the majority sought to base its decision purely on a reading of Supreme Court precedent without having regard to the policy that it intended to serve by removing non-physical advances from the patent system.¹⁰⁴

As Judge Newman explained in *In re Ferguson*,¹⁰⁵ having regard to normative issues and policy considerations is necessary in the proper administration of justice and the alignment of law and social values. Policy considerations are important because not all legal outcomes can be justified merely by an application of black-letter law. In many cases, judges can blindly apply precedent, safe in the knowledge that the law gives results that are consistent with the community's reasonable expectations and interests of fairness and justice. However, while legal disputes are to be settled according to law rather than personal whim, judges cannot ignore the ramifications of their decisions and should be alert to the fact that the law must evolve as political, social and economic conditions change.¹⁰⁶

By the rules it imposes, the legal system plays a part in facilitating and promoting technological innovation, and economic thought.¹⁰⁷ By determining which technologies may be the subject of a patent, the patentable subject matter inquiry defines the social values that the

¹⁰⁴ *In re Ferguson*, 558 F.3d 1359, 1368 (Fed. Cir. 2009) (Newman, J., concurring).

¹⁰⁵ *Id.*

¹⁰⁶ According to Judge Newman, it is the responsibility of the judges who administer the common law to pay heed to the social policies it implements, *Id.* at 1368 n.1 (Newman, J., concurring) (citing Oliver W. Holmes, *The Common Law* 35-36 (1881)).

¹⁰⁷ *Ferguson*, 558 F.3d at 1368 (Newman, J. concurring) (citing Milton Katz, *The Role of the Legal System in Technological Innovation and Economic Growth, The Positive Sum Strategy* 169 (1986)).

patent system serves.¹⁰⁸ To remain relevant and to continue to allow patent law to achieve its objectives, the law must keep pace with new trends in technology. It must respond appropriately to the claims of innovators who seek to push the currently understood boundaries of patentable subject matter, without unjustly enriching innovators or depriving them of the fruits of their labor. If it does not, it will hinder the public it is supposed to serve and people will find alternative means of achieving the practical outcomes they desire.¹⁰⁹ These alternative means will likely be based in secrecy, rather than the openness that patent law's disclosure and enablement regime promotes.

At this point in time, it is onward rushing technological evolution which requires that existing ideas about patent eligibility be challenged. There is a need to decide whether the benefits of the patent system should extend to encourage and protect the sorts of knowledge and process-based innovation we are likely to see in the "knowledge economy" of the Information Age. Addressing the patent eligibility of non-physical inventions involves asking what the proper scope and role of patentable subject matter is. This involves asking whether excluding non-physical inventions will have a detrimental effect on innovation and whether allowing patents on non-physical inventions is worth the inconvenience that the resulting monopoly rights will cause the public. It also involves asking what impact a physicality requirement will have on the different areas of technology that are likely to feature prominently on the technological landscape in the foreseeable future.

A. A Physicality Requirement is Inapposite in the Information Age

The patentable subject matter test is a broad, flexible and forward-looking test. It must accommodate all new and useful inventions that fall within the useful arts and do not fall within the recognized categories of excluded matter. The test must be technology-neutral and industry-neutral. While the objects of patent law are to encourage the creation and disclosure of new innovation for the benefit of the public, the subject matter inquiry should not involve matters of ethics and social policy upon which the courts have no special expertise. Finally, it should not involve arbitrary limitations that are engineered to achieve social goals.

That people would assume the reach of patent law would be limited to new machines, devices and physically transformative methods is unsurprising given that innovation in bygone eras has predominantly been marked by technological advances of this kind. However, this is merely a reflection of the kinds of advances that have previously dominated the technological landscape and hitherto held views about the nature of technology and patent eligibility. It does not necessarily reflect the state of the law or the nature of the patent custom.

Limiting the scope of patent eligible subject matter to inventions that involve a physical effect or transformation is not well suited to promoting innovation in a modern knowledge-based

¹⁰⁸ Dana Remus Irwin, *Paradise Lost in the Patent Law? Changing Visions of Technology in the Subject Matter Inquiry*, 60 FLA. L. REV. 775, 780 (2008); Nari Lee, *Patent Eligible Subject Matter Reconfiguration and the Emergence of Proprietary Norms—The Patent Eligibility of Business Methods*, 45 IDEA 321, 328-329 (2005). Irwin and Lee take the view that the decision to include non-physical inventions within the scope of patentable subject matter is to effect a change in the law.

¹⁰⁹ R. Carl Moy, *Subjecting Rembrandt to the Rule of Law: Rule-Based Solutions for Determining the Patentability of Business Methods*, 28 WM. MITCHELL L. REV. 1047, 1086 (2002) [hereinafter Moy, *Subjecting Rembrandt*].

economy.¹¹⁰ New and non-obvious processes do not arise only in processes that involve a physical transformation of matter or reside in a machine. A physicality requirement is a backward-looking test that may have been appropriate during the Industrial Age,¹¹¹ but is no longer appropriate in an information-based economy as it confines the scope of patentable subject matter to manufacturing technologies of the past.¹¹² A physicality requirement removes the incentives of patent law that might otherwise have encouraged the creation of potentially valuable technologies. The economic consequences of the decision to introduce this requirement are that there are new technologies that will either not be created or not disclosed to the public (either at all or as quickly as they would have been had patent protection been available).¹¹³

Limiting patent eligibility to physical inventions is emotive because it reflects an understanding of the patent system which matches many of our sensibilities. It largely limits the scope of the patent system to encouraging innovation that is of traditional industrial application, namely the creation of new physical machines, devices and physically transformative methods. However, today's advances in acquiring and using knowledge are producing a host of creative breakthroughs, which ought to receive the same treatment as traditionally recognized advances in the mechanical, chemical and agricultural fields. In an era in which many indispensable technological advances are likely to be information processing advances with few, if any, physically transformative features, limiting the reach of the patent system to new industrial manufacturing processes will render patent protection an irrelevant tool of a bygone age.¹¹⁴ As we move to becoming an economy that acknowledges that innovation is little more than practically applied information, the more we need patent law to adapt to this changed technological reality.

A national strategy of promoting innovation requires legal certainty, strong and predictable property rights, and broad subject matter eligibility. Where either the law or property rights are uncertain, incentives to innovate and invest in innovation are diminished or lost.¹¹⁵ Firms' investment decisions are tempered by risk aversion. Uncertainty about the profitability of potential investments increases when it is unclear whether the products and processes developed through research and development are likely to be patentable and thus be the subject of property

¹¹⁰ A number of other academic authors support the view that patent law does not, and should not, contain a physicality requirement. See, e.g., Sam Ricketson, *Business Method Patents: A Matter of Convenience?*, 2 INTELL. PROP. Q. 97 (2003) [hereinafter Ricketson, *Business Method Patents*]; Gruner, *Undiscovered Country*, *supra* note 28, at 398-99; Richard S. Gruner, *Intangible Inventions: Patentable Subject Matter for an Information Age*, 35 LOY. L.A. L. REV. 355, 360-361 (2002) [hereinafter Gruner, *Intangible Inventions*] (noting that "information-processing innovation is at the heart of many of the most important changes now underway in our individual, social, business, and governmental activities."); Moy, *Subjecting Rembrandt*, *supra* note 109, at 1086; Dennis S. Karjala, *Distinguishing Patent and Copyright Subject Matter*, 35 CONN. L. REV. 439, 439 (2003) [hereinafter Karjala, *Distinguishing Patent and Copyright*]; Michael Risch, *Everything is Patentable*, 75 TENN. L. REV. 591 (2008).

¹¹¹ Moy, *Subjecting Rembrandt*, *supra* note 109, at 1086.

¹¹² *Bilski*, 545 F.3d at 976 (Newman, J., dissenting); *Id.* at 1011 (Rader, J., dissenting).

¹¹³ Rochelle Cooper Dreyfuss, *Nonobviousness: A Comment on Three Learned Papers*, 12 LEWIS & CLARK L. REV. 431, 438 (2008) ("[i]n the fullness of time, it is highly likely that every invention will be made; to a large extent, the real goal of patent law is not to induce invention, but instead to induce it sooner rather than later").

¹¹⁴ Gruner, *Intangible Inventions*, *supra* note 110, at 360-61 (noting that "information-processing innovation is at the heart of many of the most important changes now underway in our individual, social, business, and governmental activities"); Moy, *Subjecting Rembrandt*, *supra* note 109, at 1086; Karjala, *Distinguishing Patent and Copyright Subject Matter*, *supra* note 110, at 439.

¹¹⁵ *Bilski*, 545 F.3d at 994-95 (Newman, J., dissenting).

rights that will adhere to the firm. This uncertainty can promote risk-averse behavior. Conversely, certainty can promote investment.¹¹⁶ If firms cannot be certain that intellectual property rights will protect their inventive output, they will keep inventions secret for as long as they can. The result is that the public loses, or faces delay in gaining, access to new knowledge and products.¹¹⁷ The effect of uncertainty on investment is that the value and credibility of firms and their assets becomes unclear. Introducing a physicality requirement would necessitate a massive re-evaluation of the economic worth of intangible assets previously thought to be patent eligible. In the face of uncertain or weak intellectual property rights, firms cannot reliably convey information about their inventions. This leads to unnecessary expenditure in the form of transaction costs and litigation, the consequence of which is that firms are less profitable and therefore will employ fewer research staff and devote less time to research and development. Conversely, by allowing firms to easily recognize which inventions may warrant a patent, the law will encourage investment.

As Judge Newman explained, the Federal Circuit's decision to introduce a physicality requirement in *In re Bilski* abruptly changed the law and unsettled the reasonable expectations of inventors, investors and patentees, who had relied on years of jurisprudence that broadly encouraged all forms of practically applied innovation without restriction.¹¹⁸ In the words of Judge Newman:

[T]he wider effect will be a disincentive to innovation-based commerce. For inventors, investors, competitors, and the public, the most grievous consequence is the effect on inventions not made or not developed because of uncertainty as to patent protection.¹¹⁹

There is no logical basis for labeling all non-physical technologies as non-inventions or abstract ideas. Inventions are patentable, provided that they are new, in the sense of not being a mere discovery; novel, in the sense of not having been previously publicly disclosed; and inventive, in the sense of not being obvious to person skilled in the relevant art. An invention is something that is repeatable in the sense that it produces consistent, predictable and near identical results each time it is carried out, such that it extends beyond the first embodiment.¹²⁰ Where a product, such as a new machine or device, is concerned, it must be possible to create an identical machine or device by following the inventor's instructions. Where a process is concerned, it must be possible to achieve consistent, predictable and near-identical results to those claimed by the inventor each time the process is instantiated.

Since its inception and throughout its history, the object of the patent system has been to provide sufficient encouragement to inventors to create and disclose the broadest possible range of new technological advances for the benefit of the public. Physical embodiment or transformation is not relevant to invention. The concept of invention is, like patentable subject

¹¹⁶ Elizabeth Webster, *The Economics of Intangible Investment* 22-23 (1999).

¹¹⁷ *Bilski*, 545 F.3d at 992 (Newman, J., dissenting).

¹¹⁸ *Id.* at 995 (Newman, J., dissenting).

¹¹⁹ *Id.*

¹²⁰ Brad Sherman & Lionel Bently, *The Making of Intellectual Property Law: The British Experience, 1760-1911*, 51 (1999).

matter, grounded in the practical application of a new idea or principle to achieve a useful result. The result to be obtained must produce some advantageous outcome of economic significance and practical reality. Whether it is embodied in a machine, physical device or causes a transformation of matter is surely not significant. The exclusion of advances that do not involve a physical effect or transformation is inconsistent with the objects of the patent system to promote innovation in whatever form it arises. It is inconsistent with the courts' pronouncements in favor of a broad and flexible subject matter inquiry, detrimental to the advancement of technology and is supportive of free-riders at the expense of innovators and entrepreneurs. It displays a short-sighted mindset that is trapped in existing paradigms and assumptions, all of which are the very opposite of what is required to stimulate innovation in the knowledge economy. It also displays a narrow understanding of what "technology" is. It denies that technology is more than the creation of new devices and physical methods.

B. *Philosophical Objections to Patenting Non-Physical Inventions*

Arguments in favor of a broad or unlimited scope of patent protection would have it that the recognized categories of excluded matter are the only limits upon the scope of patentable subject matter. The arguments in favor of narrow patent protection are premised upon the assertions that not all innovation is suitable for, or deserving of, patent protection, and that regardless of novelty, inventiveness or utility, there are some ideas and aspects of human behavior that ought not be removed from the intellectual commons.¹²¹

For example, John Thomas is of the view that extending patent protection into every corner of human activity will not result in net social gain.¹²² He holds that "patent law seems poised to embrace the broadest reaches of human experience," and as a consequence, is a threat to personal liberties.¹²³ He claims that there is a set of human activities such as "swinging a golf club, treating cancer or administering a mortgage" that ought to lie outside the bounds of patent eligible subject matter.¹²⁴ The solution he proposes is that patent eligibility should be limited to inventions that are of industrial application, where industrial application means that inventions

¹²¹ The objective of this discussion is to analyze the arguments as to what is the proper scope of patentable subject matter at the time patent validity is determined. As this discussion is limited to issues of patent validity (which is coextensive with the scope of patent protection), it does not consider issues of patent scope in the case of patent infringement. That is, it does not consider whether patent claims should be interpreted literally or augmented by non-literal infringement, say by a doctrine of equivalents. For the distinction between determining patent scope in terms of patent validity (or protection), as opposed to the case of patent infringement, see A. Samuel Oddi, *Un-Unified Economic Theories of Patents—The Not-Quite-Holy Grail*, 71 *NOTRE DAME L. REV.* 267, 271-73 (1996).

¹²² Thomas, *Liberal Professions*, *supra* note 11; Thomas, *The Post-Industrial Patent System*, *supra* note 98; John R. Thomas, *The Future of Patent Law: Liberty and Property in the Patent Law*, 39 *HOUS. L. REV.* 569 (2002) [hereinafter Thomas, *The Future of Patent Law*]; Justin Hughes, *The Philosophy of Intellectual Property*, 77 *GEO. L.J.* 287, 319-20 (1988); Kevin Gray, *Property in Thin Air*, 50 *CAMBRIDGE L.J.* 252, 280-81 (1991) (arguing that morality requires that certain things not be capable of private ownership); Anupam Chander & Madhavi Sunder, *Is Nozick Kicking Rawls's Ass? Intellectual Property and Social Justice*, 40 *U.C. DAVIS L. REV.* 563, 574-75 (2007) (arguing that intellectual property regimes must account for non-economic human values, and that intellectual property law must recognize that property rights have social effects, balance incommensurable values, and structure social relations).

¹²³ Thomas, *Liberal Professions*, *supra* note 11, at 1139; Thomas, *The Post-Industrial Patent System*, *supra* note 98, at 3. See also Thomas, *The Future of Patent Law*, *supra* note 122, at 572.

¹²⁴ Thomas, *Liberal Professions*, *supra* note 11, at 1139; Thomas, *The Post-Industrial Patent System*, *supra* note 98, at 3. See also Thomas, *The Future of Patent Law*, *supra* note 122, at 572.

must involve physical machines or devices or the transformation of physical matter. In his view, limiting patent eligibility in this way would at the very least, remove matters of aesthetics, personal skill and human organization from the patent system.¹²⁵

Similarly, Justin Hughes has set out what he describes, based on Locke's "enough and as good" provision, as two broad categories of "central ideas" that are never permitted to become private property and are to be held in a permanent commons. The first is the category of common "everyday" ideas, "such as thinking to wash one's car, to add paprika to a quiche for coloring, or to tell mystery stories to your cub scout troop." The second is the category of "extraordinary ideas," being ideas that disclose facts about the world and ideas that are subject to widespread use, and include "the Pythagorean theorem, the heliocentric theory of the solar system, or the cylindrical column in architecture."¹²⁶ Hughes's argument is that these "central ideas" are not patentable because giving property rights over them would involve a massive reallocation of wealth into the hands of those who hold property in these ideas and that not enough would be left in the commons for everyone else. He is of the view that the importance of these ideas and the ubiquity of their use is enough to render them beyond the realm of private control because otherwise society would be harmed.

While it is true that these universal ideas are not suitable for the award of a patent monopoly, the ubiquity of their use is not enough to render them beyond the realm of patent eligible subject matter. As such, they cannot be used to support a narrowing of the scope of patent eligibility above and beyond the recognized categories of excluded matter. While they ought not be privatized, the reason for this is that they would not satisfy the other strictures of patentability. It is the existing statutory requirements of novelty and inventiveness that prevent patents from removing anything from society's existing store of knowledge, not special categories of excluded matter. The "everyday ideas" Hughes has described either lack novelty, are obvious, or have not been reduced to a specific practical application (and therefore are "abstract ideas").

The reason the "extraordinary ideas" that disclose facts about the world Hughes refers to are not patentable is an issue of patent eligible subject matter. These are ideas that are discoveries or would involve a patent over a principle of nature and are therefore already excluded. The "extraordinary ideas" that are subject to widespread use would be lacking in novelty. These are not issues of patentable subject matter. If any of these ideas slip through these protections and are propertized by being made the subject of a patent, that is a failing of the administrators of the system in applying the law correctly, not the law itself.

The work of Erik Maurer quintessentially represents the argument in favor of broad patent protection at the time patent validity is determined. For Maurer, all innovation, no matter how beneficial to society, so long as it is novel, nonobvious and of utility, should be patentable regardless of its subject matter, provided that what is claimed is an invention and not one of the

¹²⁵ Thomas, *Liberal Professions*, *supra* note 11, at 1181; Thomas, *The Post-Industrial Patent System*, *supra* note 98, at 54. See also David J. Kappos, John R. Thomas & Randall J. Bluestone, *A Technological Contribution Requirement for Patentable Subject Matter: Supreme Court Precedent and Policy*, 6 NW. J. TECH. & INTELL. PROP. 152 (2008).

¹²⁶ Hughes, *supra* note 122, at 320.

categories of excluded matter.¹²⁷ For Maurer, it is free-riding, not the threat of a tragedy of the anticommons that poses the greater threat to sustaining innovation.¹²⁸ Maurer uses as examples patents on sports moves, business methods and legal strategies, and patents on medical and surgical procedures, all of which he regards as patentable subject matter.¹²⁹ He contends that the law in the United States is consistent with this broad view, as “existing statutory provisions and judicial precedent embrace the most economically efficient, though admittedly broad, perspective.”¹³⁰

Maurer is of the view that patentable subject matter should include anything under the sun made by man because free markets will determine what subject matter should be patented. He considers that artificial and subjective limits on patentable subject matter would weaken the efficient, market-driven system contemplated by existing patent laws. Maurer’s argument is that a separate patentable subject matter test in addition to the criteria of novelty, inventiveness and utility is unnecessary and an undesirable fetter on innovation.¹³¹ He emphasizes that patents will only issue to inventors that contribute something previously unknown to society’s store of knowledge and would not have been obvious in light of previous knowledge,¹³² even if only a small contribution, because “even small increases in knowledge make positive contributions to economic growth.”¹³³

C. A Physicality Requirement is an Inadequate Proxy Test

A physicality requirement is a proxy test designed to avoid the need to conduct a thorough patentable subject matter inquiry. Reliance upon a physicality requirement is seen as a predictable, workable and less-intellectually demanding approach to identifying patent eligible subject matter. It is a means of avoiding difficult questions such as what the terms “abstract” and “practical application” mean and how the “useful arts” are to be separated from the “fine arts” of literature, history, and painting. It also dispenses with the difficult issue of processes that exist solely within the human mind, because a purely mental process would involve no physicality transformation of matter.¹³⁴

Contrary to the first impressions many might have formed, dispensing with a physicality requirement is in fact a convenient, predictable, workable and less-intellectually demanding approach to distinguishing between eligible and non-eligible subject matter. Although the subject matter inquiry may appear daunting, a physicality requirement creates its own difficulties. As Judge Rader noted in dissent in *In re Bilski*, the Federal Circuit’s machine-or-transformation test

¹²⁷ Erik S. Maurer, *An Economic Justification for a Broad Interpretation of Patentable Subject Matter*, 95 NW. U. L. REV. 1057 (2001).

¹²⁸ *Id.* at 1059-63.

¹²⁹ *Id.* at 1075-84.

¹³⁰ *Id.* at 1058.

¹³¹ *Id.* at 1058-59.

¹³² *Id.* at 1064.

¹³³ *Id.* at 1073-74.

¹³⁴ Bradley C. Wright, *Business Method Patents: Are There Any Limits?*, 2 J. MARSHALL J. COMPUTER & INFO. L. 30, 52-53 (2002); William Michael Schuster, *Predictability and Patentable Processes: The Federal Circuit’s In re Bilski Decision and Its Effect on the Incentive to Invent*, 11 COLUM. SCI. & TECH. L. REV. (2009).

propagates unanswerable questions surrounding the extent and degree of physicality needed.¹³⁵ Dispensing with the physicality requirement avoids those difficult and arbitrary questions. It removes from the patent eligibility analysis difficult questions such as: What form or amount of “transformation” is needed? When is a transformation of data that is “representative” of a physical object sufficiently linked to that object to satisfy the transformation test? What, in theory and in practice, is the material difference between data “representative” of a physical object and data which are not? What link to a machine is sufficient to invoke patent eligibility? Is a general purpose computer running a software program a “specific machine?” If under United States law, § 101 recognizes “machines” as a category of patentable subject matter, why does the “process” category require a machine prong, and if it does, what connection with a machine is necessary? Does the machine prong of the machine-or-transformation test require that a process be a machine or that it merely involve or rely on the use of a machine?¹³⁶

Dispensing with a physicality requirement proxy test removes anomalous inconsistencies between the objects of patent law and what is actually patent eligible. It forces us to consider the scope of patentable subject matter and explore its boundaries. It forces us to consider how the recognized categories of excluded matter are to be applied and what the differences between the useful and the fine arts are. All these are necessary issues that must be addressed on a case-by-case basis and cannot be avoided by relying on a proxy test without distorting the purpose and intent of the fundamental principles upon which patent law rests. Given that the Supreme Court revoked the physicality requirement in *Bilski v. Kappos* without exploring the scope of the “abstract” category of excluded matter, this remains a task for another day.

D. The Supreme Court Does Not Favor Rigid Proxy Tests

The Supreme Court has repeatedly cautioned against adopting rigid rules in patent cases where the court’s precedents dictate that a broader, more flexible framework is to be followed. The court has shown a willingness to rebuff inadequate proxy tests created by the Federal Circuit in favor of more flexible approaches.

The court’s criticism of the rigid application of the Federal Circuit’s “teaching, suggestion, motivation” test for evaluating inventions that combine prior art elements in favor of a “common sense” approach in *KSR International Co. v. Teleflex Inc.* (“*KSR*”)¹³⁷ is a prime example. In *KSR*, the Supreme Court unanimously rejected the Federal Circuit’s “teaching, suggestion, or motivation” proxy test as the only test for determining obviousness under 35 U.S.C § 103. The Federal Circuit adopted this proxy test as an attempt to resolve the question of obviousness “with more uniformity and consistency” than would be possible under a straight application of the words in the statute.¹³⁸ The Supreme Court disagreed, rejecting the Federal Circuit’s “rigid” approach, stating that that “[h]elpful insights, however, need not become rigid and mandatory formulas” and “[t]he obviousness analysis cannot be confined by a formalistic conception.”¹³⁹ In a telling blow to any attempts to introduce a proxy test as a means of avoiding

¹³⁵ 545 F.3d at 1015 (Rader, J., dissenting).

¹³⁶ *Id.*

¹³⁷ 550 U.S. 398 (2007).

¹³⁸ *Id.* at 399.

¹³⁹ *Id.* at 419.

the application of complicated principles of law, the court cautioned that “when a court transforms the general principle into a rigid rule that limits the obviousness inquiry, as the Court of Appeals did here, it errs.”¹⁴⁰

In relation to the doctrine of prosecution history estoppel, the Supreme Court in *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*¹⁴¹ discarded the Federal Circuit’s “complete bar test,” saying “we have consistently applied the doctrine in a flexible way, not a rigid one.”¹⁴² The Court rejected the Federal Circuit’s attempt to impose an “absolute” bar to the application of the doctrine of equivalents when a patent claim is narrowed during prosecution. The Supreme Court unanimously rejected the Federal Circuit’s “complete bar,” warning that “courts must be cautious before adopting changes that disrupt the settled expectations of the inventing community.”¹⁴³

In *eBay Inc. v. MercExchange, LLC*,¹⁴⁴ the Supreme Court unanimously rejected the Federal Circuit’s attempt to impose a rule “unique to patent disputes, ‘that a permanent injunction will issue once infringement and validity have been adjudged.’”¹⁴⁵ Rather than creating a special rule for use in patent cases, the Supreme Court instructed the Federal Circuit to apply traditional principles of equity to determine when an injunction should issue “in patent disputes no less than in other cases governed by such standards.”¹⁴⁶

In another unanimous decision, the court in *Quanta Computer, Inc. v. LG Electronics, Inc.*¹⁴⁷ rejected an inflexible rule which rigidly limited the doctrine of patent exhaustion to apparatus claims, allowing the doctrine to be applied to process claims.¹⁴⁸

Given the Supreme Court’s dislike of proxy tests, it is of no surprise that the machine-or-transformation test was rejected as an inadequate substitute for a proper patentability analysis.

The Federal Circuit in *In re Bilski* demonstrated the error of employing a proxy test when it rejected the *State Street* “useful, concrete and tangible result” test after finding it to be ‘insufficient to determine whether a claim is patent-eligible under § 101.’¹⁴⁹ In doing so, the court observed that a proxy test can never be an adequate representation of the law.¹⁵⁰ Despite this observation, it created a proxy test of its own when it introduced the machine-or-transformation test as the ‘sole’ test for determining patent eligibility. Rather than compounding this error, the courts must rely on the existing recognized categories of excluded matter to

¹⁴⁰ *Id.*

¹⁴¹ 535 U.S. 722 (2002).

¹⁴² *Id.* at 738.

¹⁴³ *Id.* at 739.

¹⁴⁴ 547 U.S. 388 (2006).

¹⁴⁵ *Id.* at 393-94.

¹⁴⁶ *Id.* at 394.

¹⁴⁷ 553 U.S. 617 (2008).

¹⁴⁸ *Id.* at 628-30.

¹⁴⁹ 545 F.3d at 959.

¹⁵⁰ *Id.*

remove undeserving subject matter from the monopoly protection of the patent system. Sage advice in this regard was given in *In re Alappat*.¹⁵¹

Patent cases involving the distinction between idea or principle may involve subtle distinctions. ...it is impossible to generalize with bright line rules the dividing line between what is in substance the invention or discovery of a useful application within § 101 versus merely the discovery of an abstract idea or law of nature or principle outside § 101. Each case presenting a question under § 101 must be decided individually based upon the particular subject matter at issue.¹⁵²

Devising a suitable test to determine patent eligibility often involves a trade-off between bright line rules and predictability and the flexibility and fairness of outcome that often accompanies a dull line test. Given the difficulties already encountered in the current debate, as a matter policy, it should be clear that a dull line test is the only fair and just outcome possible.

E. Comparing Physicality in Patent Law and Material Form in Copyright

According to Moy, the distinction between technological and non-technological subject matter is the boundary that delineates patent and copyright.¹⁵³ Patent and copyright have mutually coexisted for hundreds of years, largely operating within distinct and separate spheres of influence.¹⁵⁴ Both patent and copyright distinguish between principles and instantiations of principles, and neither the copyright system nor the patent system provides exclusive rights in abstract ideas themselves. Ideas, although neither copyrightable nor patentable in their own right, provide a foundation from which spring copyrightable works and patentable inventions. The law recognizes that an instantiation can be privatized, but that the principle or abstraction itself must remain in the public domain. Copyright law requires that literary, dramatic, musical or artistic works must be somehow recorded in material form to be eligible for copyright protection. Material form means that there must be some tangible embodiment of the creation and the requirement for material form attaches to the making of a work. This is the idea/expression dichotomy: the principle that copyright does not protect ideas or information, but will protect an idea that is expressed in material form from which accurate copies or reproductions can be made. Accordingly, what copyright protects is not the idea behind a particular work, but the particular form of language by which the information is conveyed.¹⁵⁵

¹⁵¹ 33 F.3d 1526 (Fed. Cir. 1994).

¹⁵² *Id.* at 1554 (Archer & Nies, JJ dissenting).

¹⁵³ Moy, *Subjecting Rembrandt*, *supra* note 109, at 1084. *See also* Richard H. Stern, *Scope-of-Protection Problems with Patents and Copyrights on Methods of Doing Business*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 105 (1999).

¹⁵⁴ Most authors trace modern copyright back to the British *Statute of Anne* in 1710. *Statute of Anne*, 1710, 9 Ann., c. 19 (Eng.).

¹⁵⁵ *Donoghue v. Allied Newspapers*, [1938] Ch. 106; (U.K.); *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 348 (1991). *See also* Agreement on Trade-Related Aspects of Intellectual Property Rights, art. 9.2, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994); *World Intellectual Property Organization Copyright Treaty*, art. 2, Dec. 20, 1996, 36 I.L.M. 65 (1997) [hereinafter *WCT*] (both of which state that “[c]opyright protection extends to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such”).

Likewise, patent law does not protect abstract ideas, but protects a useful practical application of an idea. However, unlike copyright, patent law arguably does not require that an idea be reduced to some tangible physical form before it will be regarded as being a practical application of that idea. This is a consequence of what patent law protects: inventions. The study of information economics tells us that inventions are little more than useful knowledge and ideas that have been reduced to a specific practical application. It is the requirement that an invention must disclose a useful and practical result that marks the critical distinction between copyright and patent, not physicality. While it is essential that any invention claimed be capable of producing a useful result, a patent is not granted for a result *per se*, but for a product or a process that produces a useful result.¹⁵⁶ Thus, patent law's focus is function, and includes works that have a function beyond informing, entertaining, or communicating knowledge to human beings, including methodologies for gathering, organizing, and presenting information, or regulating human behaviour, accurately and efficiently.¹⁵⁷

Introducing a physicality requirement risks making patent law a tool of limited utility in the Information Age. As Moy notes, if patent protection is denied to emerging technologies on subject matter grounds, courts are likely to compensate by filling the apparent gap in coverage with copyright protection, which is of much longer duration.¹⁵⁸ Copyright protection, for most subject matter, lasts for the life of the author plus 70 years, which is much longer than the 20 year life of a patent and wholly excessive as far as the need for an inventor to recoup expenses and make a reasonable profit are concerned.

F. Tragedy of the Anticommons: Too Many Different Owners; Too Many Fragmented Property Rights

A consequence of promoting a broad scope of patentable subject matter is an exacerbation of the 'tragedy of the anticommons.' Building new knowledge is a cumulative exercise. New knowledge is always built on existing knowledge. As such, property rights awarded to encourage innovation can actually obstruct it. According to Heller and Eisenberg, tragedy of the anticommons occurs when numerous actors have ownership rights and the power of exclusion over a scarce resource. The consequence of those competing rights is that the resource is underused because no one has an effective right to use all of the technology needed to advance a particular line of inquiry within the field.¹⁵⁹ In this sense, it must be remembered that patent law recognizes no analogue to fair use in copyright.¹⁶⁰

¹⁵⁶ *Corning v. Burden*, 56 U.S. 252, 268 (1854) ("It is for the discovery or invention of some practicable method or means of producing a beneficial result or effect, that a patent is granted, and not for the result or effect itself. It is when the term process is used to represent the means or method of producing a result that it is patentable"); *Mitchell v. Tilghman*, 86 U.S. 287, 391 (1873); *Re Virginia-Carolina Chemical Corporation's Application*, (1958) R.P.C. 35, 36 (Patents Appeals Tribunal, UK).

¹⁵⁷ Karjala, *Distinguishing Patent and Copyright Subject Matter*, *supra* note 110.

¹⁵⁸ *Id.* at 453.

¹⁵⁹ Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 *Science* 698, 698 (1998) [hereinafter Heller & Eisenberg, *Can Patents Deter Innovation?*] ("Once an anticommons emerges, collecting rights into Usable private property is often brutal and slow."); Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 *HARV. L. REV.* 621, 621, 624 (1998).

¹⁶⁰ *Eldred v. Ashcroft*, 537 U.S. 186, 219-20 (2003). *See also* Maureen A. O'Rourke, *Toward a Doctrine of Fair Use in Patent Law*, 100 *COLUM. L. REV.* 1177 (2000).

Impediments to those who would otherwise innovate typically arise where private rights are allocated over pioneering discoveries in a newly emerging field of technology. When a new technology emerges, property rights in early breakthroughs may be allocated before the significance (or ordinariness) of those breakthroughs is properly understood. Once the foundation ‘building blocks’ of new technologies are privatized, rights holders can impede new advances in the field. The effect is that those who would produce follow-on inventions need to license, what may in time be regarded as elementary principles, before they are free to operate.¹⁶¹ However, proponents in favor of a broad and expansive view of patentable subject matter say that the anticommons threat will not impede public dissemination of intellectual products, because licensing will ensure that innovation will be made available to those who need and are able to pay for it.¹⁶²

Anticommons arguments have an undeniable emotional appeal. They invoke ethical concerns and concerns about the ability of private citizens to freely access that which ought to remain in the public domain. However, they do not detract from the patent law bargain. They highlight some of the difficulties inherent in the existence of a patent system, but do not warrant an overhaul of the system (not that this is what Heller and Eisenberg have called for).¹⁶³ The patent system needs to strike a delicate balance when allocating reward-based incentives between pioneering and follow-on inventors. How this balance is to be achieved will not be resolved by reducing the scope of patentable subject matter. Instead, it is rigorous application of the remaining patentability requirements that will balance these private and public interests.

Recognizing non-physical inventions does not pose a threat to the public domain. The public domain will still contain inventions that have already been disclosed to the public. Existing personal liberties and everyday ideas will not be affected, as they will be protected by the other requirements of patentability. These statutory requirements better serve the function of screening out unpatentable inventions than some vague physicality test.¹⁶⁴

Arguments that patents over non-physical inventions will create additional impediments to doing business and create additional barriers to entry into markets are spurious, because these arguments apply to all patents. Patents of any type create extra due diligence requirements for businesses. For patents over any form of new technology, there will always be a need to license patented prior art. This is a necessary by-product of the system which recognizes that innovation

¹⁶¹ Heller and Eisenberg, *Can Patents Deter Innovation?*, *supra* note 159, at 698-700 (describing patents as being tollbooths along the path of biomedical research relating to the human genome). They suggest that the research project into human genetics will be retarded by the existence of too many patent rights being held by too many different entities. They contend that if patent protections extend to mere fragments of DNA sequences, valuable research involving whole DNA sequences will be impeded by licensing and other transaction costs.

¹⁶² Wendy J. Gordon, *An Inquiry into the Merits of Copyright: The Challenges of Consistency, Consent, and Encouragement Theory*, 41 STAN. L. REV. 1343, 1439-49 (1989). Only in circumstances where transaction costs would prevent such voluntary exchanges should intellectual property owners be denied absolute control over the uses of their works, either through an outright privilege (such as the fair-use doctrine) or through a compulsory licensing system.

¹⁶³ Heller & Eisenberg, *Can Patents Deter Innovation?*, *supra* note 159, at 698-700.

¹⁶⁴ *Bilski*, 545 F.3d at 1015 (Rader, J., dissenting).

is a cumulative activity and that there is value in earlier breakthroughs that have been protected by the patent system.

G. *Why Is There No History of Patents for Non-Physical Inventions?*

Why there is no body of case law dealing with purely non-physical inventions or a demonstrable history of patents being granted in respect of them is a matter of conjecture. It is difficult to point to any evidence that would conclusively deny the patent eligibility of non-physical inventions in Anglo-American law before or after the passing of the *Statute of Monopolies*. Likewise, there is no solid evidence from the United States to indicate that they are not patentable.¹⁶⁵ Cataloguing the types of processes that were typically patented in the eighteenth and nineteenth centuries is of little assistance in determining the scope of the “useful arts” today. Doing so shows only a pattern in which patents were granted for manufacturing processes. It does not prove that the “useful arts” were limited to only manufacturing processes. Given that the purpose of granting monopolies in England was to establish a manufacturing industry in a formerly agrarian country, this is unsurprising.

New and useful non-physical methods are hardly a recent phenomenon. New financial transactions, tax minimization schemes, asset protection strategies, methods of organizing a workforce, methods of teaching or training people and animals, compliance procedures and risk hedging strategies have been used for centuries. So, why are the suggestions that these might be patent eligible being made only recently?

It would appear that people either largely presumed that non-physical inventions are not patent eligible, or had not thought to patent innovation of this kind. Such an outcome would be unsurprising given that these are things that fall outside the traditional expectations as to what subject matter is designed to protect. It may be that our understanding of technology, or our understanding of the purpose and scope of the patent system, has prevented people from seeking patents over non-physical inventions. It cannot merely be assumed that since there has not been a consistent practice of patents for non-physical inventions being sought or granted, that these things are not patentable. In the words of Stern:

It is implausible that the 18th century represented an intellectual desert for innovativeness in business methods. It is more plausible to infer that the lack of colonial business-method patents reflects a belief in their patent-ineligibility.¹⁶⁶

H. *Addressing Information Deficit, Lack of Prior Art and Patent Examination Failures*

Patent examination failures usually arise when new technologies emerge and proponents of those new technologies seek the protections of the patent system. The problems that emerge

¹⁶⁵ Judge Newman demonstrated in both *In re Bilski* and *In re Comiskey* that no English decision supports the Federal Circuit’s restrictive definition of “process.” *Bilski*, 545 F.3d at 986 (Newman, J., dissenting); *In re Comiskey*, 89 U.S.P.Q.2d (BNA) 1641, 2009 U.S. App. LEXIS 400, at *40 (Fed. Cir. 2009) (en banc) (Newman, J., dissenting), *granting reh’g en banc to In re Comiskey*, 499 F.3d 1365 (Fed. Cir. 2007). That this is in dispute: *see Bilski*, 545 F.3d at 970-74 (Fed. Cir. 2008) (en banc) (Dyk and Linn, JJ., concurring).

¹⁶⁶ Stern, *Being Within the Useful Arts*, *supra* note 10.

are not problems of subject matter, but are caused by a lack of suitable and comprehensive prior art repositories and an examination process that prevents patent examiners locating essential prior art.¹⁶⁷ When new technologies emerge or new areas are discovered to be patentable, it takes some time for prior art repositories to mature to a state where they contain sufficient information to be of use in determining whether an alleged invention is novel and nonobvious. This problem was no doubt encountered when the first computer software patent applications were examined.

This is compounded by the fact that patent offices around the world are overburdened by the number of new patent applications they receive each year. The USPTO receives more than 420,000 patent applications each year and has a backlog of more than 700,000 applications. The pressure that this backlog places on the USPTO results in less rigorous reviews of patent applications being undertaken and less robust patents being issued.¹⁶⁸ The Japan Patent Office (“JPO”) reports similar numbers. It receives over 400,000 patent applications annually and has a backlog of more than 750,000 applications.¹⁶⁹

The role of a patent examiner is an unenviable one. First, patent law is a complex and difficult area of the law to understand and apply. It is complicated by the voluminous nature of the material, court decisions that confuse the law, and the different opinions that are aired as to what the law is and what it should be. Second, a large body of knowledge is needed to understand the prior art and the common general knowledge of experts in the relevant art. This information is often difficult to locate and is arguably not knowable in its entirety. Further, the state of the art is rapidly changing. With such a vast array and volume of new patent applications being filed, it is simply not possible for each and every patent examiner to be an expert in every piece of technology that comes across his or her desk. Similarly, patent examiners cannot feasibly locate every piece of prior art that is relevant to the issue of whether the application in question is novel and nonobvious. Adam Jaffe and Josh Lerner have comparable concerns.

The patent office has been granting patents on old ideas because it has inadequate examination resources, and also because it is not very good at finding information about the relevant existing technologies, particularly in new, fast-moving technological fields.¹⁷⁰

As noted by Fitzgerald, et al, these issues have been of particular concern since the flood of software and e-commerce method patent filings began in the mid-1990s.

¹⁶⁷ United States Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law*, c.3, 44 (Oct. 2003), <http://www.ftc.gov/os/2003/10/innovationrpt.pdf> (observing that the problem of “questionable” patents stems mostly from “the difficulty patent examiners can have in considering all the relevant prior art in the field and staying informed about the rapid advance of computer science”). See generally Beth Simone Noveck, *Wiki Government: How Technology Can Make Government Better, Democracy Stronger, and Citizens More Powerful* (2009) [hereinafter NOVECK, WIKI GOVERNMENT]; Beth Simone Noveck, “Peer to Patent”: *Collective Intelligence, Open Review, and Patent Reform*, 20 HARV. J.L. & TECH. 123 (2006) [hereinafter Noveck, “Peer to Patent”]; 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 (1999).

¹⁶⁸ Noveck, *Wiki Government*, *supra* note 167, at 59 (citing USPTO, *U.S. Patent Activity, Calendar Years 1790 to the Present* (2010)).

¹⁶⁹ *Id.* (citing Eur. Pat. Office, *Patents Around the World* (2010)).

¹⁷⁰ Adam B. Jaffe & Joshua Lerner, *Innovation and Its Discontents: How Our Broken Patent System is Endangering Innovation and Progress, and What To Do About It*, 22 (2004).

There is no doubt that patent offices in Australia, the United States and elsewhere were not equipped to deal with the volume and novelty of applications for software and e-commerce method patents which were filed in increasing numbers from the mid-1990s onwards. Patent offices – or at least the technology groups responsible for examining patents in these fields – have been understaffed and lacking in expertise to properly examine these applications for novelty and inventiveness, with the result that patents have undoubtedly been granted for inventions that were not new or which were obvious.¹⁷¹

While there are problems with the patent examination process, cutting down subject matter at the threshold is the wrong approach to take, because doing so will have unintended consequences. Those consequences are a removal of the incentive to create many novel and inventive products and processes that will improve the living standards of human beings. A better approach is to ensure that the other requirements of patentability are properly examined and satisfied.

While prior art repositories of non-physical inventions may lack the depth and comprehensiveness found where more established subject matter is concerned, it is only a matter of time before this deficiency will be remedied. According to Gruner, the difficulties encountered in locating prior art for business method and computer software patents may be no more serious than those for other technologies before they were recognized as falling within the scope of patentable subject matter by judicial decisions.¹⁷² Indeed, improvements may already be occurring in this regard. There is evidence that the USPTO's grant rate in business method classes has fallen dramatically. As examiners have gained more experience with such patents and with searching public databases for information about them, they have rejected more patents.¹⁷³

To properly contend with the challenges that lie ahead, in what can only become an increasingly complex system, technological, administrative and legislative changes are needed. What the patent system needs is innovation in searching and managing prior art repositories. Advances in information management technologies can be employed by patent offices to create better, more intelligent, artificial searching tools to assist the search for prior art. Advances in the field of artificial intelligence, data searching and legal expert systems will reach a stage where they can be reliably used by a patent examiner to determine whether an invention is actually novel and non-obvious and state what the common general knowledge in the relevant field is.

The administrative reforms required are those that involve better coordination and cooperation between national patent offices to share the load as far as conducting prior art searches is concerned. Further, there needs to be more accessible means of encouraging third parties with specific expertise in relevant areas to provide the patent office with information relevant to the novelty and inventiveness of applications under examination. The Peer-to-Patent

¹⁷¹ Brian Fitzgerald ET AL., *Internet and E-commerce Law: Technology, Law and Policy* 370 (2007) [hereinafter FITZGERALD ET AL., INTERNET AND E-COMMERCE LAW]. See also Merges, *supra* note 167, at 606-09.

¹⁷² Gruner, *Intangible Inventions*, *supra* note 110, at 368.

¹⁷³ Mark A. Lemley & Bhaven Sampat, *Is the Patent Office a Rubber Stamp?*, 58 EMORY L.J. 181 (2008) (finding that only 15% of applications in Class 705, business methods, had been approved seven and a half years after filing).

projects facilitate this by placing pending patent applications online on a publicly available web site and encouraging appropriately skilled and qualified people to review those applications and submit relevant prior art.¹⁷⁴ The ten most relevant prior art documents, as selected by the community of reviewers, are forwarded to the patent office to be considered by the patent examiner responsible for assessing the application in question.¹⁷⁵ Peer-to-Patent is a step in the right direction and is the genesis of what will hopefully be a more comprehensive means of promoting citizen engagement with government administrative processes.¹⁷⁶ What is needed is a global Peer-to-Patent platform and a means of developing a culture, in which the large companies that are the major users of the patent system donate a portion of their technically-skilled employees' time to peer reviewing pending applications as way of supporting the system which provides them with the exclusive property rights they value so dearly. While Peer-to-Patent is not a comprehensive solution to patent law's difficulties, it has the potential, in concert with other initiatives, to make incremental improvements to the system.

There is also a need to develop prior art repositories that can be searched by patent examiners and others to identify what the state of the art in a particular field of technology is. Projects that go some way to making it easier to search the prior art and understand the state of the art by encouraging scientists to publish new breakthroughs in biotechnology in the public domain as quickly as possible include:¹⁷⁷ CAMBIA's Patent Lens;¹⁷⁸ the Bermuda Principles;¹⁷⁹ and the HapMap project.¹⁸⁰ The Open Source as Prior Art ('OSAPA') initiative is a prior art repository for software.¹⁸¹ The goal of OSAPA is to reduce the number of poor quality patents that issue by improving the accessibility of code and documentation that can be used as prior art

¹⁷⁴ *Peer-to-Patent*, <http://www.peertopatent.org> (last visited Feb. 4, 2010); *Peer-to-Patent Australia*, <http://www.peertopatent.org.au> (last visited Feb. 4, 2010); Noveck, "Peer to Patent," *supra* note 167.

¹⁷⁵ In the United States, third party protest is only allowed with the consent of the patent applicant under 35 U.S.C. § 122(c) (protest and pre-issuance opposition), which provides that: "The Director shall establish appropriate procedures to ensure that no protest or other form of pre-issuance opposition to the grant of a patent on an application may be initiated after publication of the application without the express written consent of the applicant." In contrast, this restriction does not exist under Australian law, which under *Patents Act 1990* (Cth) s 27 (Austl.) (entitled, "Notice of matters affecting validity of standard patents") provides that: "A person may, within the prescribed period after a complete specification filed in relation to an application for a standard patent becomes open to public inspection, notify the Commissioner... that the person asserts, for reasons stated in the notice, that the invention concerned is not a patentable invention"

¹⁷⁶ See generally Noveck, *Wiki Government*, *supra* note 167.

¹⁷⁷ See generally Anne Fitzgerald & Kylie Pappalardo, *Building the Infrastructure for Data Access and Reuse in Collaborative Research: An Analysis of the Legal Context* (2007).

¹⁷⁸ CAMBIA is an international, independent non-profit research institute led by world-renowned scientist, Richard Jefferson. CAMBIA's Patent Lens aims to build patent landscapes. See *CAMBIA*, <http://www.cambia.org> (last visited Feb. 4, 2010); Richard Jefferson, *Science as Social Enterprise: The CAMBIA BiOS Initiative*, *INNOVATIONS* 13, 27 (2006).

¹⁷⁹ The Bermuda Principles were intended to provide a basis for the rapid public disclosure of genomic data to create prior art which would defeat potential patents filed by high-profile private sector competitors: Andrés Guadamuz González, *Open Science: Open Source Licenses In Scientific Research*, 7 N.C. J.L. & TECH. 321, 358 (2006) (citing Rebecca Eisenberg, *The Public Domain in Genomics* (2000)).

¹⁸⁰ The International Haplotype Project (HapMap) was a three-year project designed to develop a haplotype map of the human genome. The HapMap principle is that scientific data should be freely available to the public and that restrictive patents should not be filed on inventions based on submitted data. *HapMap*, <http://www.hapmap.org/abouthapmap.html> (last visited May 22, 2007).

¹⁸¹ *Open Source as Prior Art* (OSAPA), <http://www.linuxfoundation.org/programs/legal/osapa> (last visited Mar. 3, 2010).

during the patent examination process. The project encourages programmers to electronically publish source code and its related documentation as early as they can. It also involves an interface that allows patent examiners and others to more easily locate relevant electronically published source code and related documentation. Furthermore, it facilitates a taxonomy or tagging system that can be used by software developers, patent examiners and others to describe and help locate relevant source code and documentation. For the open source community and others, this will hopefully reduce the number of undeserving software patents that can be used to threaten software developers.

The lesson in this regard is that those concerned with the future of the innovation system, both in the public and private sectors, should focus on establishing prior art repositories that enable people to conveniently upload information describing new inventions and discoveries as quickly as possible, so that the teething problems that ordinarily arise when patent applications claiming advances in new areas of technology are filed can be minimized.

Other initiatives, which are a step in the right direction in this regard, include work-sharing arrangements that have been instituted by various national patent offices to improve the communication of search and examination results during patent prosecution. These include various bilateral or multilateral arrangements between patent offices such as the Patent Prosecution Highway ('PPH') and the Vancouver Agreement. The Patent Prosecution Highway (PPH) is a set of initiatives for providing accelerated patent prosecution procedures by sharing information between some patent offices. The PPH is a result of bilateral arrangements made between national patent offices. It permits each participating patent office to benefit from work previously done by another patent office, with the dual goals of reducing examination workload and improving patent quality.

A trilateral Patent Cooperation Treaty/Patent Prosecution Highway (PCT/PPH) pilot program commenced on 29 January 2010 for a planned period of two years. This pilot program enables fast-tracking of patent examination procedures for PCT applications that have received a positive written opinion of either the International Searching Authority or the International Preliminary Examining Authority, or an international preliminary examination report from the European Patent Office (EPO), the Japan Patent Office (JPO) or the United States Patent and Trademark Office (USPTO).

A similar arrangement exists between signatories to the Vancouver Agreement, which is a collaborative arrangement between the Canadian, Australian and United Kingdom patent offices. These three offices, known as the Vancouver Group, aim to eliminate duplication of effort between the offices by sharing information and relying on examinations performed by other offices within the group.

In summary, patent examination failures can be addressed through technological and administrative reforms. Patent examination can be improved through deploying new technology to assist examiners to effectively locate and search through the myriad of prior art. It can be improved through administrative reforms such as better coordination and cooperation between national patent offices to share the load as far as conducting prior art searches is concerned,

promoting and developing projects such as Peer-to-Patent and projects that publicize new technologies as quickly as possible.

I. A Physicality Requirement is Arguably Inconsistent With TRIPS

A consequence of the Federal Circuit introducing the machine-or-transformation test was that the United States was for a time arguably in breach of its obligations under Article 27.1 of the *Agreement on Trade-Related Aspects of Intellectual Property Rights*¹⁸² ('TRIPS Agreement'). This has now been remedied by *Bilski v. Kappos*.

The TRIPS Agreement sets forth a raft of minimum standards for patent protection in member states. Article 27.1 requires that all member states of the World Trade Organization ('WTO') ensure that:

patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.¹⁸³

Despite Article 27.2 and 27.3 allowing member states to exclude a range of inventions from patentability, there is no mention of a physicality requirement in the TRIPS Agreement. As a consequence, the TRIPS Agreement does not permit the exclusion of classes of subject matter, such as non-physical inventions, from patentability.¹⁸⁴

V. The Impact of a Physicality Requirement on Various Areas of Technology

This section considers the effect that imposing a physicality requirement will have on innovation in a number of areas of technology. It finds that a physicality requirement would cause unsatisfactory consequences in a number of industries and across a range of existing and emerging technologies.

A. Computer Software

Patenting computer software remains a controversial proposition even though the courts have clearly ruled the subject matter patent eligible.¹⁸⁵ Despite the controversy, computer

¹⁸² Agreement on Trade-Related Aspects of Intellectual Property Rights, art. 27.1, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994) (entered into force Jan. 1, 1995).

¹⁸³ *Id.* The provision goes on to say: "Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 3 of this Article, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced."

¹⁸⁴ By the same logic, the patentable subject matter test under the *European Patent Convention* is also inconsistent with the TRIPS Agreement because the inclusion of a list of excluded categories in that convention means that patents in member states of the European Union are not "available for any inventions . . . in all fields of technology."

¹⁸⁵ See, e.g., *Diamond v. Diehr*, 450 U.S. 175, 187 (1981); cf. *Id.* at 219-20 (Stevens, Brennan, Marshall & Blackmun, JJ., dissenting). Justice Stevens would have declared all computer software programs that are "entirely dependent upon the utilization of a computer in a familiar process" unpatentable.

software inventions are possibly the best illustrative example of why a physicality requirement is an inappropriate fetter on the scope of patentable subject matter.

Computer software is protectable by both copyright and patent law, with each providing distinct advantages to the rights holder. Copyright's coverage of computer software code only protects the expression of an idea in material form, not the underlying inventive idea itself.¹⁸⁶ Copyright law protects against literal copying or adaptation of source code, while patent law protects functionality. Without patent protection, it is possible to independently produce a non-infringing version of software that achieves a functionally equivalent result.¹⁸⁷

It is antithetical to established wisdom to argue that new computer software innovations lie outside the bounds of subject matter traditionally recognized as patent eligible. Computer software is the digital equivalent of the machines and articles of manufacture of the Industrial Age. Rather than producing manufactured articles of commerce, software is used to construct and transform the digital equivalent, namely, data and information. Alan Durham has explained the importance of the computer to today's technological progress.

The computer is a powerful symbol of technological progress. Once a prohibitively expensive and specialized piece of equipment, the computer has become a tool of nearly universal application, transforming such diverse fields as engineering, communications, entertainment, medicine, business, education, mathematics, and science. The computer defines our technological era as the steam engine defined the early years of the industrial revolution.¹⁸⁸

The suggestion that computer software does not fall within the useful arts because it is just an abstract algorithm for computers is superficial at best. Software is more than just an algorithm for computers; it is a means of achieving a useful and practical application of ideas. Software is a means of describing a useful process in language that can be processed and automated by a general purpose computer. This is an ideal means of simplifying complex, difficult or repetitive tasks that would otherwise be prone to human error or time consuming. In *In re Alappat*, the Federal Circuit explained that programming a general purpose computer:

creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions

¹⁸⁶ *Hollinrake v. Truswell*, [1894] 3 Ch. 420, 427 (“Copyright... does not extend to ideas, or schemes, or systems, or methods; it is confined to the expression; and if their expression is not copied the copyright is not infringed.”); *Baker v. Selden*, 101 U.S. 99, 244 (1879); Copyright Act of 1976 § 102(b), 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.”); *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 349-50 (1991); *Eldred v. Ashcroft*, 537 U.S. 186, 219 (2003) (stating that the idea/expression dichotomy limits copyright's monopoly to an author's expression, leaving ideas “instantly available for public exploitation.”); *Lotus Dev. Corp. v. Boland Int'l Inc.*, 49 F.3d 807 (1st Cir. 1995) (holding that copyright does not protect the functional aspects of software, and as such that the menu command hierarchy of a computer spreadsheet program was not protected by copyright). Also, the First Amendment precludes the extension of statutory monopolies to abstract ideas, *Eldred v. Ashcroft*, 537 U.S. at 219.

¹⁸⁷ Chisum, *Patentability of Algorithms*, *supra* note 30, at 1016-18.

¹⁸⁸ Durham, “*Useful Arts*”, *supra* note 9, at 1419 (citation omitted).

pursuant to instructions from program software... Consequently, a computer operating pursuant to software may represent patentable subject matter, provided, of course, that the claimed subject matter meets all of the other requirements of Title 35. In any case, a computer, like a rasterizer, is apparatus not mathematics.¹⁸⁹

There the court swept away any concern that software programs should be excluded from patent eligibility for lack of physical effect or transformation, and its statement demonstrates the efficiency of creating software that runs on an existing machine, rather than creating a new machine.

The supposed problems surrounding the patent eligibility of software will dissolve when it is properly understood that computer hardware is the underlying base upon which new technology can be built. Since general purpose computing machines already exist, programmers no longer need to ‘reinvent the wheel’, so to speak, by building their own machine. While computer software designed to run on a general-purpose computer does need a machine to run, the machine itself forms part of the prior art and predates any inventive advance the programmer is responsible for. The consequence is that most non-obvious computer software designed to run on a computer will not involve an inventive advance that has any significant physical element. This does not change the fact that a piece of software can be as useful and socially beneficial as any machine.

Arguments that a liberal reading of the “transformation limb” of the Federal Circuit’s machine-or-transformation test would be satisfied by software running on a general purpose computer because it causes electrical currents to surge through the computer¹⁹⁰ are misguided as questions about the need for software to involve a physical effect or cause a physical transformation of matter display a misunderstanding of the technology. Asking these questions misses the point that computer software is directly analogous to the mechanical innovation of previous times. More importantly, it displays a misunderstanding of the significance of general purpose personal computers, and the momentous effect they have had on innovation as a platform upon which new automated processes can be built. The value of many software programs is not the transformation of a physical object, but results generated from information processing or the automation of some manual task. For example, an invention that halves the time it takes for a computer to load an operating system and thus boot up does not necessarily transform anything physical, but is an improvement to existing machines and increases productivity by allowing people to spend time on productive enterprises, rather than being idle.

To think that computer software running on a general purpose computer might be unpatentable because it does not involve a physical effect or transformation is to confuse an incidental physical medium with the inventive breakthrough. The fallacy inherent in this thought becomes obvious when the principle of hardware/software equivalence is considered. That principle is that anything implemented in software can also be replicated in hardware to achieve the same result. The benefit of building functionality into software is that software is much easier and less expensive to produce than specifically programmed hardware machines or components.

¹⁸⁹ 33 F.3d 1526, 1558 (Fed. Cir. 1994).

¹⁹⁰ See, e.g., Wright, *supra* note 134, at 33-35.

For every general purpose computer running under the control of computer software, there is potentially an equivalent and indistinguishable device consisting solely of hardware that is ‘programmed’ with capacitors, transistors and other circuit elements, solder joints, and wires and so forth to achieve the same result. Since a machine such as this is undoubtedly patentable subject matter, there is no reason why functionally equivalent software that does exactly the same thing should be treated differently.¹⁹¹ For these reasons, patent drafting that seeks to show a physical interaction between software and an underlying computer misses the point, promotes form over substance and is unnecessary.¹⁹² According to Durham:

Such things should be considered to be at the core of patentable subject matter, without straining to rely on the tangible aspects of the computer hardware. The silicon and wire of the computer circuits, the electrons that course through those circuits, the mouse and keyboard that provide input, and the monitor or paper that displays the results are all physical entities.¹⁹³

Further, any future-looking perspective must acknowledge this. As scientists envisage computers based on quantum mechanics, beams of light, or DNA, the irrelevance of hardware becomes increasingly apparent.¹⁹⁴ There may even be scope for arguing that software that implements a “virtual machine” falls within the “machine” category under § 101 in United States law.

A misreading of *Gottschalk v. Benson*¹⁹⁵ led many to believe that all software programs are unpatentable abstract mathematical algorithms.¹⁹⁶ This is clearly not the case. Useful software implementations appear in many industries involving communications, transport, manufacturing, finance, medicine and entertainment. While software does indeed consist of algorithms, software programs are useful automated processes designed to accomplish specific practical results. While code may appear to be expressed in a language of logic or mathematics, it is nothing more than a set of instructions for a machine to follow according to input it receives from the outside world.

Opposition to software patents stems from a philosophical viewpoint that sharing and reuse of information and ideas should be the norm, rather than innovation theory. Many in the

¹⁹¹ Karjala, *Distinguishing Patent and Copyright*, *supra* note 110, at 444-445; Fitzgerald ET AL., INTERNET AND E-COMMERCE LAW, *supra* note 171, at 299.

¹⁹² That being said, it is still prudent for patent attorneys to draft patent applications claiming computer software in a way that makes specific reference to physical objects, such as input devices for receiving data, interactions with the computer’s memory for storing data, interactions with the computer’s processor, and an output mechanism for displaying data to a human (or another machine), for the reason that the Supreme Court in *Bilski v. Kappos* has made clear that the presence of a machine-or-transformation is an indication of patent eligibility, even though the hardware often has little or no connection to the inventive breakthrough. Cohen and Lemley call this “the doctrine of the magic words”: Julie Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1, 9 (2001).

¹⁹³ Durham, “*Useful Arts*”, *supra* note 188, at 1514.

¹⁹⁴ *Id.* at 1514.

¹⁹⁵ 409 U.S. 63 (1972).

¹⁹⁶ See generally Chisum, *Patentability of Algorithms*, *supra* note 30.

free and open source software communities share that philosophical viewpoint.¹⁹⁷ Opponents say that privatizing ideas that underlie software code is inconsistent with principles of openness that are the benchmark of the collaborative, distributed open source software projects that create products such as varieties of the Linux operating system, the Mozilla and Firefox web browsers, and the Apache web server. Although open source software producers impart a valuable community service by providing an inexpensive alternative to the products of corporate behemoths like Microsoft and IBM, they consistently follow the lead of these companies. While there is undoubtedly innovation in free and open source software,¹⁹⁸ many of these programs emulate (copy) the functionality and look-and-feel of the products of the market leaders who routinely rely on patent protection for their new software.

Much opposition to patenting software is based on concerns that patents are being granted over known software techniques, algorithms, or ideas. These concerns generally relate to patents over processes that are already being used in code, or are an obvious implementation of existing techniques. The stifling effect of improperly awarded software patents and the difficulty and expense involved in having them removed from the patent register is all too familiar. As has been explained above, concerns of this nature are appropriately dealt with under the criteria of novelty and nonobviousness, and not as an issue of patentable subject matter.

Software developers need patent protection from free riders like any other inventors. The free-rider problem is of particular concern in the software industry because computer software is particularly vulnerable to almost instant and inexpensive copying and the prevailing consumer culture is one that pays little regard to unlawful duplication and sharing. The combination of massive numbers of educated people in highly networked communities, readily available and inexpensive mass data storage, high speed communication and data transfer facilities, plus a culture of freely sharing other people's work, means that software copying and emulation is the norm.

Rather than blindly opposing software patents, supporters of free and open source software should be thankful for the innovation of market leaders that they are free to emulate as a result of those market leaders accepting that some degree of copying is an immutable part of the programming landscape, and even share some of their patent portfolios by pledging not to enforce some of the patents they own.¹⁹⁹ Assuming there is nothing that can be done to prevent software patenting,²⁰⁰ the next best option for those in the software community who are concerned about software patents is to take steps to ensure that only deserving software patents

¹⁹⁷ For an explanation of free and open source software models and the differences between them, see Brian Fitzgerald and Nic Suzor, *Legal Issues For the Use of Free and Open Source Software in Government*, 29 MELB. U. L. REV. 412, 413-14 (2005). For an overview of the motivations behind peer- and user-led content production see Yochai Benkler, *Coase's Penguin, or, Linux and The Nature of the Firm*, 112 YALE L.J. 369 (2002); Josh Lerner & Jean Tirole, *Some Simple Economics of Open Source Software*, 50 J. INDUS. ECON. 197 (2002); Eric von Hippel, *Innovation by User Communities: Learning from Open Source Software*, 42 SLOAN MGMT. REV. 82 (2001).

¹⁹⁸ For an example of innovation in free and open source software, that is itself emulated by companies such as Microsoft, see *Firefox Web Browser*, www.mozilla.org/en-U.S./firefox/upgrade.html (last visited Mar. 12, 2010).

¹⁹⁹ *Patent Commons*, www.patent-commons.org (last visited Mar. 12, 2010).

²⁰⁰ Given that software patents have been a part of the legal and technological landscape since *Diamond v. Diehr*, 450 U.S. 175 (1981), the courts are unlikely to remove them from the scope of patentable subject matter any time soon.

are issued by becoming involved in projects like Peer-to-Patent and those that publicize new ideas to quickly fill prior art repositories that can be searched by patent examiners when they are determining the patent eligibility of software inventions at the examination stage.²⁰¹

However, it must be noted that it is difficult to mount an effective challenge to an invalid patent or undeserving patent application when the relevant prior art cannot be located. It is particularly difficult for patent examiners to locate and understand relevant software prior art. Not all software code or documentation describing how software is coded is publicly disclosed. Often software code and documentation is a jealously guarded trade secret. In many cases, the only publicly available documentation may be the object code itself, which cannot be interpreted by a human. Even if source code is disclosed, it is still difficult for an examiner to decipher it in the available time patent offices allow for examination.

A related issue is that the courts need to better understand the nature of non-obviousness in computer software. They need to ensure that claims to computer programs that merely automate processes that are well known outside computer science are not automatically found to satisfy the inventive step requirement for patentability simply because such a process has not been previously automated. Instead, the patent applicant needs to show that the automation is not merely a routine application of computer programming principles that would be obvious to one skilled in the art of computer programming.

B. Business Methods

That a physicality requirement is too blunt a tool with which to confine the scope of patentable subject matter is demonstrated by its effect on business methods. A physicality requirement would restrict the patent eligibility of business methods to those embodied in a physical machine or device or those which involve a physical transformation of matter. This begs the question, what material difference is there between business methods that involve a physical effect or transformation and those that do not, to justify the extension of the patentable subject matter to include the former but not the latter?

The term, business method, is notoriously difficult to define, although, arriving at a precise definition is not essential, given that business methods are not regarded as a category of excluded matter. Given the difficulty in striking upon a definition, it is not easy to distinguish between methods of doing business and tools or techniques useful in conducting business. It is sufficient to say a business method is an artificial process in which the inventive element lies in entrepreneurial strategy.²⁰² There are two attributes of the expression that stand out. First, it describes what is essentially a commercial (as opposed to technological) activity, and second, it describes a process rather than an apparatus or an artifact, so that any physical or software

²⁰¹ See e.g., *Open Source as Prior Art (OSAPA)* initiative, <http://www.linuxfoundation.org/programs/legal/osapa> (last visited Mar. 3, 2010).

²⁰² Pollack, *Multiple Unconstitutionality*, *supra* note 11, at 70; Merges, *supra* note 167, at 579; Ricketson, *Business Method Patents*, *supra* note 110, at 101-103; Fitzgerald ET AL., *INTERNET AND E-COMMERCE LAW*, *supra* note 171, at 305; Ben McEniery, *Patents for Intangible Inventions in Australia After Grant v. Commissioner of Patents (Part I)*, 13 *COMPUTER & TELECOMM. L. REV.* 70, 70 (2007) (“A business method can broadly be described as a method of operating any aspect of an economic enterprise.”). See also 35 U.S.C. § 273(a)(3) (defining a business method, for the purpose for the section, as “a method of doing or conducting business”).

elements that are claimed are usually at such a high level of generality that they are for all practical purposes nominal. Accordingly, the definition is one that can attach to a method that either has or does not have a physical effect. “Pure” business method patents, being those that do not involve a physical aspect, are a subset of business method patents. They are “methods of operating an aspect of a commercial enterprise which do not involve a physical aspect,”²⁰³ or in other words, are business methods that not tied to, implemented in, or worked in conjunction with a physical device, such as a computer.

The patentability of business methods has been of great controversy in recent years. Kevin Schubert’s analysis in this regard bears repeating. He notes that there are two main criticisms of business methods put forward. The first concerns the quality of patents granted, and the second is one of economic inefficiency.²⁰⁴ The main criticism raised in relation to business methods patents is that they are often of low quality, and accordingly, cause more harm than good. For example, Justice Kennedy expressed concern over business method patents for their “potential vagueness and suspect validity.”²⁰⁵ A quality patent is one likely to meet the requirements of novelty, inventiveness and sufficiency of specification, and thus not likely to be found invalid if challenged. A low quality patent is one that is demonstrably not novel or non-obvious, which should be found invalid.²⁰⁶ This criticism stems from the perception that patents more often than not claim business practices that are already known and widely used in the community, which is a question of novelty. One of the particular criticisms of patent offices in this regard is their perceived inability to see that the automation of processes that were previously performed manually do not amount to novel methods of performing business processes. Internet business methods, in particular, have been labeled as low quality patents for this reason.²⁰⁷ Another concern is that business method patents protect methods that are widely practiced, but not necessarily documented, which are thus undiscoverable by patent examiners who seek prior art to reject patent applications.²⁰⁸

As Schubert notes, some commentators challenge this conventional wisdom. What they say is striking about the business method controversy is the manner in which this consensus surrounding the quality of business method patents has been formed. They hold that typically opponents of business method patents have offered only opinions and anecdotal evidence, usually in the form of one or two broad business method patents such as the Amazon.com one-click patent,²⁰⁹ to support this theory, rather than empirical evidence.²¹⁰

²⁰³ McEniery, *supra* note 202, at 70.

²⁰⁴ Kevin Schubert, *Should State Street be Overruled? Continuing Controversy Over Business Method Patents*, 90 J. PAT. & TRADEMARK OFF. SOC’Y 461, 463 (2008).

²⁰⁵ *eBay, Inc. v. MercExchange, LLC*, 547 U.S. 388, 397 (2006) (Kennedy, J., concurring). Justice Kennedy took the view that infringement of business method patents may not merit injunctive relief because of their “potential vagueness and suspect validity.” The Supreme Court unanimously decided that a permanent injunction should not automatically be issued following a finding of patent infringement.

²⁰⁶ John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 996 (2003); John R. Allison & Starling D. Hunter, *On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods*, 21 BERKELEY TECH. L.J. 729, 729 (2006); Raskind, *supra* note 98, at 66; Nuno Pires De Carvalho, *The Primary Function of Patents*, U. ILL. J.L. TECH. & POL’Y 25, 59 (2001).

²⁰⁷ See, e.g., Dreyfuss, *Are Business Method Patents Bad for Business?*, *supra* note 98.

²⁰⁸ *Merges*, *supra* note 167, at 589.

²⁰⁹ *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343 (Fed. Cir. 2001).

While there may have been teething problems with the examination of business methods when they first began to appear en masse, those problems would not appear to be as serious as some might suggest. Empirical studies indicate that business method patents are not of low quality, nor are they inferior to other kinds of patents in the quantity and quality of prior art they cite. It has been found that problems of patent quality exist in all fields of technology and do not exist in greater proportion in business method patents.²¹¹ In any event, this, if it is indeed a problem, is not an issue of subject matter, but an issue that exposes deficiencies in the examination of particular patents against the requirements of novelty and non-obviousness.

The second argument against the patentability of business methods is one of economic inefficiency. The argument is summarized by Raskind.

To state the conclusion in advance of an offer of proof, the economic analysis of patent protection does not support the extension of patent protection to methods of doing business. Both economic theory and empirical studies of patent-intensive industries cast doubt on the premise that patent protection of business methods is required either as an incentive for innovation or as an ingredient of the efficient diffusion of business methods in the economy.²¹²

The argument is that the social costs of a proliferation of business method patents, namely the perceived and actual barriers to undertaking commercial activity they erect outweigh any benefits they bring.²¹³ The anticommons danger in this respect is considerable, and the problem is compounded by the dynamic and voluminous nature of the Internet.²¹⁴ Determining whether an invention is novel and nonobvious is hard enough in a stable field of technology. In a market in which the technology's creative destruction is rampant, it is near impossible for anyone, let alone a patent examiner who is not necessarily perfectly skilled in each piece of technology that passes his or her desk and does not have sufficient time to conduct an exhaustive search of the prior art.

Many question whether patent protection is needed in a field where the pace of development is rapid, the costs may not be as high as in other areas (such as in biotechnology and pharmaceuticals), and where the advantages of being first in the market place or trade secret protection may be a sufficient incentive to encourage innovation to take place in sufficient

²¹⁰ Schubert, *supra* note 204, at 464 (citing *Amazon.com*, 239 F.3d 1343); Starling D. Hunter, *Have Business Method Patents Gotten a Bum Rap? Some Empirical Evidence*, 6 J. INFO. TECH. THEORY & APPLICATION 1, 1-2 (2004).

²¹¹ Allison & Tiller, *supra* note 206, at 1082 (presenting evidence to suggest that business method patents are no less valid than other types of patents by comparing 1,093 internet-related business method patents issued through December 31, 1999 with a randomly selected sample of 1,000 contemporaneously issued patents from the general population of patents); Hunter, *supra* note 210, at 6 (taking a 10% sample of 35,184 data processing patents in classifications 700 to 707 and 715 to 717 issued between 1975 and 1999 and comparing those patents in main classification 705 patents with those in the other "data processing" classifications); Allison & Hunter, *supra* note 206, at 735-36; Joshua Lerner, *Where Does State Street Lead? A First Look at Finance Patents 1971-2000*, 57 J. FIN. 901 (2002).

²¹² Raskind, *supra* note 206, at 64.

²¹³ *Id.* at 64-67; Dreyfuss, *Are Business Method Patents Bad for Business?*, *supra* note 207, at 274.

²¹⁴ Ben Depoorter, *The Several Lives of Mickey Mouse: The Expanding Boundaries Of Intellectual Property Law*, 9 VA. J.L. & TECH. 66 (2004).

quantities. They also point to the fact that there is no evidence that the patentability of business methods will spur innovation. They say that in the absence of data showing a need to spur innovation in business methods, it is equally plausible that the spur of competition and the long tradition of competition by emulation have been sufficient to provide an adequate level of innovation in methods of doing business.²¹⁵

This logic is contrary to the established approach to determining patent eligible subject matter, which treats all forms of innovation without discrimination. In other words, it ignores the fact that the law regards patent eligibility as a technology-neutral construct. In the words of Jaffe and Lerner:

There is no fundamental reason why an entrepreneur who does come up with a novel and non-obvious method of doing business needs patent protection less than an entrepreneur trying to make a go of comfortable high-heeled shoes or a new way of using radio spectrum for cell phones.²¹⁶

These arguments are not unique to business methods. They can be made with respect to any technology. Why business method patents should be treated differently is unclear, especially when business methods are normally overtly publicly available and thus may be easily reverse-engineered, like those which run on Internet web sites, which can be observed by anyone online.²¹⁷

The advantages of allowing business method patents are that innovation in business methods produces tangible flow-on benefits for the public, such as better and less expensive products and services, better and faster access to more products, more profitable companies, a greater share of profits to shareholders, greater income tax revenue for governments, and a higher standard of living for the public at large. For example, a product distribution method that enables a retailer to charge a lesser price for goods on its shelves that are identical to the goods offered for sale by other merchants, because the cost of getting the goods onto its shelves is lowered, is of important economic value and practical significance to the retailer and the public. In the same way that a person who uses a new labor-saving device to prepare food has more time devote to other creative pursuits, an organization that improves the methods by which it conducts its core business, operates more efficiently and has more time to improve other aspects of the business.

Business methods should be patentable if they represent a novel and inventive advance over the existing state of the art. They must also be described sufficiently so as to enable a person skilled in the relevant art to reproduce the method claimed, and be reduced to a specific practical application so as to not be a mere fundamental principle or abstract idea. This should be the case irrespective of whether or not the process is tied to a machine or transforms something

²¹⁵ Raskind, *supra* note 206, at 78 (interestingly, Raskind does not go on to say whether e-commerce needs a monopoly-free period to develop before becoming patent eligible); Dreyfuss, *Are Business Method Patents Bad for Business?*, *supra* note 207, at 275.

²¹⁶ Jaffe & Lerner, *supra* note 170, at 200.

²¹⁷ Greg S. Fine, *To Issue or Not to Issue: Analysis of the Business Method Patent Controversy on the Internet*, 42 B.C. L. REV. 1195, 1212-13 (2001) (arguing that criticism of business method patents ignores the realities of the Internet).

physical. The focus of the subject matter enquiry should thus not be on the questions of whether business methods or non-physical methods ought to be patentable, but on ensuring that patent offices are equipped to properly identify prior art relating to these technologies. The problem of low quality Internet or business method patents, if indeed there is one, will not be solved by a physicality requirement. In any event, the introduction of a physicality requirement will do little to stem the flow of business methods that are tied to physical apparatus or physically transform matter. All a physicality requirement could achieve is an unjustified exclusion of business methods that lack a physical effect or transformation from the benefits of patent protection.

Any threat to the patentability of non-physical business processes that arises now in response to the Supreme Court's finding that physicality remains a clue to patentability will encourage companies to keep their business methods secret or disguise them as other technologies. This will only hinder the advance of technology and the development of a mature pool of prior art as valuable methods will not be made available to the public, at all, or as quickly as they otherwise would. The uncertainty that remains is what an inventor of a non-physical business method must disclose to avoid the suggestion that the invention is abstract. Such uncertainty in the law does nothing to promote the disclosure of new methods so that the public may learn and improve upon them. It also impacts significantly upon the ability of a business to raise capital from private equity sources if no intellectual property rights can be offered as a capital contribution.²¹⁸

C. *Methods of Applying the Law*

Patenting methods of applying the law is a proposition many will find difficult to stomach. This is a proposition that smacks of preventing citizens complying with, and relying upon, the laws they are obliged and entitled to act in accordance with. The subject matter potentially affected includes new tax minimization strategies,²¹⁹ trust structures and asset protection schemes,²²⁰ corporate takeover strategies and ways to defend against them,²²¹ drafting techniques, wills and estates, litigation strategies and industrial relations and workforce organization schemes. Allowing patents over methods of applying the law has the potential to reduce access to justice by increasing costs. It will also increase the cost of compliance since

²¹⁸ Brief for Timothy F McDonough, Ph.D. as Amicus Curiae In Support of Petitioners, *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc), cert. granted sub nom. *Bilski v. Doll*, 129 S. Ct. 2735 (2009) (No. 08--964), 6-7. According to Jaffe and Lerner, *supra* note 170, providing incentives to invest in innovation and fostering the investment in the research and development that supports innovation is a key problem in patent law today.

²¹⁹ William A. Drennan, *The Patented Loophole: How Should Congress Respond to this Judicial Invention?*, 59 FLA. L. REV. 229 (2007); Linda M. Beale, *Is Bilski Likely the Final Word on Tax Strategy Patents? Coherence Matters*, 9 J. MARSHALL REV. INTELL. PROP. L. 110 (2009); Brian C. Banner, *Patenting Tax Strategies: The Case for Excluding Legal Methods From the Realm of Patentable Subject Matter*, 15 TEX. INTELL. PROP. L.J. 491 (2007); Max Stul Oppenheimer, *Patents, Taxes, and the Nuclear Option: Do We Need a "Tax Strategy Patent" Ban Treaty?*, 8 U. ILL. J.L. TECH. & POL'Y 1 (2008).

²²⁰ Grant v. Commissioner of Patents, [2006] FCAFC 120 (Federal Court of Australia).

²²¹ Andrew A. Schwartz, *The Patent Office Meets the Poison Pill: Why Legal Methods Cannot Be Patented*, 20 HARV. J.L. & TECH. 333, 350 (2007) (citing Martin Lipton, *Twenty-Five Years After Takeover Bids in the Target's Boardroom: Old Battles, New Attacks and the Continuing War*, BUS. LAWYER 1369, 1372 (2005) and Ronald J. Gibson, *Lipton and Rowe's Apologia for Delaware: A Short Reply* 27 DEL. J. CORPORATE L. 37, 37 (2002)). Swartz gives as an example the "poison pill," invented in 1982 by Martin Lipton of the Wachtell Lipton law firm and formally known as a "shareholder rights plan."

legal practitioners will need to ensure they avoid infringing existing patents before advising clients or acting on their instructions.

It might be thought that legal methods are not patentable as they are a discovery of a basic truth about the legal system or the law and are akin to a discovery of a feature of the natural world, rather than an invention.²²² It should be clear, however, that not all innovation in methods of applying the law are necessary discoveries about how the law operates, but are a practical application of legal principles. Categorizing legal innovations as discoveries rather than inventions fails to recognize the distinction between a discovery of what the law is on a particular point and an inventive scheme that is a practical application of that discovery. While there can be no inventiveness in a mere discovery, a new practical application coupled with a mode of carrying it into effect will be patentable if the method is novel, inventive and sufficiently described and enabled.²²³

Whether the legal system will allow patents over legal methods is difficult to predict. In the United States, there is clear and consistent Supreme Court authority that establishes that patentability requires harnessing the “laws of nature,”²²⁴ and may preclude alleged inventions that harness the “laws of man.”²²⁵ On the other hand, it could equally be said that methods of applying the law are an appropriate subject matter for the grant of a patent simply on the basis of their ingenuity.

There are two main policy arguments against methods of applying the law. The first is that the right to apply the law in a particular manner is a right that should be available to all free of charge and without restriction. The second is that as there are already sufficient incentives to encourage the development of innovative legal methods, there is no need for the patent system to provide further incentives. Schwartz argues against the patenting of legal methods on the assumption that research and development costs are much lower when creating new legal methods, as there is not the need to invest in expensive machinery or prototypes when conceiving new ways of applying the law.²²⁶ That is an easily rebuttable presumption. There are surely methods of applying the law that require much time and expense to research and develop, and there are surely industrial methods that require minimal expense, time and research to develop.

Issues regarding novelty and inventiveness also arise where methods of applying the law are concerned. As a result of the difficulties in identifying prior art, many of the patents that have or will be issued for methods of applying the law will involve techniques that have long been accepted as routine, or will be obvious implementations of the existing law. This creates a difficult and expensive problem to rectify in court if patents are awarded for strategies that have

²²² Grant v. Commissioner of Patents, [2006] FCAFC 120, [33]-[34] (Federal Court of Australia); Hughes, *supra* note 122, at 320-21 (citing Saul Levmore, *Explaining Restitution*, 71 VA. L. REV. 65, 96 (1985)); B. Kaplan, *An Unhurried View of Copyright* 65 (1967); Schwartz, *supra* note 221, at 336.

²²³ McEniery, *supra* note 202, at 104.

²²⁴ Funk Bros. Seed Co v. Kalo Inoculant Co, 333 U.S. 127, 130 (1948) (“If there is to be invention from . . . a discovery, it must come from the application of the law of nature to a new and useful end.”)

²²⁵ Schwartz, *supra* note 221, at 351 (citing Dolbear v. American Bell Telephone Co. (*The Telephone Cases*), 126 U.S. 1 (1888)).

²²⁶ Schwartz, *supra* note 221, at 369-70.

been already widely known and practiced. As methods of applying the law is a class of subject matter that patent offices have not traditionally been exposed to and lawyers are unaccustomed to publicizing their legal strategies, current prior art repositories are unlikely to be sufficiently stocked to enable patent examiners to locate the most relevant prior art. Proving a lack of novelty may be difficult due to the fact that legal advice given by a lawyer to a client is seldom disclosed to the public at large. A legal document or letter of advice given by a lawyer to a client will not constitute prior art information if not disclosed to the public. Documents of this nature are unlikely to have been publicly disclosed if protected by legal professional privilege. What is more, a document under legal professional privilege cannot be relied on as prior art unless the client waives privilege in respect of the document. Accordingly, it may be that some patents over methods of applying the law will be improperly awarded by the patent office before it is able to accumulate a satisfactory repository of prior art. In terms of the inventive step or non-obviousness requirement, if a method of applying the law is to be patentable, it must involve an appreciable degree of ingenuity and not just be a novel but obvious application of the existing law.

While the issues raised highlight valid practical problems, none are arguments that cannot be applied to other technologies. Thus, it is not clear why methods of applying the law, in the event that they meet the remaining requirements of novelty and nonobviousness, should be treated any differently to other inventions. The person who discovers and reduces to practice a valuable means of, say minimizing tax liability under certain circumstances, and discloses it to the public rather than keeping it secret should be allowed to reap a benefit, in the form of a fee, from others who make use of that means. Surely innovative developments in the way law is applied that achieve a useful result that is of economic significance are of a commercial character and therefore ought to be encouraged by the reward of the monopoly protection afforded by a patent. We return once again to the same argument, that as with other classes of technology, allowing patents for new and non-obvious advances over prior techniques, that involve an application of the law to achieve a desirable result, is one way to encourage the devotion of greater efforts in this field.²²⁷ Incongruously, methods of applying the law would be patentable subject matter under the Federal Circuit's machine-or-transformation test if carried out by a machine. As with business methods, a physicality requirement will not exclude methods of applying the law that are somehow embodied in a physical apparatus or involve the transformation of matter, such as where the method in question is incorporated in a computer software program. Removing only methods of applying the law that are somehow embodied in a physical apparatus or involve the transformation of matter from patentability is plainly a course of action that will lead to anomalous results and artful drafting.

D. Financial Services

Patenting financial services and products is surprisingly not a new phenomenon. According to the USPTO, forty-one financial apparatus and method patents in paper-based technologies were awarded in the United States dating back as early as 1799. These include

²²⁷ Maurer, *supra* note 127, at 1080.

patents for bank notes, bills of credit, bills of exchange, check blanks, detecting and preventing counterfeiting, coin counting, interest calculation tables, and lotteries.²²⁸

Financial services patents are arguably a subset of business method patents and patent over methods of applying the law. They are yet another vehicle that demonstrates why patent law should not contain a physicality requirement.²²⁹ Examples of deservedly patent eligible subject matter include: the Black-Scholes equation, which is the foundation for most options pricing models;²³⁰ a process for securitizing mutual funds; and a method of valuing a mutual fund product (commonly known as a Master-Feeder fund), which was the alleged invention considered in *State Street*.

A physicality requirement would arbitrarily exclude new and valuable financial services. That new financial products only transform the non-physical financial risks and legal liabilities of market participants is not cause to render them unpatentable. While they largely involve innovation in the application of the law, contractual relationships between entities, or the management of property or human expertise, this does not necessarily place the financial services industry outside the scope of the patent system.

Innovation in the realm of financial services is as valid and valuable as innovation in the mechanical and industrial arts. Financial services firms innovate to provide better services to their clients than their competitors. Innovation thus creates a public benefit in the form of access to better services. While there are other incentives that encourage innovation in financial services that would exist without the patent system, that is no ground for excluding innovation in this category from patent law's incentives.

E. Communications

Communications technologies concern the transmission of information. Most users of modern communications technologies utilize those technologies without having regard to the physical structures upon which their communications are transmitted. Over the years, innumerable communications methods of far-reaching economic and social consequence that do not disclose a physicality requirement have been rightfully afforded patent protection. Had the movement in favor of a physicality requirement prevailed earlier, many of these inventions might never have been either conceived at all or conceived as early as they were.²³¹ For example, Samuel Morse's claim 5 to a method of signaling using electromagnetism to send telegraph

²²⁸ USPTO, *White Paper on Automated Financial or Management Data Processing Methods*, BUSINESS METHODS 3-4 (2006); *Id.* at appendix A (citing Edmund Burke, Comm'r of Patents, *List of Patents for Inventions and Designs, Issued by the United States from 1790 to 1847* (1847). One of these is U.S. Patent No. 853,852 (Issued May 14, 1907) ("Insurance system") issued to Adams.

²²⁹ Douglas L. Price, *Assessing the Patentability of Financial Services and Products*, 3 J. HIGH TECH. L. 141 (2004).

²³⁰ William M. Landes & Richard A. Posner, *The Economic Structure of Intellectual Property Law* 306 (2003). The Black-Scholes options-pricing model is a differential equation that values stock options, based on the assumption that the underlying stock price moves according to Brownian motion. The Black-Scholes options-pricing model is not itself patentable because it is simply a mathematical algorithm, but a novel and Useful method employing the model would be patentable subject matter.

²³¹ These examples were taken from Brief for Boston Patent Law Association as Amicus Curiae in Support of Petitioners, *In re Bilski*, 545 F.3d 943 (Fed. Cir., 2008) (en banc), *cert. granted* sub nom. *Bilski v. Doll*, 129 S. Ct. 2735 (2009), 8-15.

messages,²³² does not disclose a physical element and would not have been patentable. Edwin Armstrong, known as the father of FM radio, was awarded a patent for a process that was rapidly adopted in nearly all radio communication and remains a standard for radios, television sets, mobile phones and other wireless devices. It involves converting, or shifting, the received radio signal from its broadcast frequency to a lower, so-called intermediate frequency for processing. This dramatically reduces the cost of receivers and simplifies receiver design.²³³ This claim alone, without a physical receiver to delimit its scope, involves only a series of steps performed on energy (or a signal), and therefore would not satisfy a physicality requirement. Also in doubt would be claim 2 of the Hellman patent to the public key encryption system,²³⁴ an invention of immense significance because it allows secure data transmission. That these break-through inventions in the field of communications would not be patent eligible as a consequence of a physicality requirement being invoked demonstrates the error of the Federal Circuit majority in *In re Nuijten*.²³⁵

F. Biotechnology

The patent eligibility of biotechnology inventions can be dealt with briefly because these would largely be unaffected by a physicality requirement. Biotechnology involves the exploitation of biological processes or living micro-organisms for industrial purposes, especially the genetic manipulation of micro-organisms for the production of antibiotics and hormones.

The Supreme Court made clear in *Chakrabarty* that biotechnology inventions are patentable subject matter provided that they claim something more than just a scientific theory, discovery of a natural phenomenon or principle of nature.²³⁶ A physicality requirement would have little effect on biotechnology innovation. Most, if not all, new inventions in the field of biotechnology exist in the realm of the physical.

G. Methods of Medical Treatment

Like methods of applying the law, patents on methods of medical treatment are an impediment to professionals providing services to the public in a cost-effective and timely manner and researchers who want to improve upon existing techniques. Justice Breyer elegantly identified some of the problems in his dissent from the Supreme Court's decision to revoke certiorari in *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.* ("*Labcorp*").²³⁷

²³² O'Reilly v. Morse, 56 U.S. 62 (1854).

²³³ U.S. Patent No. 1,342,885. Claim 1 of the Armstrong patent reads:

1. The method of amplifying and receiving high frequency electrical oscillatory energy which comprises, combining the incoming energy with locally generated high frequency continuous oscillations of a frequency differing from said incoming energy by a third readily-amplifiable high frequency, converting the combined energy by suitable means to produce said readily-amplifiable high frequency oscillations, amplifying the third said high frequency oscillations, and detecting and indicating the resulting amplified oscillations.

²³⁴ U.S. Patent No. 4,200,770 (filed Sept. 6, 1977) ("*Cryptographic Apparatus and Method*").

²³⁵ 500 F.3d 1346, 1356 (Fed. Cir. 2007) (holding that signals are transitory and intangible, and therefore not "manufactures" or "articles").

²³⁶ *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

²³⁷ 548 U.S. 124, 138 (2006).

If I am correct in my conclusion... that the patent is invalid, then special public interest considerations reinforce my view that we should decide this case. To fail to do so threatens to leave the medical profession subject to the restrictions imposed by this individual patent and others of its kind. Those restrictions may inhibit doctors from using their best medical judgment; they may force doctors to spend unnecessary time and energy to enter into license agreements; they may divert resources from the medical task of health care to the legal task of searching patent files for similar simple correlations; they may raise the cost of healthcare while inhibiting its effective delivery.²³⁸

The Federal Circuit's predictable response to this dilemma has been to apply the machine-or-transformation test. In *Prometheus v. Mayo*,²³⁹ the Federal Circuit applied the machine-or-transformation test to determine the patent eligibility of methods of providing medical treatment to a human being. The court upheld the patent eligibility of "a series of transformative steps that optimizes efficacy and reduces toxicity of a method of treatment for particular diseases using particular drugs."²⁴⁰ The applicant claimed methods of medical treatment that involve calibrating the proper dosage of thiopurine drugs, which are used for treating both gastrointestinal and non-gastrointestinal autoimmune diseases. To that end, the patents claim methods to optimize therapeutic efficacy while minimizing toxic side effects. The diagnostic element of the methods involves an iterative testing mechanism in which a drug is injected into a patient and the patient's metabolic response is measured. Subsequent doses are re-calibrated according to the measured metabolic response.²⁴¹

In doing so, the court explained that methods of medical treatment that cause these biochemical changes do not impermissibly claim or wholly pre-empt the use of natural phenomena, because they are a procedure for treating a person that involves the practical application of a discovery of natural phenomena. This assertion is doubtful. *Prometheus v. Mayo*

²³⁸ *Id.* at 138. See also James Bessen & Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* 8-10, 27 (2008).

²³⁹ 581 F.3d 1336 (Fed. Cir. 2009) (Michel, C.J., Lourie & Clark, JJ.). Judge Lourie gave an opinion on behalf of the court. District Judge Clark of the United States District Court for the Eastern District of Texas sat by designation.

²⁴⁰ *Id.* at 1349 (citing *In re Grams*, 888 F.2d 835, 839 (Fed. Cir. 1989)) (citation omitted).

²⁴¹ *Id.* at 1339. The only issue before the court was whether the claims meet the requirements of § 101. This appeal did not raise any questions about lack of novelty, obviousness, or overbreadth. *Id.* at 1345. According to the court, claim 1 of the '623 patent is representative of the independent claims asserted by Prometheus in this case:

A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:

- (a) administering a drug providing 6-thioguanine to a subject having said immune-mediated gastrointestinal disorder; and
- (b) determining the level of 6-thioguanine in said subject having said immune-mediated gastrointestinal disorder, wherein the level of 6-thioguanine less than about 230 pmol per 8x10⁸ red blood cells indicates a need to increase the amount of said drug subsequently administered to said subject and wherein the level of 6-thioguanine greater than about 400 pmol per 8x10⁸ red blood cells indicates a need to decrease the amount of said drug subsequently administered to said subject.

A broader claim (claim 46 of the '632 patent) does not require the administering step of claim 1 above.

may well present an example of circumstances in which claims satisfy the machine-or-transformation test, but pre-empt of a law of nature.

Mayo contended that the patents impermissibly claim and wholly pre-empt the use of natural phenomena, specifically, the correlations between drug metabolite levels and efficacy and toxicity.²⁴² In a unanimous opinion, the Federal Circuit rejected Mayo's patentable subject matter challenge, holding that the claimed methods for calibrating a drug dosage are patent eligible.²⁴³ The Federal Circuit concluded that the methods of treatment claimed in the patents in suit "squarely fall within the realm of patentable subject matter" because they satisfy the transformation prong of the machine-or-transformation test. It held that they "transform an article into a different state or thing," and this transformation is "central to the purpose of the claimed process."²⁴⁴ The court determined that the disputed claims do not merely claim natural correlations and data-gathering steps. Instead, it recognized the claims as being made in respect of methods of treatment that involve data-gathering steps and reference to natural correlations.²⁴⁵

The court noted that administering drug treatment transforms the biochemical makeup of the patient's body for the purpose of treating disease because "drugs do not pass through the body untouched without affecting it."²⁴⁶

The transformation is of the human body following administration of a drug and the various chemical and physical changes of the drug's metabolites that enable their concentrations to be determined.²⁴⁷

The court observed that a physical transformation always occurs when medicines are administered to treat a person, and agreed that physical transformations such as a human body's metabolic reaction in response to the administration of a drug are not ineligible simply because they proceed according to natural laws or occur within the human body.²⁴⁸ The court summarized its finding in the following way.

In other words, when asked the critical question of "What did the applicant invent?," the answer is a series of transformative steps that optimizes efficacy and reduces toxicity of a method of treatment for particular diseases using particular drugs.²⁴⁹

Finally, the court rebutted Mayo's argument that the Prometheus claims wholly pre-empt the use of a natural process.

²⁴² *Id.* at 1340-41.

²⁴³ *Id.* at 1339. The court made clear that the dispute focused solely on patentable subject matter issues and not other validity issues such as obviousness or novelty.

²⁴⁴ *Id.* at 1346 (citing *In re Bilski*, 545 F.3d 943, 962 (Fed. Cir. 2008)).

²⁴⁵ *Prometheus*, 581 F.3d at 1346.

²⁴⁶ *Id.*

²⁴⁷ *Id.*

²⁴⁸ *Id.*

²⁴⁹ *Id.* at 1349 (citing *In re Grams*, 888 F.2d 835, 839 (Fed. Cir. 1989)) (citation omitted).

The claims cover a particular application of natural processes to treat various diseases, but transformative steps utilizing natural processes are not unpatentable subject matter. Moreover, the claims do not preempt natural processes; they utilize them in a series of specific steps.²⁵⁰

The court distinguished the Prometheus claims from diagnostic claims that merely require data gathering and correlation, rather than an introduction of drugs into the body. In doing so, it hinted that the diagnostic claim in *LabCorp* is not patentable.

Although the court noted that the *LabCorp* dissent is not of precedential value, it found Justice Breyer's reasoning persuasive.²⁵¹ However, the facts in *Prometheus v. Mayo* are to be distinguished from those in *LabCorp*. *LabCorp* involved testing for an elevated level of homocysteine and correlating an elevated level of homocysteine with a vitamin B deficiency, where any form of test, even one in the public domain, could be used. This really is nothing more than an attempt to claim, and wholly pre-empt, a natural phenomenon, namely the inverse correlation between homocysteine and vitamin B levels within the body. This is different to what was claimed in *Prometheus v. Mayo*, which is a method of treatment that involves a discovery of a natural phenomenon having been reduced to a specific practical application in a treatment method. As such, the Prometheus claims would not prevent someone other than the patentee drawing a conclusion after having observed the metabolite levels.

The court also distinguished the Prometheus claims from those in *In re Grams*²⁵² ("*Grams*"). In *Grams*, the applicant claimed a diagnostic test procedure that involved: (1) performing a clinical test on individuals; and (2) based on the test result, determining if an abnormality existed and any possible causes of any abnormality by using an algorithm. The court found that the process was not drawn to patentable subject matter because the essence of the claimed process was a mathematical algorithm, rather than any transformation taking place within the tested individuals.²⁵³ The *Grams* process was seen in *In re Bilski* as merely being an algorithm combined with a data-gathering step.²⁵⁴ Unlike the diagnostic test in *Grams*, the administering and determining steps in Prometheus's methods are not mere data-gathering steps or insignificant extra-solution activity, but are elements of treatment regimes.²⁵⁵

It may be troublesome that the Prometheus patents appear to comprise nothing more than a discovery coupled with physically transformative steps that would be obvious to take once the discovery has been made. To many it would surely seem that the obvious use of a discovery should not be patent eligible. The use of "obvious" in this context, does not mean obvious in light of the prior art, but refers to that which is obvious to try once the discovery is made. This concern is starkly brought to the fore because the methods claimed in *Prometheus v. Mayo* are quite uncomplicated because they do not involve many steps.

²⁵⁰ *Prometheus*, 581 F.3d at 1349.

²⁵¹ *Id.* at 1346.

²⁵² 888 F.2d 835. *See Prometheus*, 581 F.3d at 1348.

²⁵³ *Grams*, 888 F.2d at 839-41.

²⁵⁴ *Bilski*, 545 F.3d at 963.

²⁵⁵ *Prometheus*, 581 F.3d at 1348.

However, it is not the number of steps that determines a method's patentability, nor is patentability denied where the reduction to practice might appear obvious once a natural phenomenon has been discovered. Rather, the critical issue is that the inventor must not pre-empt all uses of the phenomenon discovered, or all uses within a field. Alas, it appears that once a natural phenomenon is discovered, using the principle that underlies the phenomenon in a series of physically transformative steps, that when followed produces a useful result, is sufficient to justify a patent provided the remaining strictures of patentability are met.²⁵⁶

After the Federal Circuit decision of *Prometheus v. Mayo*, it is clear that methods of medical treatment will satisfy the machine-or-transformation test because that they cause biochemical changes to occur within the patient's body. This is the case despite the fact that there is no guarantee that a particular medical treatment will, in all circumstances and conditions, produce exactly the same results in all persons to whom it is administered, nor that it will not pre-empt a law of nature. Where there is uncertainty is the patentability of clinical tests to detect disease or an abnormality within the body following *Grams* and its treatment in *Prometheus v. Mayo*.

The Supreme Court has since granted certiorari in *Prometheus v. Mayo* and summarily vacated the decision with a remand to the Federal Circuit to reconsider the matter in light of *Bilski v. Kappos*.²⁵⁷

All methods of treating the human body necessarily involve a physical effect or transformation because they cause biochemical transformations on or within the body. Those biochemical transformations might be caused by the administration of a drug, a surgical procedure, the administration of physical treatment (such as massage), or treating people's thoughts to affect their behaviors and emotions (either through counseling, drug treatment, or both). As such they may be patent eligible, provided they can properly be classed as new and useful inventions, and that any physical aspect is "central to the purpose of the claimed process."²⁵⁸ However, those physical transformations should be regarded as patent eligible transformations only to the extent that they do not pre-empt the use of a law of nature or naturally occurring phenomenon.

H. Medical Diagnostic Methods

Medical diagnostic methods are to be distinguished from methods of medical treatment. Methods of medical treatment are used to treat disease, illness or other ailment, and either may or may not include a diagnostic step. Medical diagnostic methods, on the other hand, are purely used to identify the nature of a disease, illness or other ailment.²⁵⁹

²⁵⁶ *Diamond v. Diehr*, 450 U.S. 175, 189 n.12 (1981) (“To accept the analysis proffered by the petitioner would, if carried to its extreme, make all inventions unpatentable, because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious.”.)

²⁵⁷ *Mayo Collaborative Servs., v. Prometheus Labs., Inc.*, 130 S. Ct. 3543 (2010).

²⁵⁸ *Prometheus*, 581 F.3d at 1346 (Fed. Cir. 2009) (citing *Bilski*, 545 F.3d at 962).

²⁵⁹ See Aaron S. Kesselheim & Michelle M. Mello, *Medical-Process Patents - Monopolizing the Delivery of Health Care*, 355 NEW ENG. J. MED. 141, 146 (2006).

Unlike methods of medical treatment, not all medical diagnostic methods involve a physical element. Some diagnostic methods involve mixing a human sample (such as tissue or blood) with another substance whose properties are known (for example, dyes such as iodine, or chemical reagents) to allow it to be observed, thus enabling a diagnosis to be made. Mixing substances in this way is physically transformative. Other diagnostic methods do not involve a physical transformation, such as those that only require an observation of the patient's overt physical presentation (for example, a physical examination to detect appendicitis or observing blood or a tissue sample under a microscope). The facts surrounding the "panel test" in *Labcorp* are an example of a diagnostic method that does not rely on a physical transformation.

A physicality requirement is of little use in determining whether a medical diagnostic method ought to be patent eligible. Determining a claim's patentability should not hinge on whether the mental step could be carried out by a device or in response to a physical transformation of tissue or blood. To be patentable, a method of medical diagnosis must involve something more than merely making an observation of some naturally occurring phenomenon and drawing a fairly obvious conclusion in light of medical knowledge. Patent law does not allow patents for a discovery of fundamental principles of nature and natural phenomena. These are excluded categories of subject matter. It is asserted that methods of medical diagnosis per se are not patentable subject matter, because they involve nothing more than merely making an observation of some naturally occurring phenomenon and drawing an obvious conclusion in light of medical knowledge.²⁶⁰ Methods of medical diagnosis per se are not patent eligible because they are not processes. They are a claim to the naturally occurring phenomenon itself and would wholly pre-empt the use of it, which is not permissible. Naturally occurring phenomena and any observations that can be made in relation to them are not inventions, and thus must remain in the public domain, free for all to use.

Diagnostic methods that put a human sample in a state that allows it to be observed in a way that permits a medical diagnosis to be made are patent eligible. However, it is not permissible to add mere known or obvious preparatory or data-gathering steps to a method of medical diagnosis and then claim it is patent eligible. The diagnostic method will be considered as a whole to determine its patent eligibility. The critical question is "What did the applicant invent?"²⁶¹ If the inventor has only discovered a natural correlation that indicates a particular diagnosis, there is no invention.

After *In re Bilski*, the Federal Circuit affirmed, in a brief one-graph non-precedential opinion, a district court grant of summary judgment of invalidity for claims directed to methods of selecting vaccine regimens less likely to cause chronic autoimmune disorders in *Classen Immunotherapies, Inc. v. Biogen IDEC*.²⁶² It did so solely on the basis that the claims do not satisfy the machine-or-transformation test.

²⁶⁰ This is the essence of what Justice Breyer said in the Supreme Court's non-precedential denial of certiorari in *Laboratory Corporation of America Holdings v. Metabolite Laboratories, Inc.*, 548 U.S. 124 (2006). There the "panel test" created involved nothing more than a discovery that there is an inverse correlation between the concentration of homocysteine and two B vitamins: cobalamin and folate. Samples with an elevated level of homocysteine were likely to have a B vitamin deficiency and samples with an unelevated level of homocysteine were likely not to have a B vitamin deficiency.

²⁶¹ *Prometheus*, 581 F.3d at 1349 (citations omitted).

²⁶² 304 F. App'x 866 (Fed. Cir. 2008).

Claim 1 of the Classen patent recites:

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.²⁶³

Like the disputed claim in *Labcorp*, the claim instructs a person to immunize mammals in any way and consider the results. The Federal Circuit's dealing with this case will be scrutinized, as the Supreme Court has granted a petition for writ of certiorari.²⁶⁴

I. Purely Mental Steps

Claims that involve steps that can be performed solely within the human mind are directly relevant to the patentability or otherwise of purely intangible inventions, because a claim that propertizes thought is necessarily going to be one that involves an alleged invention that does not involve any physical effect or physical transformation of matter. Almost 40 years ago, in *In re Musgrave*,²⁶⁵ (“*Musgrave*”) the United States Court of Customs and Patent Appeals did away with the mental steps doctrine.

We cannot agree with the board that these claims (all the steps of which can be carried out by the disclosed apparatus) are directed to non-statutory processes merely because some or all the steps therein can also be carried out in or with the aid of the human mind or because it may be necessary for one performing the processes to think. All that is necessary, in our view, to make a sequence of operational steps a statutory “process” within 35 U.S.C 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of “useful arts.” Const. Art. 1, sec. 8.²⁶⁶

Soon after, the United States Supreme Court briefly dabbled with the idea of including mental steps in the categories of excluded matter in *Gottschalk v. Benson*²⁶⁷ and *Parker v. Flook*,²⁶⁸ but did not maintain this view in *Chakrabarty* and *Diehr*. This indicates that the Supreme Court did not intend to follow its earlier decisions and did not intend that ‘mental steps’ would be included as a category of excluded matter, a view confirmed by the Supreme Court in *Bilski v. Kappos*. As Chisum noted in his criticism of *Gottschalk v. Benson*:

²⁶³ U.S. Patent No. 5,723,283 (filed May 31, 1995).

²⁶⁴ *Classen Immunotherapies, Inc. v. Biogen IDEC*, 130 S. Ct. 3541 (2010).

²⁶⁵ 431 F.2d 882 (C.C.P.A. 1970).

²⁶⁶ *Id.* at 893.

²⁶⁷ 409 U.S. 63, 67 (1972).

²⁶⁸ 437 U.S. 584, 589 (1978) (citing *Benson*, 409 U.S. at 67).

there is no basis for lumping together phenomena of nature and abstract concepts with “mental steps.” A process consisting partially or wholly of “mental steps” does not exist in nature and can be quite specific.²⁶⁹

After almost three decades, the Federal Circuit recently reinvigorated the mental steps doctrine in *Comiskey*, ruling that patent claims based solely on human thought processes are not patentable subject matter.

However, mental processes--or processes of human thinking--standing alone are not patentable even if they have practical application.²⁷⁰

The Federal Circuit did the same in *In re Bilski*, by holding that “mental processes, like fundamental principles, are excluded by § 101.”²⁷¹ In doing so, the court impliedly ruled that a claim involving only mental steps does not satisfy the machine-or-transformation test.²⁷²

The *LabCorp* certiorari denial brought new attention to the mental steps issue; however, there, Justice Breyer wisely left the mental steps issue out of his analysis.²⁷³

From a policy standpoint, excluding mental processes from the scope of patentable subject matter is undesirable. Patent law protects new products and processes which are novel and inventive and meet the remaining criteria for patentability. While there may be valid concerns that processes comprising only mental steps might fail tests of definiteness, usefulness or nonobviousness, this does not mean that every invention that involves human thought ought to be ruled out at the subject matter threshold. Each alleged invention that involves mental steps must be tested against the remaining elements of patentability.²⁷⁴

In many cases, mental processes will lie within one of the recognized categories of excluded matter and thereby be excluded from patentability. An example is the circumstances that arose in *LabCorp*. The diagnosis method in that case, stripped of obvious or extra-solution activity, was merely an observation of a natural phenomenon. Other mental processes, standing alone, will likely be abstract ideas not reduced to practice, indefinite, or incapable of reliably producing consistent results each time the process is executed. As such, there is no need to resort

²⁶⁹ Chisum, *supra* note 30, at 981.

²⁷⁰ *In re Comiskey*, 554 F.3d 967, 979 (Fed. Cir. 2009) (citing *Benson*, 409 U.S. at 67). *See also Comiskey*, 554 F.3d at 979-80.

²⁷¹ 545 F.3d 943, 960 (Fed. Cir. 2008) (*en banc*).

²⁷² Wright, *supra* note 134, at 52-53 (viewing that for the purpose of a physicality requirement, any physical change within a human brain that occurs as a result of engaging in purely mental processes can be discarded because the physical transformation must be artificially-induced rather than naturally-occurring). However, Wright is of the view that methods of treating the human body that involve an artificially induced physical change to part of the body would be patentable subject matter.

²⁷³ Kevin Emerson Collins, *Propertizing Thought*, 60 SMU L. REV. 317, 321 (2007).

²⁷⁴ Risch, *supra* note 110, at 629; Chisum, *supra* note 30, at 981.

to Collins' argument that, as a matter of policy, purely mental processes need to be excluded from patentability.²⁷⁵

Another basis upon which mental processes can be excluded from patentability is that the inventions claimed may not describe processes that will reliably produce identical or near identical results each time they are invoked. It is clear that a patent may not properly issue for a method dependent upon the aesthetic, emotional, or physical reactions of a human. Rejections of patents involving mental steps may reflect concerns over the imprecision or irreproducibility of methods such as these. Under this view, processes involving certain mental steps are unpatentable because, although they produce practical results, they do so through partially specified exercises of individual judgment or decision making.²⁷⁶

One theory for barring protection of mental steps advanced in the United States is that protecting mental processes would limit freedom of speech and thought, conflicting with the First Amendment.²⁷⁷ However, the acts of thinking about and discussing ideas are not necessarily akin to practicing an invention.

A concern with attempts to patent processes that are solely composed of mental steps is that claims that involve independent human choice and judgment are abstract ideas because they allow for claims that are far broader than the applicant has disclosed. These concerns can be allayed by noting that claims involving mental steps will be patentable so long as they can be properly described in such a way as to enable a person skilled in the art to successfully and faithfully reproduce them without the need to exercise significant independent judgment. In other words, they are to be evaluated in the same way as other inventions.

VI. Conclusion

The opinion expressed in this article is that from a normative perspective, physicality has no role to play in patent eligibility, as a physicality requirement is an undesirable limitation on patentable subject matter. It essentially confines all process patents to manufacturing methods, using a test that may have been appropriate during the Industrial Age,²⁷⁸ but is no longer appropriate in an information-based economy in which the next foreseeable wave of technological breakthroughs will be in the fields of nanotechnology, genetics, biotechnology, health sciences (especially in the fields of medical diagnosis, personalized medicine and neurotechnology), information technology and communications (including computer software, and computer and telecommunications networks), business methods, environmental protection and renewable energy production. While it is likely that the majority of new breakthroughs in these areas will be bounded by physical constraints, a large percentage will not. It is this significant number of non-physical technological processes that demand an appropriate subject matter test bereft of physical constraints.

²⁷⁵ Collins, *supra* note 273. According to Collins, as a matter of policy, patent law should not remove our ability to think from the public domain. Collins' argument is that if the element of novelty exists only in the mental step, as is the case with the claim at issue in *Labcorp*, then the claim is not patentable subject matter.

²⁷⁶ Gruner, *Intangible Inventions*, *supra* note 110, at 403.

²⁷⁷ U.S. CONST. amend. I.

²⁷⁸ *Bilski*, 545 F.3d at 976 (Newman, J., dissenting); *Id.* at 1011 (Rader, J., dissenting).

Even though there are concerns about the patent system, and in particular business method and computer software patents, introducing a physicality requirement at the threshold is a suboptimal means of addressing these concerns. Rather, it is the strictures of novelty, inventiveness and sufficiency of description that will exclude undeserving subject matter from patentability. Relying on a physicality requirement will have unintended adverse effects in various fields of technology, particularly those emerging technologies that are likely to have a profound social effect in the future. The Supreme Court was right to reject this as a proxy for determining patent eligibility. Now that the Federal Circuit's short-lived dalliance with its machine-or-transformation physicality requirement has been shut down, the § 101 jurisprudence has come full circle, leaving the law back where it started. What remains to be explored is how the existing constraints on subject matter eligibility are to be invoked to exclude non-deserving subject matter.

While patents have traditionally been awarded in respect of either physical artifacts or industrial, mechanical and manufacturing processes, it is not the case that the law is limited in this way. As such, the sorts of invention we are likely to witness in the Information Age will receive the same encouragement as industrial and manufacturing advances of previous times.

The presence of a physical effect or transformation is merely an indication or "clue" that an invention is patent eligible, and is not the dividing line that lies between patentable subject matter and the recognized categories of excluded matter. To be patent eligible, it is sufficient that an invention involves a specific practical application of an idea or principle to achieve a useful result. The test for determining patent eligibility is that patentable subject matter encompasses all new and useful technological advances that fall within the useful arts, but does not include the recognized categories of excluded matter, namely fundamental principles, natural phenomena and abstract ideas. The existing law properly establishes a flexible technology-neutral and industry-neutral approach to the subject matter inquiry that appropriately distinguishes between that which is abstract and non-abstract, and that which is technological and non-technological, without relying on irrelevant considerations involving physical embodiment. Accordingly, it is not only traditionally recognized mechanical, industrial, chemical and manufacturing processes that are patent eligible, as patent eligibility extends to include non-physical inventions.

A physicality requirement is not desirable as a matter of policy because it is not an appropriate means of encouraging much of the valuable innovation we are likely to witness during the Information Age. A physicality requirement is not a panacea for the patent system's perceived problems due to the advent of computer software and business method patents and an increase in the volume of patent applications filed each year. Concerns that there is a crisis in patent law caused by a trend of overreaching commoditization or proprietization, where the boundaries of patent law have been expanded too far, are unfounded since the strictures of novelty, inventiveness and sufficiency of description will exclude undeserving subject matter from patentability.

Any concerns that potentially vague or trivial patents are being granted should be addressed by the other requirements for patentability. While § 101 provides a valuable threshold, it is the remaining strictures of patentability, novelty, nonobviousness, sufficiency of written

description, and enablement, that are the focus of patentability and are the tools for eliminating undeserving patents. First, proper enforcement of the novelty and nonobviousness requirements in §§ 102 and 103 will prevent patents that claim old and well-known processes being awarded.²⁷⁹ Second, § 101 is not intended to protect against overbroad claims. That is the role of § 112, which demands that the inventor clearly describe and distinctly claim the invention. The existing requirements for patentability properly applied are better suited than the machine-or-transformation test to prevent vague or trivial patents being granted.

Rather than expending valuable time, energy and resources on a process of whittling down the patentable subject matter test that will have unintended and adverse consequences, those concerned about the future direction of the innovation system should focus on projects that improve our ability to properly enforce the remaining patentability standards. Both the public and private sectors should focus on establishing prior art repositories that enable new inventions and discoveries to be publicized as soon as possible, so that the teething problems that ordinarily arise when new technologies are patented are minimized. They should also focus on developing and making part of standard patent office practice projects such as Peer-to-Patent that throw the patent examination process open to expert involvement and scrutiny.

Patent law is about achieving a difficult but essential balance between too much reward for intellectual effort and too little protection for inventors from imitators and free riders. It is about providing appropriate incentives to encourage inventors to create new and inventive products and processes, without stifling innovation or unreasonably interfering with trade and commerce by allowing odious monopolies to be granted in respect of undeserving known subject matter. While a physicality requirement may appear to be a sensible limitation that keeps the bounds of the patent system within the purview of traditionally held expectations about what patents ought to protect, it ties patent eligibility to a bygone era. Given that the object of patent law is the encouragement of new and innovative technologies in whatever unpredictable form or field they arise, there are no good reasons to restrict the scope of patentable subject matter in this way. The useful arts limitation and the recognized categories of excluded matter are the appropriate tools to distinguish between applied and abstract inventions, while the remaining patentability requirements of novelty, inventive step and the need to describe the invention and fairly base claims on that description, are the appropriate tools to distinguish other undeserving subject matter.

²⁷⁹ *In re Bergy*, 563 F.2d 952, 960 (C.C.P.A. 1979). Since the decision in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 420-21 (2007), it is now clear that § 103 bars patents for improvements that result from mere “common sense” or “ordinary creativity.”