

Patent Eligibility and Computer-Related Processes:

A Critique of In re Bilski and the Machine-or-Transformation Test

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ABSTRACT

Section 101 of the Patent Act enumerates categories of patent eligible subject matter. Subject to a few judicial exclusions aimed at preventing the preemption of the fundamental principles on which technological progress depends, processes otherwise meeting the requirements of the Patent Act have historically been eligible for patent protection. In *In re Bilski*, the Federal Circuit radically departed from its section 101 jurisprudence, partially abrogating several of its decisions and asserting that the “definitive” and exclusive test for assessing the subject-matter eligibility of processes under the Patent Act is the “machine-or-transformation test.” This note argues that the *Bilski* decision directly contravenes Supreme Court precedent and ignores both the language of the Patent Act and Congressional intent. The note further argues that the uncertainty generated by the decision with regard to the patent eligibility of computer-related processes will necessarily dampen incentives for research and development in information technology. Furthermore, it is argued that the machine-or-transformation test will lead patent prosecutors to draft claims and specifications of patents directed toward software in a way that limits the quality of the information conveyed to the public, further dampening innovation in this crucial area. The note presents the case that, by unnecessarily eliminating its prior tests for the patent eligibility of processes and reverting to a standard more appropriate to the nineteenth century than the twenty-first, the Federal Circuit has taken a step backwards – a step that will impede rather than encourage innovation.

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I. INTRODUCTION

In 1997, Bernard L. Bilski and Rand A. Warsaw filed a patent application containing eleven claims directed toward “[a] method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price”¹ Following the rejection of all eleven claims by the United States Patent and Trademark Office (“PTO”) as not being directed toward patent-eligible subject matter under 35 U.S.C. § 101,² the applicants appealed to the Federal Circuit.³ On October 30, 2008, with one concurrence⁴

¹ *In re Bilski*, 545 F.3d 943, 949 (Fed. Cir. 2008); U.S. Patent Application Serial No. 08/833,892. Claim 1 reads: A method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of: (a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate based upon historical averages, said fixed rate corresponding to a risk position of said consumer; (b) identifying market participants for said commodity having a counter-risk position to said consumers; and (c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions.

² The examiner stated in the rejection that: “[r]egarding . . . claims 1-11, the invention is not implemented on a specific apparatus and merely manipulates [an] abstract idea and solves a purely mathematical problem without any limitation to a practical application, therefore, the invention is not directed to the technological arts.” *Bilski*, 545 F.3d at 950 (citing *Ex Parte Bilski*, No. 2002-2257, 2006 WL 573864 51, at *3 (B.P.A.I. Sept. 26, 2006)). The PTO’s Board of Patent Appeals and Interferences (“BPAI”) affirmed the rejections. *Ex parte Bilski*, No. 2002-2257, 2006 WL 5738364 at *64, available at <http://www.uspto.gov/web/offices/dcom/bpai/its/fd022257.pdf>.

³ *Bilski*, 545 F.3d at 949.

and three dissents,⁵ the Federal Circuit, sitting en banc, affirmed the decision of the PTO.⁶ In the course of the opinion, the court deviated from its prior section 101 jurisprudence, eliminating two of its tests for the subject-matter eligibility of processes,⁷ partially abrogating several of its prior decisions,⁸ and asserting that the “definitive” and exclusive test for assessing the subject-matter eligibility of processes under the Patent Act is the “machine-or-transformation test,” supposedly enunciated by the Supreme Court.⁹

Far from enunciating a definitive “machine-or-transformation” test, as is claimed by the *Bilski* majority,¹⁰ the Supreme Court’s decisions in *Gottschalk v. Benson*,¹¹ *Parker v. Flook*,¹² and *Diamond v. Diehr*¹³ carefully avoided reading into the Patent Act new limitations that the legislature had not expressed, and explicitly and repeatedly rejected the very limitations that the majority imposed in *In re Bilski*. As the Supreme Court reaffirmed in *Diehr*, only those claims directed toward natural laws, natural phenomena, and abstract ideas are ineligible for patent protection under section 101.¹⁴ Unsurprisingly, given both the importance of the issue and the Federal Circuit’s deviation from precedent, the Supreme Court, on June 1, 2009, granted certiorari in *Bilski v. Doll*.¹⁵

Part I of this Note examines section 101 of the Patent Act and provides a brief history of the approaches taken by the courts to the subject-matter eligibility of processes. Part II summarizes the decision in *In re Bilski* and argues that the Federal Circuit’s

⁴ Filed by Judge Dyk and joined by Judge Linn, the concurrence, fully joining the majority opinion, sought to “respond to the claim in the . . . dissents that the majority’s opinion is not grounded in the statute, but rather ‘usurps the legislative role.’” *Bilski*, 545 F.3d at 966.

⁵ Judges Newman, Mayer, and Rader each filed separate dissents. *Id.* at 949.

⁶ *Id.*

⁷ *Id.* at 959 n.17 (“In light of the present opinion . . . the *Freeman-Walter-Abele* test is inadequate.”); *Id.* at 960 n.19 (“[W]hile looking for ‘a useful, concrete, and tangible result’ may in many instances provide useful indications of whether a claim is drawn to a fundamental principle or a practical application of such a principle, that inquiry is insufficient to determine whether a claim is patent-eligible under § 101.”).

⁸ *Id.* at 959 n.17 (“Therefore, in *Abele*, *Meyer*, *Grams*, *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, . . . and other decisions, those portions relying solely on the *Freeman-Walter-Abele* test should no longer be relied on.”); *id.* at 960 n. 19 (“As a result, those portions of our opinions in *State Street* and *AT&T* relying solely on a ‘useful, concrete and tangible result’ analysis should no longer be relied on.”).

⁹ *Bilski*, 545 F.3d at 954.

¹⁰ *Id.*

¹¹ *Gottschalk v. Benson*, 409 U.S. 63 (1972).

¹² *Parker v. Flook*, 437 U.S. 584 (1978).

¹³ *Diamond v. Diehr*, 450 U.S. 175 (1981).

¹⁴ *See id.* at 185 (“Our recent holdings in *Gottschalk v. Benson* . . . and *Parker v. Flook*, . . . both of which are computer-related, stand for no more than these long-established principles.”).

¹⁵ The petition for certiorari presented two questions for review: 1) “Whether the Federal Circuit erred by holding that a ‘process’ must be tied to a particular machine or apparatus, or transform a particular article into a different state or thing (‘machine-or-transformation’ test), to be eligible for patenting under 35 U.S.C. § 101, despite this Court’s precedent declining to limit the broad statutory grant of patent eligibility for ‘any’ new and useful process beyond excluding patents for ‘laws of nature, physical phenomena, and abstract ideas’”; and 2) “Whether the Federal Circuit’s ‘machine-or-transformation’ test for patent eligibility, which effectively forecloses meaningful patent protection to many business methods, contradicts the clear Congressional intent that patents protect ‘method[s] of doing or conducting business.’ 35 U.S.C. § 273.” Petition for Writ of Certiorari, *Bilski v. Doll*, 129 S. Ct. 2735 (No. 08-964).

determination that the only test applicable “when evaluating the patent-eligibility of process claims” is the “machine-or-transformation” test¹⁶ directly contravenes Supreme Court precedent and ignores both the language of the Patent Act and Congressional intent. Finally, Part III argues that the Federal Circuit’s departure from precedent and explicit rejection of its prior tests has needlessly jeopardized innovation by creating uncertainty and has the potential to reinforce a style of strategic drafting that limits the quality of disclosure. As Judge Rader put it in his dissent, the Federal Circuit has chosen to link “patent eligibility to the age of iron and steel at a time of subatomic particles and terabytes”¹⁷ By unnecessarily eliminating its prior tests and adopting a standard more appropriate to the nineteenth century than the twenty-first, the Federal Circuit has taken a step backwards – a step that will impede rather than encourage innovation.

II. BACKGROUND

A. Subject-Matter Eligibility and Process Patents

The Constitution empowers Congress “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”¹⁸ “The Patent Act of 1793, authored by Thomas Jefferson, defined statutory subject matter as ‘any new and useful art, machine, manufacture, or composition of matter, or any new and useful embodiment [thereof].’”¹⁹ This statutory language reflected its author’s philosophy that “ingenuity should receive a liberal encouragement.”²⁰ In 1952, “Congress replaced the word ‘art’ with ‘process,’ but otherwise left Jefferson’s language intact.”²¹ Section 101 of the 1952 Patent Act thus enumerates four categories of patent eligible subject matter, providing that: “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.”²²

The plain language of section 101, with its use of expansive terms modified by the comprehensive “any,” signals Congressional intent to establish a wide breadth of

¹⁶ *Bilski*, 545 F.3d at 964.

¹⁷ *Id.* at 1011 (Rader, J., dissenting).

¹⁸ U.S. CONST. art. I § 8, cl. 8. Contemporary scholars and practitioners commonly refer to this clause, authorizing Congress to enact both copyright and patent law, as the “Intellectual Property Clause,” but for many years the clause was known simply as the “Patent and Copyright Clause.” JULIE E. COHEN, ET AL., COPYRIGHT IN A GLOBAL INFORMATION ECONOMY 4 (2d ed. 2006). Throughout this note, the clause will be referred to as the “Intellectual Property Clause.”

¹⁹ *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980) (quoting 1 Stat. 319 (1793)).

²⁰ *Id.* at 308-09 (quoting 5 WRITINGS OF THOMAS JEFFERSON 75-76 (Washington ed. 1871)). Subsequent patent statutes in 1836, 1870, and 1874 retained Jefferson’s language. *Chakrabarty*, 447 U.S. at 309.

²¹ *Chakrabarty*, 447 U.S. at 308-09

²² 35 U.S.C. § 101 (2006).

eligible subject matter²³ and the Committee Reports accompanying the 1952 Act establish that “Congress intended statutory subject matter to ‘include anything under the sun that is made by man.’”²⁴ Section 101 is not an independent condition of patentability, but is rather a general statement of subject matter eligible for patent protection.²⁵ The “plain and unambiguous meaning of § 101” is that any invention falling within one of the four statutory categories is patentable “if it meets the requirements for patentability set forth in Title 35.”²⁶ The question of whether a particular invention meets the specific conditions of patentability set forth in the statute is therefore “wholly apart from whether the invention falls in a category of statutory subject matter.”²⁷ Patentability is limited to inventions that are useful, novel, and nonobvious.²⁸ A patent specification must further satisfy three disclosure requirements (pertaining to the informative quality of the patent application rather than to the technical merits of the invention itself) before a patent can be granted: enablement, best mode, and written description.²⁹

Although the term “process” did not appear in section 101 until 1952, processes historically enjoyed patent protection under the general term “useful art”³⁰ and the subject matter eligibility of processes did not change with the modification of section 101.³¹ Under the 1952 Patent Act, ‘process’ means “process, art, or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.”³² Process inventions “involve a series of acts” performed in order to produce a given result³³ and are patentable “irrespective of the instrumentalities used”³⁴ The end

²³ *Chakrabarty*, 447 U.S. at 308 (“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.”)

²⁴ *Id.* at 309 (rejecting a proposed restriction on the patent eligibility of life forms and affirming the eligibility of claims directed toward an engineered bacterium capable of cleaning oil spills by digesting hydrocarbons and excreting environmentally innocuous components) (quoting H.R. Rep. No. 1923, at 6 (1952); S. Rep. No. 1979, at 5 (1952)).

²⁵ *In re Bilski*, 545 F.3d 943, 976 (Fed. Cir. 2008) (Newman, J., dissenting).

²⁶ *In re Alappat*, 33 F.3d 1526, 1542 (Fed. Cir. 1994).

²⁷ *See Diamond v. Diehr*, 450 U.S. 175, 190 (1981) (quoting *In re Bergy*, 596 F.2d 952, 961 (C.C.P.A. 1979)).

²⁸ JANICE M. MUELLER, *AN INTRODUCTION TO PATENT LAW* 211 (2d ed. 2006). Utility, novelty, and nonobviousness are governed by 35 U.S.C. §§ 101, 102, and 103, respectively.

²⁹ MUELLER, *supra* note 28, at 83. The enablement, best mode, and written description requirements are found in 35 U.S.C. § 112.

³⁰ *Diehr*, 450 U.S. at 184 (1981) (quoting *Corning v. Burden*, 56 U.S. 252, 268 (1854) (“A process, *eo nomine*, is not made the subject of a patent in our act of Congress. It is included under the general term ‘useful art.’”)).

³¹ *Id.* *See also Bilski*, 545 F.3d at 978 (“The legislative history for the 1952 Act explained that ‘art’ had been ‘interpreted by courts to be practically synonymous with process or method.’”) (quoting S. Rep. No. 1979 (1952)) (Newman, J., dissenting).

³² 35 U.S.C. § 100(b) (2006).

³³ *Cochrane v. Deener*, 94 U.S. 780, 788 (1877) (“A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery.”). *See also* ROGER E. SCHECHTER & JOHN R. THOMAS, *INTELLECTUAL PROPERTY: THE LAW OF COPYRIGHTS, PATENTS AND TRADEMARKS* 293 (2003).

product of a process need not itself be patentable in order for the process to qualify for patent protection.³⁵

B. Judicial Exclusions: Laws of Nature, Natural Phenomena, and Abstract Ideas

The Intellectual Property Clause “is both a grant of power and a limitation.”³⁶ The authority “[t]o promote the Progress of . . . useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their . . . Discoveries . . .” is qualified.³⁷ As the Supreme Court explained in *Graham v. John Deere*:

The Congress in the exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose. Nor may it enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby. Moreover, Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available. Innovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must “promote the Progress of . . . useful Arts.”³⁸

Accordingly, the Supreme Court has excluded “basic tools of scientific and technological work” from patent protection, as patents directed toward these tools might hinder rather than advance technological innovation.³⁹ Specifically, three categories of subject matter are generally excluded from patent protection: “laws of nature, natural phenomena, and abstract ideas.”⁴⁰

However, “[w]hile a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of the knowledge

³⁴ *Cochrane*, 94 U.S. at 788 (“That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed.”); *Corning*, 56 U.S. at 267-68 (“One may discover a new and useful improvement in the process of tanning, dyeing, etc., irrespective of any particular form of machinery or mechanical device.”).

³⁵ *Corning*, 56 U.S. at 268 (“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.”); See also MUELLER, *supra* note 28, at 216.

³⁶ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 5 (1966).

³⁷ *Id.* (quoting U.S. CONST. art. I, § 8, cl. 8.).

³⁸ *Id.* at 5-6.

³⁹ See *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) (“Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.”); see also Robert E. Thomas, *Debugging Software Patents: Increasing Innovation and Reducing Uncertainty in the Judicial Reform of Software Patent Law*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 191, 194 (2008).

⁴⁰ *Diamond v. Diehr*, 450 U.S. 175, 185 (1981); see also M.P.E.P § 2106 (2008) (“These three exclusions recognize that subject matter that is not a *practical application or use* of an idea, a law of nature or a natural phenomenon is not patentable.”) (emphasis in original).

of scientific truth may be.”⁴¹ As the Supreme Court stated in *Funk Bros. Seed Co. v. Kalo Co.*, “[h]e who discovers a hitherto unknown phenomena of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end.”⁴²

In other words, although hitherto unknown natural phenomena do not qualify for patent protection, products of human ingenuity do. In *Funk Bros.*, the Court invalidated product claims directed to mixed cultures of Rhizobia capable of inoculating the seeds of legumes belonging to several cross-inoculation groups.⁴³ In doing so, the majority characterized discovery of the fact that certain strains of Rhizobium “can be mixed without harmful effect to the properties of either” as nothing more than the nonpatentable discovery of their natural qualities of non-inhibition.⁴⁴ In contrast to *Funk*, the patentee in *Diamond v. Chakrabarty* genetically engineered “a new bacterium with markedly different characteristics from any found in nature and one having the potential for significant utility.”⁴⁵ Chakrabarty’s bacteria “qualifie[d] as patentable subject matter” since “[h]is claim [was] not to a hitherto unknown natural phenomenon, but to a nonnaturally occurring manufacture or composition of matter—a product of human ingenuity. . . .”⁴⁶

Inventors cannot preempt all use of particular phenomena, laws, or ideas. Eligible claims are limited to the specific applications disclosed. In *O’Reilly v. Morse*, the

⁴¹ *Mackay Co. v. Radio Corp.*, 306 U.S. 86, 94 (1939); see also *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874) (“An idea of itself is not patentable, but a new device by which it may be made practically useful is.”).

⁴² *Funk Bros. Seed Co. v. Kalo Co.*, 333 U.S. 127, 130 (1948).

⁴³ *Id.* at 130. The patentee in *Funk* attempted to claim a mixed culture of bacteria capable of inoculating the seeds of leguminous plants. *Id.* Legumes fix nitrogen from the air, converting it to organic nitrogenous compounds, but this process requires infection of the roots of the plants by bacteria belonging to the genus Rhizobium. *Id.* at 128-29; see also PETER H. RAVEN & GEORGE B. JOHNSON, *BIOLOGY* 575, 781 (6th ed. 2002) (describing the nitrogen cycle, the symbiotic relationship between some genera of bacteria and legumes, and the role of that relationship in nitrogen production). No one species of Rhizobia will infect all species of legumes, but each can infect well-defined groups of leguminous plants. *Funk*, 333 U.S. at 129. It had been common practice for “agriculturalists” to purchase packages of laboratory-produced bacteria to inoculate the seeds of their plants, but when mixed in a common base, different species of Rhizobia bacteria inhibited one another, resulting in decreased efficiency. *Id.* Because of these difficulties, farmers growing crops of different species of legumes typically purchased several different inoculants, one for each species. *Id.* The patentee in *Funk* discovered that “there are strains of each species of root-nodule bacteria which do not exert a mutually inhibitive effect on each other” and “that those mutually non-inhibitive strains can, by certain methods of selection and testing, be isolated and used in mixed cultures.” *Id.* at 130.

⁴⁴ *Funk*, 333 U.S. at 131.

⁴⁵ *Diamond v. Chakrabarty*, 447 U.S. 303, 310 (1980). Chakrabarty, a microbiologist, asserted claims to a “genetically engineered bacterium . . . capable of breaking down multiple components of crude oil . . . [a] property . . . possessed by no naturally occurring bacteria . . . [and] believed to have significant value for the treatment of oil spills.” *Id.* at 305.

⁴⁶ *Id.* at 309. In reaching this conclusion, the Court listed examples of natural phenomena, including “a new mineral discovered in the earth or a new plant discovered in the wild,” and laws of nature, including “the law of gravity” and “ $E=mc^2$,” that would not qualify as eligible subject matter. *Id.*

Supreme Court upheld the validity of claims directed toward a process of telegraphy employing electromagnetism, but simultaneously struck down as invalid the broadest claim in Samuel F. B. Morse's patent.⁴⁷ Claiming to be the first to "invent" or discover electromagnetism, Morse "claim[ed] the exclusive right to every improvement where the motive power is the electric or galvanic current, and the result is the marking or printing [of] intelligible characters, signs, or letters at a distance."⁴⁸ In rejecting this claim as "too broad, and not warranted by law," the Supreme Court noted that "while [Morse] shuts the door against inventions of other persons [he] would be able to avail himself of new discoveries in the properties and powers of electro-magnetism which scientific [discovery] might bring to light."⁴⁹ *Morse* established that the use of a particular natural law, phenomena of nature, or abstract idea, "without regard to the particular processes with which it was connected in the patent," cannot be claimed "but that its use in that connection [can]."⁵⁰

The fact that a particular process might involve all practical use of a law, phenomena, or idea traditionally did not, in and of itself, make the process ineligible for patentability. At issue in *The Telephone Cases* was whether Alexander Graham Bell had attempted to preempt "all telephonic use of electricity" in one of his claims to a method for transmitting vocal or other sounds by electric current and, if so, whether the suspect claim was therefore invalid.⁵¹ The Supreme Court characterized Bell's claim as being "not for the use of a current of electricity in its natural state . . ." but rather as being directed toward "putting a continuous current in a closed circuit into a certain specified condition suited to the transmission of vocal and other sounds, and using it in that condition for that purpose."⁵² The Court stated that nothing in *O'Reilly v. Morse* defeated Bell's claim and that, "on the contrary, it [was] in all respects sustained by that authority."⁵³ Acknowledging that "[i]t may be that electricity cannot be used at all for the

⁴⁷ *O'Reilly v. Morse*, 56 U.S. 62 (1854). Morse's claims to particular applications of electromagnetism were valid, but the claim to every use, however developed, "was void, because it was a claim 'for a patent for an effect produced by the use of electro-magnetism, distinct from the process or machinery necessary to produce it.'" *The Telephone Cases*, 126 U.S. 1, 534 (1888) (quoting *O'Reilly v. Morse*, 56 U.S. at 107.).

⁴⁸ *O'Reilly*, 56 U.S. at 112.

⁴⁹ *Id.* at 107-08. Some commentators have characterized this finding of invalidity as resulting from lack of enablement or written description rather than from Morse's attempt to claim ineligible subject matter. See, e.g., Brief for Roberta J. Morris, Esq., Ph.D. as Amicus Curiae Supporting Appellants at 9, In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (No. 2007-1130), 2008 WL 1842256 ("[M]ost of Morse's claims to the telegraph were upheld, but the one whose invalidity is often cited for the proposition that abstract ideas cannot be patented was, in today's parlance, held not enabled."). There is support for this position in the text of the opinion: "In fine he claims an exclusive right to use a manner and process which he has not described and indeed had not invented, and therefore could not describe when he obtained his patent." *Morse*, 56 U.S. at 109. In *Gottschalk v. Benson*, however, the Supreme Court included *Morse* in its description of the development of subject matter exclusions. *Gottschalk v. Benson*, 409 U.S. 63, 67-68 (1972).

⁵⁰ *The Telephone Cases*, 126 U.S. at 534.

⁵¹ See *Benson* 409 U.S. at 69 ("Bell's claim, in other words, was not one for all telephonic use of electricity.").

⁵² *The Telephone Cases*, 126 U.S. at 534.

⁵³ *Id.* at 535.

transmission of speech except in the way Bell has discovered,” (presumably a plausible assumption at the time) the Court nonetheless upheld the validity of the claim.⁵⁴

Two opinions from the 19th century are commonly cited as articulating a traditional requirement that processes work a physical transformation in order to be patentable: *Cochrane v. Deener* and *Corning v. Burden*.⁵⁵ In *Cochrane*, the court considered a claim to an improved process for the manufacturing of flour that was “not limited to any special arrangement of machinery.”⁵⁶ It was, nevertheless, found eligible:

That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument or machinery is used to effect that object, whether a hammer, a pestle and mortar, or a mill . . . A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.⁵⁷ If new and useful, it is just as patentable as is a piece of machinery.⁵⁷

Both the language and the result of *Cochrane* echo the earlier decision in *Corning v. Burden*, in which the court stated that “[o]ne may discover a new and useful improvement in the process of tanning, dyeing etc., irrespective of any particular form of machinery or mechanical device.”⁵⁸ Over a century later, the Supreme Court, citing *Corning*, noted that the examples of patentable processes listed in the earlier opinion were “instances . . . where the use of chemical substances or physical acts . . . transform[ed] . . . raw materials . . . [in a way] sufficiently definite to confine the patent monopoly within rather definite bounds.”⁵⁹ In other words, one way to ensure that a process not limited to machines or mechanical devices is sufficiently definite as to be eligible for patent protection is to check that the subject-matter upon which the process is performed is “transformed and reduced to a different state or thing.”⁶⁰

C. The Subject-Matter Eligibility of Computer-Related Processes

The advent of computer technology raised new questions concerning subject-matter eligibility, forcing courts to reconsider the meaning of the judicial exceptions and to explore how they might apply to, among other things, software and computer-implemented business methods. Whether and to what extent software inventions comprise applied technology rather than ineligible abstract ideas has proven consistently

⁵⁴ *Id.* “[T]hat does not make his claim one for the use of electricity distinct from the particular process with which it is connected in his patent. It will, if true, show more clearly the great importance of his discovery, but it will not invalidate his patent.” *Id.*

⁵⁵ See, e.g., *Benson*, 409 U.S. at 69; SCHECHTER & THOMAS, *supra* note 33, at 294.

⁵⁶ *Cochrane v. Deener*, 94 U.S. 780, 785, 787-88 (1877).

⁵⁷ *Id.* at 787-88.

⁵⁸ *Corning v. Burden*, 56 U.S. 252, 267-68 (1854).

⁵⁹ *Benson*, 409 U.S. at 69.

⁶⁰ *Cochrane*, 94 U.S. at 787.

controversial.⁶¹

1. The Supreme Court Trinity: *Benson*, *Flook*, and *Diehr*

In *Gottschalk v. Benson*, the first of three Supreme Court cases concerning the subject-matter eligibility of patents claiming computer-related processes, the applicant claimed a method of converting numerals from binary-coded decimal (“BCD”) to pure binary format.⁶² The claims were directed both to the method in the abstract, without regard to a particular physical means of performance, and to the method as performed by a computer.⁶³ Characterizing the claims as “broad” and “sweeping,” the Supreme Court noted that the end use might “vary from the operation of a train to verification of drivers’ licenses to researching the law books for precedents and [might] . . . be performed through any . . . future-devised machinery”⁶⁴ Writing that “[t]ransformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines,” the Court upheld the rejection of the patent application on grounds of ineligibility.⁶⁵

The Court did, however, explicitly state that it was not implementing a machine-or-transformation test:

⁶¹ SCHECHTER & THOMAS, *supra* note 33, at 302.

⁶² *Id.* Digital computers operate on data stored in “bits” or binary digits. LINDA NULL & JULIA LOBUR, *THE ESSENTIALS OF COMPUTER ORGANIZATION AND ARCHITECTURE* 37 (2003). Each bit corresponds to a physical state of “high” and “low” or “on” and “off” within a computer; these states are easily represented through the binary number system as “1” and “0,” respectively. *Id.* at 38-39. Within a computer, “[t]he representation of numbers may be in the form of a time series of electrical impulses, magnetized spots on the surface of tapes, drums or discs, charged spots on cathode-ray tube screens, the presence or absence of punched holes on paper cards, or other devices.” *Benson*, 409 U.S. at 65. Positional numbering systems represent numeric values through increasing powers of a radix, also known as a base. NULL & LOBUR, at 38. The decimal or base 10 system uses ten digits, 0 through 9, to represent numeric values. The binary or base 2 system uses two digits, 0 and 1. *Id.* The value represented by any digit depends on both its individual value and its position in the numeral. *Benson*, 409 U.S. at 66. A subscript is used to distinguish between different radices; 101_{10} , for example, signifies $1 \times 10^2 + 0 \times 10^1 + 1 \times 10^0$. 101_2 signifies $1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$, or 5_{10} . Any decimal number from 0 to 10 can be represented in the binary system using four digits. *Id.* at 66. Any decimal integer can be expressed exactly in any integral base system. NULL & LOBUR, at 37. The BCD system replaces each component decimal digit in a decimal numeral with the corresponding four-digit binary numeral. The binary numerals corresponding to each decimal digit are as follows: $0_{10} = 0000_2$, $1_{10} = 0001_2$, $2_{10} = 0010_2$, $3_{10} = 0011_2$, $4_{10} = 0100_2$, $5_{10} = 0101_2$, $6_{10} = 0110_2$, $7_{10} = 0111_2$, $8_{10} = 1000_2$, $9_{10} = 1001_2$, and $10_{10} = 1010_2$. *Benson*, 409 U.S. at 66; NULL & LOBUR, at 39. The BCD representation of 101_{10} , for example, is 0001 0000 0001. This representation, however, differs from pure binary. In pure binary, 101_{10} is equivalent to 1100101_2 .

⁶³ SCHECHTER & THOMAS, *supra* note 33, at 303. Claims 8 and 13 are representative; claim 8 was drafted to capture the process as implemented by a computer, and claim 13 was drafted to capture the process in the abstract. *See Benson*, 409 U.S. at 73.

⁶⁴ *Benson*, 409 U.S. at 68.

⁶⁵ *Id.* at 69. Of course, those claims reciting computer implementation of the process did involve physical transformations, and recitation of this requirement in the course of rejecting those claims is somewhat dubious. *See* SCHECHTER & THOMAS, *supra* note 33, at 303 (“Operation of the computer would not only manipulate those electrical signals representing the data, but generate electrical signals in order to instruct the computer to perform certain tasks.”).

It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a ‘different state or thing.’ We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. It is said that the decision precludes a patent for any program servicing a computer. We do not so hold . . . It is said we freeze process patents to old technologies, leaving no room for the revelations of the new, onrushing technology. Such is not our purpose.⁶⁶

The Court explained its decision in terms of preemption of an abstract idea, stating that, “in a nutshell,” a patent for converting BCD numerals to pure binary numerals would, “in practical effect,” be a patent on an idea.⁶⁷ As commentators have long recognized, the Supreme Court’s reasoning in *Benson* is subject to the basic objection that, by definition, the quid pro quo that is the patent system operates by enabling patentees to “wholly pre-empt” the subject matter of the invention for a statutorily defined period.⁶⁸ In exchange, the public benefits from innovation encouraged through this arrangement as well as from disclosure of the patented invention.

The Supreme Court next confronted the subject-matter eligibility of computer-related processes in *Parker v. Flook*, decided six years later in 1978.⁶⁹ The patent application at issue in *Flook* claimed a method for updating an “alarm limit” related to operating conditions involved in processes comprising the catalytic chemical conversion of hydrocarbons.⁷⁰ The Court characterized the “mathematical algorithm or formula” used in the second step as the “only difference between the conventional methods of

⁶⁶ *Benson*, 409 U.S. at 71.

⁶⁷ *Id.* “The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that . . . [a] patent [on this process] would wholly preempt the mathematical formula and in practical effect would be a patent on the algorithm itself.” *Id.* at 71-72. Interestingly, the Court’s reasoning in this passage seems to directly contradict the holding in *The Telephone Cases* that process claims preempting all practical use of a particular phenomena or idea are nonetheless valid so long as such uses are not distinct from the particular process with which the idea or phenomenon is connected in the patent. See *The Telephone Cases*, 126 U.S. 1, 535 (1888).

⁶⁸ Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 989 (1986). (“Wholly preempting’ some class of product or process for a limited number of years is exactly how the patent system operates and has operated for almost 200 years.”). The Supreme Court itself raised a similar concern in *Parker v. Flook*, noting that “it is not entirely clear why a process claim is any more or less patentable because the specific end use contemplated is the only for which the algorithm has any patentable application.” *Parker v. Flook*, 437 U.S. 584, 590 n.11 (1978).

⁶⁹ *Flook*, 437 U.S. at 584.

⁷⁰ *Id.* at 585, 596. When operating conditions (including temperature, pressure, and flow rates) in these processes exceed a predetermined limit, an alarm can be used to signal inefficiency or danger. *Id.* at 585. Because fixed limits can be inappropriate during transient operating situations, it may be necessary to periodically update the limits past which an alarm is triggered. *Id.* The *Flook* applicant’s method for updating alarm limits proceeded in three steps: first, measuring the value of a process variable, second, calculating an updated alarm limit value using a mathematical equation, and third, adjusting the alarm limit to the new value. *Id.* at 596. The Court noted that “[a]lthough the computations can be made by pencil and paper calculations, the abstract of disclosure makes it clear that the formula is primarily useful for computerized calculations producing automatic adjustments in alarm settings.” *Id.* at 586.

changing alarm limits” and the process described in the application.⁷¹ Citing *Benson* and *Morse* for the proposition that a mathematical algorithm must be treated “as though it were a familiar part of the prior art,” regardless of whether known or unknown at the time of the claimed invention,⁷² the Court concluded that the process was “unpatentable under § 101, not because it contains a mathematical algorithm as one component, but because once that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention.”⁷³

In the course of the decision, the Court rejected the applicant’s argument that specific “post-solution activity,” the adjustment of the alarm limit, distinguished the case from *Benson* and made the process patentable.⁷⁴ Noting that “[a] competent draftsman could attach some form of post-solution activity to almost any mathematical formula,” the Court characterized the argument that “post-solution activity . . . can transform an unpatentable principle into a patentable process” as exalting “form over substance.”⁷⁵

The last word from the Supreme Court on the patent eligibility of computer-related processes came with its 1981 decision in *Diamond v. Diehr*.⁷⁶ *Diehr* elaborated on, and in part superseded, the reasoning in *Benson* and *Flook*, “plac[ing] the patentability of computer-aided inventions in the mainstream of the law.”⁷⁷

The applicants in *Diehr* claimed a computer-aided process for “molding raw, uncured synthetic rubber into cured precision products.”⁷⁸ Citing *Cochrane* and *Benson* for the proposition that “[t]ransformation and reduction of an article to a different state or thing is the clue to patentability of a process claim that does not include particular machines,” the court noted that it was beyond dispute that the claimed process transformed an article, uncured synthetic rubber, into a different state or thing and further noted that “[i]ndustrial processes such as [the claimed process] are the types which have

⁷¹ *Id.* at 585-86.

⁷² *Id.* at 591-92. Professor Chisum has described this notion, that an inventor’s discovery should be treated as though it were known prior art, as an “aberration . . . basically antithetical to patent law principles” Chisum, *supra* note 69, at 995.

⁷³ *Flook*, 437 U.S. at 594.

⁷⁴ *Id.* at 590.

⁷⁵ *Id.*

⁷⁶ SCHECHTER & THOMAS, *supra* note 33, at 304.

⁷⁷ *Arrhythmia Research Tech. v. Corazonix Corp.*, 958 F.2d 1053, 1057 (Fed. Cir. 1992).

⁷⁸ *Diamond v. Diehr*, 450 U.S. 175, 177 (1981). Contemporaneous methods of curing rubber applied heat and pressure to uncured product in a molding press but, despite the availability of the well-known Arrhenius equation through which an optimal time for opening the press could be calculated, suffered from an inability to obtain uniform cures because the temperature inside the press, a variable in the equation, fluctuates. *Id.* at 178. The applicants claimed a process solving the problem by constantly measuring the temperature inside the mold and automatically feeding the measurements into a digital computer which repeatedly recalculates the cure time using the Arrhenius equation. *Id.* at 179. The computer signals a device to open the press once the recalculated time equals the actual time elapsed, resulting in a superior cure. *Id.* The Arrhenius equation, named after its discoverer Svante Arrhenius, can be expressed as: $\ln v = CZ + x$, where v is the total required cure time, C is an activation constant, unique to each batch of molded compound, Z is the temperature of the mold, and x is a constant dependent on the geometry of the particular mold in the press. *Id.* at 178 n.2.

historically been eligible” for patent protection.⁷⁹ The Court’s conclusion that applicants claimed an eligible process was “not altered by the fact that in several steps of the process a mathematical equation and a programmed digital computer [were] used.”⁸⁰

Reviewing its prior decisions in *Benson* and *Flook*, “both of which are computer-related,” the Court wrote that the cases stand “for no more than [the] long established principle” that “laws of nature, natural phenomena, and abstract ideas” are excluded from patent protection.⁸¹ “In *Benson*,” the Court wrote, “we held unpatentable claims for an algorithm” for which “[t]he sole practical application . . . was in connection with the programming of a general purpose digital computer . . . we concluded that such an algorithm, or mathematical formula, is like a law of nature, which cannot be the subject of a patent.”⁸² *Flook* “presented a similar situation . . . An ‘alarm limit’ is simply a number and . . . [all the application] provides is a formula for computing an updated alarm limit.”⁸³

In contrast, the applicants in *Diehr* did “not seek to patent a mathematical formula . . . instead they [sought] patent protection for a process of curing synthetic rubber.”⁸⁴ Because their claims only foreclosed the use of an equation in “conjunction with all the other steps in their claimed process”⁸⁵ the Court held that the applicants did not seek to pre-empt use of the equation.⁸⁶ Furthermore, noting that applications “of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection,” the court held that “a claim drawn to subject matter otherwise statutory does not become non-statutory simply because it uses a mathematical formula, computer

⁷⁹ *Id.* at 184 (citations omitted).

⁸⁰ *Id.* at 185.

⁸¹ *Id.*

⁸² *Id.* at 185-86. The Court further recognized that “[t]he term ‘algorithm’ is subject to a variety of definitions” and that “[o]ur previous decisions regarding the patentability of ‘algorithms’ are necessarily limited to the . . . narrow definition employed by the Court . . .” *Id.* at 186 n.9. The definition employed by the Court in *Benson* was: “A procedure for solving a given type of mathematical problem . . .” *Gottschalk v. Benson*, 409 U.S. 63, 65 (1972). The petitioner in *Diehr* defined an algorithm as: “1. A fixed step-by-step procedure for accomplishing a given result; usually a simplified procedure for solving a complex problem, also a full statement of a finite number of steps. 2. A defined process or set of rules that leads [*sic*] and assures development of a desired output from a given input. A sequence of formulas and/or algebraic/logical steps to calculate or determine a given task; processing rules.” *Diehr*, 450 U.S. at 186 n.9 (quoting Brief of Petitioner at 6, n. 12, *Diamond v. Bradley*, 450 U.S. 381 (1980) (No. 79-855)). The Court did “not pass judgment on whether processes falling outside the definition previously used by this Court, but within the definition offered by the petitioner, would be patentable subject matter.” *Id.*

⁸³ *Diehr*, 450 U.S. at 186-87.

⁸⁴ *Id.* at 187.

⁸⁵ *Id.* “These [steps] include installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time.” *Id.* Arrhenius’ equation was “not patentable in isolation,” but the claim of the applicants to a process for curing rubber which incorporated “in it a more efficient solution of the equation . . . [was] at the very least not barred at the threshold by § 101.” *Id.* at 188.

⁸⁶ *Id.* at 187.

program, or digital computer.”⁸⁷

In closing, however, the Court warned that the principle that “a mathematical formula as such is not accorded the protection” of the patent laws “cannot be circumvented by attempting to limit the use of the formula to a particular technological environment” and that “[s]imilarly, insignificant post-solution activity will not transform an unpatentable principle into a patentable process.”⁸⁸ “On the other hand,” the Court wrote:

when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (*e. g.*, transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.⁸⁹

Because the applicants’ claims were “drawn to an industrial process for the molding of rubber products” rather than to a mathematical formula in the abstract, they were eligible for patent protection.⁹⁰

2. The Freeman-Walter-Abele and Useful, Concrete, and Tangible Result Tests

In the aftermath of the pronouncements by the Supreme Court in *Benson*, *Flook*, and *Diehr*, the Court of Customs and Patent Appeals (“CCPA”), the predecessor to the Federal Circuit, formed the two-part *Freeman-Walter-Abele* (“FWA”) test for assessing the patentability of computer-related processes.⁹¹ As described by the Federal Circuit in *Arrhythmia Research Technology v. Corazonix Corporation*, the test reflects the crystallization of the law around a core principle:

[C]laims directed solely to an abstract mathematical formula or equation, including the mathematical expression of scientific truth or a law of nature, whether directly or indirectly stated, are nonstatutory under section 101; whereas claims to a specific process or apparatus that is implemented in accordance with a mathematical algorithm will generally satisfy section 101.⁹²

⁸⁷ *Id.* The Court noted that its earlier decisions in *Benson* and *Flook* “lend support” to that conclusion. *Id.* In *Benson*, the Court explicitly denied that it was rendering computer programs ineligible for patent protection: “It is said that the decision precludes a patent for any program servicing a computer. We do not so hold.” *Benson*, 409 U.S. at 71. Similar support was found in the statement from *Flook* that “a process is not unpatentable simply because it contains a law of nature or a mathematical algorithm.” *Parker v. Flook*, 437 U.S. 584, 590 (1978).

⁸⁸ *Diehr*, 450 U.S. at 191-92. “To hold otherwise,” the Court warned, “would allow a competent draftsman to evade the recognized limitations on the type of subject matter eligible for patent protection.” *Id.* at 192.

⁸⁹ *Id.* at 192.

⁹⁰ *Id.* at 192-93.

⁹¹ SCHECHTER & THOMAS, *supra* note 33, at 304.

⁹² *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1057 (Fed. Cir. 1992).

When applied to an invention in which process steps “are described at least in part in terms of mathematical procedures, the mathematical procedures are considered in the context of the claimed invention as a whole.”⁹³ The FWA test proceeds in two stages:

It is first determined whether a mathematical algorithm is recited directly or indirectly in the claim. If so, it is next determined whether the claimed invention as a whole is no more than the algorithm itself; that is, whether the claim is directed to a mathematical algorithm that is not applied to or limited by physical elements or process steps. Such claims are nonstatutory. However, when the mathematical algorithm is applied in one or more steps of an otherwise statutory process claim, or one or more elements of an otherwise statutory apparatus claim, the requirements of section 101 are met.⁹⁴

In *Arrhythmia*, the Federal Circuit applied the FWA test in order to determine the subject-matter eligibility of a computer-related process. The patent at issue in *Arrhythmia* claimed a process for detecting a dangerous heart condition through analysis of an “electrocardiographically measured heart cycle.”⁹⁵ Applying the FWA test, the court accepted for purposes of analysis that a mathematical algorithm was present in the claimed subject matter, because some of the claimed process steps were described in the patent specification in terms of the mathematical formulae used to program a computer.⁹⁶ This finding necessitated the second stage of analysis: determining whether the claimed process was otherwise statutory or, as the court phrased it, determining “what the claimed steps do, independent of how they are implemented.”⁹⁷

The claimed process converted electrocardiograph signals obtained from electrodes attached to the patient’s body from analog to digital, applied a procedure known as reverse time order filtration to the resultant digital signal in order to eliminate perturbations, determined an average magnitude through application of the root mean square technique, and compared the output to a predetermined level of high frequency

⁹³ *Id.*

⁹⁴ *Id.* at 1058.

⁹⁵ *Id.* The process can be used to determine whether a patient is at high risk for ventricular tachycardia, an acute type of heart arrhythmia commonly occurring in the hours immediately following a heart attack. *Id.* at 1054. The analysis was achieved “by means of electronic equipment programmed to perform mathematical computation.” *Id.* Specifically, a general-purpose digital computer was used, although dedicated specific purpose equipment or hard wired logic circuitry would also have been acceptable. *Id.* at 1055. Design decisions of this sort are commonly encountered by computer scientists and engineers because “anything that can be done with software can also be done with hardware, and anything that can be done with hardware can also be done with software.” NULL & LOBUR, *supra* note 63, at 3. “A special purpose computer can be designed to perform any task . . . [and] programs can be written to carry out the functions of special-purpose computers.” *Id.* Null and Lobur refer to this as the “principle of equivalence of hardware and software.” *Id.* The choice between hardware and software is not entirely arbitrary because “[t]here are times when a simple embedded system gives . . . much better performance than a complicated computer program, and there are times when a program is the preferred approach.” *Id.*

⁹⁶ See *Arrhythmia Research Tech.*, 958 F.2d at 1055, 1058-59.

⁹⁷ *Id.* at 1059.

energy in order to determine whether the patient was subject to the heart condition.⁹⁸ Emphasizing that “[t]he view that ‘there is nothing necessarily physical about ‘signals’ is incorrect,’”⁹⁹ the court concluded that the claimed steps of “‘converting’, ‘applying’, ‘determining’, and ‘comparing’ are physical process steps that transform one physical, electrical signal into another.”¹⁰⁰ Because the mathematical procedures were applied to physical process steps, the FWA standard was met, and the process claims were held eligible for patent protection.¹⁰¹

The Federal Circuit gradually turned away from the FWA test, adopting a more permissive stance toward subject-matter eligibility with its en banc decision in *In re Alappat*.¹⁰² Alappat’s invention involved a “means for creating a smooth waveform display in a digital oscilloscope.”¹⁰³

The Federal Circuit’s subject-matter eligibility analysis recognized that “at the core of the [Supreme] Court’s analysis in each of [*Diehr*, *Flook*, and *Benson*],” the Court was attempting to explain “a rather straightforward concept . . . that certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, and thus that subject matter is not, in and of itself, entitled to patent protection.”¹⁰⁴ Writing that the FWA test “is not an improper analysis,” the Federal Circuit then pointed out that “the ultimate issue always has been whether the claim as a whole is drawn to statutory subject matter.”¹⁰⁵ With that understanding, the “proper inquiry” is “whether the claimed subject matter as a whole is a disembodied mathematical concept . . . which in essence represents nothing more than a

⁹⁸ *Id.* at 1055, 1059.

⁹⁹ *Id.* at 1059 (quoting *In re Taner*, 681 F.2d 787, 790 (C.C.P.A. 1982)).

¹⁰⁰ *Id.*

¹⁰¹ *Id.* at 1059-60.

¹⁰² See SCHECHTER & THOMAS, *supra* note 33, at 305. Alappat claimed a machine rather than a process (a “rasterizer”), but the case was a major turning point in the Federal Circuit’s approach to computer-related inventions impacting the subject-matter eligibility of processes as well as machines. *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994).

¹⁰³ *Alappat*, 33 F.3d at 1537. An oscilloscope displays data on a cathode-ray tube (“CRT”) screen by illuminating an array (or raster) of pixels using directed electron beams. *Id.* Each column in the array represents a different time period and each row represents a different magnitude. *Id.* Oscilloscopes sample and digitize input signals, creating waveform sequences (vector lists) which are then processed into bitmaps (stored data arrays) indicating which pixels are to be illuminated. *Id.* “The waveform ultimately displayed is formed by a group of vectors, wherein each vector has a straight line trajectory between two points on the screen” *Id.* Because a CRT screen contains a finite number of pixels,” the displayed “waveform can appear discontinuous or jagged” and portions of the waveform “can appear to oscillate between contiguous pixel rows.” *Id.* These effects are known as aliasing. *Id.* Alappat’s invention comprised an anti-aliasing system, or rasterizer, which employed a series of mathematical computations in order to convert one set of numbers, vector list data, into another, pixel illumination intensity data, in which the “intensity at which each of the pixels is illuminated depends upon the distance of the center point of each pixel from the trajectory of the vector.” *Id.* The use of the converted data in the display eliminated apparent discontinuities, jaggedness, and oscillation, “giving the visual appearance of a smooth continuous waveform.” *Id.*

¹⁰⁴ *Id.* at 1543.

¹⁰⁵ *Id.* at 1543 n.21.

‘law of nature,’ ‘natural phenomenon,’ or ‘abstract idea.’”¹⁰⁶ Judged against that standard, *Alappat*’s invention was deemed eligible for patent protection:

Although many, or arguably even all, of the means elements recited in claim 15 represent circuitry elements that perform mathematical calculations, which is essentially true of all digital electrical circuits, the claimed invention as a whole is directed to a combination of interrelated elements which combine to form a machine for converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means. This is not a disembodied mathematical concept which may be characterized as an “abstract idea,” but rather a specific machine to produce a useful, concrete, and tangible result.¹⁰⁷

The decision in *Alappat* created a new test for subject-matter eligibility: whether the invention produces a “useful, concrete, and tangible result.”¹⁰⁸ The development of the useful, concrete, and tangible result test, in turn, led the Federal Circuit to reject a blanket requirement that patent claims to processes involve a physical transformation of subject matter into a different state or thing.¹⁰⁹ As the Federal Circuit wrote in *AT&T v. Excel*, “[t]he notion of ‘physical transformation’ can be misunderstood . . . it is not an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application.”¹¹⁰ The United State Patent and Trademark Office adopted the same position in its official guidelines for patent examiners, issued in 2005: “a practical [and therefore patent eligible] application of a 35 U.S.C. § 101 judicial exception is claimed if the claimed invention physically transforms an article or physical object to a different state or thing, or if the claimed invention otherwise produces a useful, concrete, and tangible result.”¹¹¹

Following *Alappat*, in *State Street Bank & Trust Co. v. Signature Financial*

¹⁰⁶ *Id.* at 1544.

¹⁰⁷ *Id.*

¹⁰⁸ *See, e.g., State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998) (laying the “ill-conceived” business method exception to rest).

¹⁰⁹ *See* MUELLER, *supra* note 28, at 220.

¹¹⁰ *AT&T Corp. v. Excel Commc’ns, Inc.*, 172 F.3d 1352, 1358 (Fed. Cir. 1999). *AT&T* involved a patent enabling long-distance carriers to provide “differential billing treatment for subscribers, depending upon whether a subscriber calls someone with the same or a different long-distance carrier.” *Id.* at 1353. The patented process relied upon primary interexchange carrier (“PIC”) data in the electronic record of long-distance telephone calls. *Id.* at 1358. The PIC data represented the long-distance carriers associated with the subscribers and call recipients. *Id.* The claimed process applied Boolean algebra to the PIC data in order to determine the value of a PIC Indicator, and then applied “that value through switching and recording mechanisms to create a signal useful for billing purposes.” *Id.* at 1358, 1361. Although the claimed process involved a mathematical principle, it applied it, “without pre-empting other uses,” “to produce a useful, concrete, tangible result . . .” *Id.* at 1358. As such, the Federal Circuit held that the “claims asserted fall comfortably within the broad scope of patentable subject matter under § 101.” *Id.* at 1361.

¹¹¹ U.S. PATENT AND TRADEMARK OFFICE, INTERIM GUIDELINES FOR EXAMINATION OF PATENT APPLICATIONS FOR PATENT SUBJECT MATTER ELIGIBILITY 2 (2005), *available at* http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/guidelines101_20051026.pdf.

Group, Inc., the Federal Circuit signaled acceptance of the subject matter eligibility of methods of doing business, holding that the transformation of data representing discrete dollar amounts through a series of mathematical calculations into a final share price, a “useful, concrete, and tangible” result, constitutes eligible subject matter.¹¹² Acknowledging concern within the patent community about potentially unfair enforcement of business method patents against prior inventors, Congress enacted 35 U.S.C. § 273 to limit liability for infringement, by prior inventors, of business method patents.¹¹³ Section 273, nonetheless, explicitly recognized the patent eligibility of methods of doing business.¹¹⁴ Legislative history accompanying section 273 embraced the flexible approach to subject matter eligibility taken by the Federal Circuit in *State Street*, describing the “essential question” as “whether the invention produce[s] a ‘useful, concrete, and tangible result.’”¹¹⁵

III. *IN RE BILSKI*

In 1997, Bernard L. Bilski and Rand A. Warsaw filed a patent application containing eleven claims directed toward “[a] method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price”¹¹⁶ Following the examiner’s rejection of all eleven claims as not being directed toward patent-eligible subject matter under 35 U.S.C. § 101,¹¹⁷ the applicants appealed to the Patent and Trademark Office’s Board of Patent Appeals and Interferences, which sustained the rejections.¹¹⁸ The applicants then appealed to the Federal Circuit, which heard arguments

¹¹² *State St. Bank & Trust Co.*, 149 F.3d at 1373-74.

¹¹³ Brief for Accenture and Pitney Bowes, Inc. as Amici Curiae Supporting Petitioners at 19, *Bilski v. Doll*, 129 S. Ct. 2735, cert. granted, 77 U.S.L.W. 3656 (June 1, 2009) (No. 08-964), 2009 WL 559340 (citing 35 U.S.C. § 273 (1999)).

¹¹⁴ See 35 U.S.C. §§ 273(a)(3), 273(b)(1) (2006); see also H.R. REP. NO. 106-464, at 122 (1999) (Conf. Rep.) (“In order to protect inventors and to encourage proper disclosure, this subtitle focuses on methods for doing and conducting business, including methods used in connection with internal commercial operations as well as those used in connection with the sale or transfer of useful end results—whether in the form of physical products, or in the form of services, or in the form of some other useful results; for example, results produced through the manipulation of data or other inputs to produce a useful result.”).

¹¹⁵ H.R. REP. NO. 106-464, at 122 (1999) (Conf. Rep.).

¹¹⁶ U.S. Patent Application Serial No. 08/833892, available at <http://www.google.com/patents?id=UkKXAAAEB&dq=08/833,892>. Claim 1 reads: A method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of: (a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate based upon historical averages, said fixed rate corresponding to a risk position of said consumer; (b) identifying market participants for said commodity having a counter-risk position to said consumers; and (c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions. *Id.*

¹¹⁷ The examiner stated in the rejection that: “[r]egarding . . . claims 1-11, the invention is not implemented on a specific apparatus and merely manipulates [an] abstract idea and solves a purely mathematical problem without any limitation to a practical application, therefore, the invention is not directed to the technological arts.” *In re Bilski*, 545 F.3d 943, 950 (Fed. Cir. 2008).

¹¹⁸ *Ex parte Bilski*, No. 2002-2257, 2006 WL 5738364, at *1 (B.P.A.I. Sept. 26, 2006), available at <http://www.uspto.gov/web/offices/dcom/bpai/its/fd022257.pdf>.

before a panel of the court on October 1, 2007.¹¹⁹ Prior to disposition by the panel, the court *sua sponte* ordered en banc review, and requested that the parties file supplementary briefs answering five questions:

1. Whether claim 1 of the 08/833,892 patent application claims patent-eligible subject matter under 35 U.S.C. § 101?
2. What standard should govern in determining whether a process is patent-eligible subject matter under section 101?
3. Whether the claimed subject matter is not patent-eligible because it constitutes an abstract idea or mental process; when does a claim that contains both mental and physical steps create patent-eligible subject matter?
4. Whether a method or process must result in a physical transformation of an article or be tied to a machine to be patent-eligible subject matter under section 101?
5. Whether it is appropriate to reconsider *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), and *AT&T Corp. v. Excel Communs., Inc.*, 172 F.3d 1352 (Fed. Cir. 1999), in this case and, if so, whether those cases should be overruled in any respect?¹²⁰

The Board of Patent Appeals and Interferences, in its “informative opinion” in *Ex parte Bilski*, had mentioned that “it would be helpful” for the Federal Circuit to directly address the section 101 issues raised by the case.¹²¹ These questions revealed a willingness and, given the fact that they were raised *sua sponte*, perhaps even an eagerness, to do exactly that.

A. Summary of the Decision

With one concurrence¹²² and three dissents,¹²³ the Federal Circuit affirmed the decision of the Board, holding that the claims were not directed toward patent-eligible subject matter.¹²⁴ In the course of the decision, the court also radically deviated from its

¹¹⁹ In re *Bilski*, 264 Fed. Appx. 896 (Fed. Cir. 2008).

¹²⁰ *Id.* at 897.

¹²¹ Ex parte *Bilski*, No. 2002-2257, 2006 WL 5738364 at *64 (B.P.A.I. Sept. 26, 2006). The Board took the position that “not every series of steps is a ‘process’ under § 101 because the Supreme Court’s definition of a ‘process’ requires a transformation of physical subject matter from one state to another” and noted that “[i]t would be helpful if the Federal Circuit would address this question directly.” *Id.* The Board further surmised that “[i]f every series of steps is presumptively a process under § 101, then it would be almost impossible to hold that such a claim is directed to nonstatutory subject matter because the ‘abstract idea’ exclusion technically refers to subject matter that is not within § 101.” *Id.*

¹²² Filed by Judge Dyk and joined by Judge Linn, the concurrence, fully joining the majority opinion, sought to “respond to the claim in the . . . dissents that the majority’s opinion is not grounded in the statute, but rather ‘usurps the legislative role.’” In re *Bilski*, 545 F.3d 943, 966 (Fed. Cir. 2008).

¹²³ Judges Newman, Mayer, and Rader each filed separate dissents.

¹²⁴ *Bilski*, 545 F.3d at 949.

prior section 101 jurisprudence, eliminating the FWA¹²⁵ and “useful, concrete, and tangible result” tests,¹²⁶ and asserting that only the “definitive” “machine-or-transformation test” is applicable in assessing the subject-matter eligibility of process claims.¹²⁷

Writing for the majority, Chief Judge Michel characterized “the true issue” in the case as “whether Applicants are seeking to claim a fundamental principle (such as an abstract idea) or a mental process.”¹²⁸ The “underlying legal question thus presented,” he continued, “is what test or set of criteria governs the determination by the Patent and Trademark Office . . . or courts as to whether a claim to a process is patentable under § 101 or, conversely, is drawn to unpatentable subject matter because it claims only a fundamental principle.”¹²⁹ Michel noted that “[t]he Court in *Diehr* . . . drew a distinction between those claims that ‘seek to pre-empt the use of’ a fundamental principle, on the one hand, and claims that seek only to foreclose others from using a particular ‘application’ of that fundamental principle, on the other.”¹³⁰ “*Diehr* can be understood to suggest,” he continued, “that whether a claim is drawn only to a fundamental principle is essentially an inquiry into the scope of that exclusion; *i.e.*, whether the effect of allowing the claim would be to allow the patentee to pre-empt substantially all uses of that fundamental principle.”¹³¹ “If so, the claim is not drawn to patent-eligible subject matter.”¹³² The majority thus framed the issue as “whether Applicants’ claim recites a fundamental principle and, if so, whether it would pre-empt substantially all use of that fundamental principle if allowed.”¹³³

Up to this point, the decision had not substantially departed from prior cases dealing with section 101. However, after noting that the inquiry before the court was “hardly straightforward,” and that “the more challenging process claims of the twenty-first century are seldom so clearly limited in scope as the highly specific, plainly corporeal industrial manufacturing process of *Diehr*; nor . . . typically as broadly claimed or purely abstract and mathematical as the algorithm of *Benson*,” the majority sought refuge in a “definitive” test which, it claimed, originated with the Supreme Court:

¹²⁵ *Id.* (“In light of the present opinion, we conclude that the *Freeman-Walter-Abele* test is inadequate”). The court further instructed that “[t]herefore, in *Abele*, *Meyer*, *Grams*, *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, . . . and other decisions, those portions relying solely on the *Freeman-Walter-Abele* test should no longer be relied on.” *Id.* at 959 n. 17.

¹²⁶ *Id.* at 959 (“[W]hile looking for ‘a useful, concrete, and tangible result’ may in many instances provide useful indications of whether a claim is drawn to a fundamental principle or a practical application of such a principle, that inquiry is insufficient to determine whether a claim is patent-eligible under § 101.”) The court instructed that “[a]s a result, those portions of our opinions in *State Street* and *AT&T* relying solely on a ‘useful, concrete and tangible result’ analysis should no longer be relied on.” *Id.* at 960 n.19.

¹²⁷ *See id.* at 954.

¹²⁸ *Id.* at 952.

¹²⁹ *Id.*

¹³⁰ *Id.* at 953.

¹³¹ *Id.*

¹³² *Id.*

¹³³ *Id.* at 954.

The Supreme Court . . . has enunciated a definitive test to determine whether a process claim is tailored narrowly enough to encompass only a particular application of a fundamental principle rather than to pre-empt the principle itself. A claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing.¹³⁴

After quoting *Benson*, *Diehr*, *Flook*, and *Cochrane* in support of this claim, the majority reasoned that:

A claimed process involving a fundamental principle that uses a particular machine or apparatus would not pre-empt uses of the principle that do not also use the specified machine or apparatus in the manner claimed. And a claimed process that transforms a particular article to a specified different state or thing by applying a fundamental principle would not pre-empt the use of the principle to transform any other article, to transform the same article but in a manner not covered by the claim, or to do anything other than transform the specified article.¹³⁵

The majority dismissed arguments that the Supreme Court “did not intend the machine-or-transformation test to be the sole test governing § 101 analyses,” but nevertheless admitted “that future developments in technology and the sciences may present difficult challenges to the machine-or-transformation test, just as the widespread use of computers and the advent of the Internet has begun to challenge it in the past decade.”¹³⁶ Despite that, the majority “reaffirm[ed] [sic] that the machine-or-transformation test, properly applied, is the governing test for determining patent eligibility of a process under § 101.”¹³⁷

“The machine-or-transformation test is a two-branched inquiry; an applicant may show that a process claim satisfies § 101 either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article.”¹³⁸ Because the *Bilski* process was not limited to a particular machine or apparatus, the Federal Circuit declined to elaborate on “the precise contours of machine implementation,” leaving to future decisions answers to “particular questions, such as whether or when recitation of a computer suffices to tie a process claim to a particular machine.”¹³⁹ Instead, the court focused on the transformation prong. Satisfaction of section 101 under this prong of the test requires a transformation, “which must be central to the purpose of the claimed process,”¹⁴⁰ of an article into a different state or thing.¹⁴¹ “The main aspect of the

¹³⁴ *Bilski*, 545 F.3d at 954.

¹³⁵ *Id.*

¹³⁶ *Id.* at 955-56.

¹³⁷ *Id.* at 956.

¹³⁸ *Id.* at 961.

¹³⁹ *Id.*

¹⁴⁰ *Bilski*, 545 F.3d at 962. This language likely refers to the rejection, earlier in the decision, of “insignificant post-solution activity”: “even if a claim recites a specific machine or a particular transformation of a specific article, the recited machine or transformation must not constitute mere

transformation test that requires clarification,” wrote the majority, “is what sorts of things constitute ‘articles’ such that their transformation is sufficient to impart patent-eligibility under § 101.”¹⁴²

According to the majority, “[i]t is virtually self-evident that a process for a chemical or physical transformation of *physical objects or substances* is patent-eligible subject matter.”¹⁴³ “The raw materials of many information-age processes, however, are electronic signals and electronically-manipulated data . . . [a]nd some so-called business methods, such as that claimed in the present case, involve the manipulation of even more abstract constructs such as legal obligations, organizational relationships, and business risks.”¹⁴⁴ The question for the court was: “Which, if any, of these processes qualify as a transformation or reduction of an article into a different state or thing constituting patent-eligible subject matter?”¹⁴⁵

Stating that “[o]ur case law has taken a measured approach to this question,” the court turned to the now partly defunct *Abele* for illustration.¹⁴⁶ In *Abele*, the Court of Customs and Patent Appeals rejected an independent claim “reciting a process of graphically displaying variances of data from average values,” but found eligible a dependant claim which specified that “said data is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner.”¹⁴⁷ While the rejected claim “did not specify any particular type or nature of data . . . or from where the data was obtained or what the data represented,” the data in the eligible claim “clearly represented physical and tangible objects, namely the structure of bones, organs, and other body tissues.”¹⁴⁸ “Thus,” wrote the majority, “the transformation of that raw data into a particular visual depiction of a physical object on a display was sufficient to render that more narrowly-claimed process patent-eligible.”¹⁴⁹ The majority explained that:

[s]o long as the claimed process is limited to a practical application of a fundamental principle to transform specific data, and the claim is limited to a visual depiction that represents specific physical objects or

‘insignificant postsolution activity.’” *Id.* at 957. What, precisely, is meant by this phrase remains something of a mystery. To illustrate, the majority quoted *Flook*, in which the Supreme Court explained that “[a] competent draftsman could attach some form of post-solution activity to almost any mathematical formula; the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques.” *Parker v. Flook*, 437 U.S. 584, 590 (1978).

¹⁴¹ *In re Bilski*, 545 F.3d at 962.

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* (citing *In re Abele*, 684 F.2d 902, 908-09 (CCPA 1982)).

¹⁴⁸ *Id.* at 962-63.

¹⁴⁹ *Id.* at 963. The court noted “for clarity that the electronic transformation of the data itself into a visual depiction in *Abele* was sufficient; the claim was not required to involve any transformation of the underlying physical object that the data represented.” *Id.*

substances, there is no danger that the scope of the claim would wholly pre-empt all uses of the principle.”¹⁵⁰

The majority was certainly correct to say that the dependant claim was narrower than the independent claim but, from the example, why it is important that transformed data represent something physical remains less than self-evident. Nevertheless, this reasoning was central to the majority’s rejection of the *Bilski* process as non-eligible:

We hold that the Applicants’ process as claimed does not transform any article to a different state or thing. Purported transformations or manipulations simply of public or private legal obligations or relationships, business risks, or other such abstractions cannot meet the test because they are not physical objects or substances, and they are not representative of physical objects or substances. Applicants’ process at most incorporates only such ineligible transformations . . . the process as claimed encompasses the exchange of only options, which are simply legal rights to purchase some commodity at a given price in a given time period . . . [and] only refers to “transactions” involving the exchange of these legal rights at a “fixed rate corresponding to a risk position” Thus, claim 1 does not involve the transformation of any physical object or substance, or an electronic signal representative of any physical object or substance. Given its admitted failure to meet the machine implementation part of the test as well, the claim entirely fails the machine-or-transformation test and is not drawn to patent-eligible subject matter.¹⁵¹

B. Statutory and Precedential Critiques

The Federal Circuit’s determination that the only test applicable “when evaluating the patent-eligibility of process claims” is the “machine-or-transformation” test¹⁵² directly contravenes Supreme Court precedent and ignores both the language of the Patent Act and Congressional intent. Statutory construction “begin[s] with the language of the statute” and “[u]nless otherwise defined, ‘words [are] interpreted as taking their ordinary, contemporary, common meaning.’”¹⁵³ Section 101, “a dynamic provision designed to encompass new and unforeseen inventions,”¹⁵⁴ broadly defines the scope of patent eligible subject matter:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful

¹⁵⁰ *Bilski*, 545 F.3d at 963.

¹⁵¹ *Id.* at 963-64.

¹⁵² *Id.* at 964.

¹⁵³ *Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (quoting *Perrin v. United States*, 444 U.S. 37, 42 (1979)).

¹⁵⁴ *J.E.M. AG Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 135 (2001).

improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.¹⁵⁵

In *Chakrabarty*, the Supreme Court acknowledged that “Congress plainly contemplated that the patent laws would be given wide scope,”¹⁵⁶ and recognized that the language of the Patent Act reflects Congressional intent to permit patent eligibility for “anything under the sun that is made by man.”¹⁵⁷ “The subject-matter provisions of the patent law,” the Court wrote, “have been cast in broad terms to fulfill the constitutional and statutory goal of promoting ‘the Progress of Science and the useful Arts’ with all that means for the social and economic benefits envisioned by Jefferson.”¹⁵⁸ “[T]he inventions most benefiting mankind are those that ‘push back the frontiers of chemistry, physics, and the like,’”¹⁵⁹ and “Congress employed broad general language in drafting § 101 precisely because such inventions are often unforeseeable.”¹⁶⁰

The Supreme Court has repeatedly “cautioned that ‘courts should not read into the patent laws limitations and conditions which the legislature has not expressed.’”¹⁶¹ By “limiting access to the patent system to those processes that use specific machinery or that transform matter,”¹⁶² the Federal Circuit has done exactly that. Section 100(b) of the Patent Act, deemed “unhelpful” by the *Bilski* majority,¹⁶³ states that:

The term ‘process’ means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.¹⁶⁴

As Judge Newman noted forcefully in her dissent, far from being “unhelpful,” Section 100(b) “points up the errors in the court’s new statutory interpretation,” which is “contrary to two centuries of statutory definition.”¹⁶⁵

Section 100(b), Newman reminded, “incorporates the prior usage ‘art’ and the term ‘method,’ and places no restriction on the definition.”¹⁶⁶ As early as 1876, in *Cochrane v. Deener* (from which the language the *Bilski* majority claims supports an

¹⁵⁵ 35 U.S.C. § 101 (2006).

¹⁵⁶ *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980).

¹⁵⁷ *Id.* at 309.

¹⁵⁸ *Id.* at 316. The Patent Act “encourage[s] innovation and its fruits: new jobs and new industries, new consumer goods and trade benefits.” *Paulik v. Rizkalla*, 760 F.2d 1270, 1276 (Fed. Cir. 1985) (en banc).

¹⁵⁹ *Id.* at 316 (quoting *Great A.&P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 154 (1950) (Douglas, J., concurring)).

¹⁶⁰ *Chakrabarty*, 447 U.S. at 308.

¹⁶¹ *Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (quoting *Chakrabarty*, 447 U.S. at 308) (internal quotation marks removed); *see also* *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 199 (1933).

¹⁶² *In re Bilski*, 545 F.3d 943, 978 (2008) (Newman, J., dissenting).

¹⁶³ *Id.* at 951 n.3 (“this provision is unhelpful given that the definition itself uses the term ‘process.’”).

¹⁶⁴ 35 U.S.C. § 100(b) (2006).

¹⁶⁵ *Bilski*, 545 F.3d at 978 (Newman, J., dissenting).

¹⁶⁶ *Id.* Crucially for computer-related processes, as will be explained *infra*, § 100(b) also establishes that the “term ‘process’ . . . includes a new use of a known process, machine, manufacture, composition of matter, or material.” 35 U.S.C. § 100(b) (2006) (emphasis added).

exclusive machine-or-transformation test is derived¹⁶⁷), the Supreme Court wrote that “a process may be patentable, irrespective of the particular form of the instrumentalities used.”¹⁶⁸ As Judge Newman noted,¹⁶⁹ the Court of Customs and Patent Appeals (“CCPA”) observed in *In re Prater* that *Cochrane*’s description of a process as “a series of acts, performed upon subject-matter to be transformed and reduced to a different state or thing,”¹⁷⁰ has “sometimes been misconstrued as a ‘rule’ or ‘definition’ requiring that all processes, to be patentable, must operate physically on substances.”¹⁷¹ The CCPA continued:

Such a result misapprehends the nature of the passage quoted as dictum, in its context, and the question being discussed by the author of the opinion. To deduce such a rule from the statement would be contrary to its intendment which was not to limit process patentability but to point out that a process is not limited to the means used in performing it.¹⁷²

More recently, the Supreme Court has repeatedly and explicitly rejected limiting subject-matter eligibility to only those processes that meet what the Federal Circuit has called the machine-or-transformation test. The *Bilski* majority quoted, in support of its test, *Benson*’s passage that “[t]ransformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.”¹⁷³ But, in *Benson*, the Court also wrote that:

It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a “different state or thing.” We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. It is said that the decision precludes a patent for any program servicing a computer. We do not so hold It is said we freeze process patents to old technologies, leaving no room for the revelations of the new, onrushing technology. Such is not our purpose.¹⁷⁴

This is a clear rejection of a requirement that process patents be tied to particular machines or operate to change articles or materials to different states or things. The passage quoted by the *Bilski* majority, in context, can be reasonably understood as explaining the requirements of prior precedents, but was not meant to restrict the patentability of future processes.

This explicit rejection of an exclusive machine-or-transformation test was repeated in *Flook*, in which the Supreme Court stated:

¹⁶⁷ See *Bilski*, 545 F.3d at 955.

¹⁶⁸ *Cochrane v. Deener*, 94 U.S. 780, 787 (1876).

¹⁶⁹ *Bilski*, 545 F.3d at 984.

¹⁷⁰ *Cochrane*, 94 U.S. at 788.

¹⁷¹ *In re Prater*, 415 F.2d 1393, 1403 (C.C.P.A. 1969).

¹⁷² *Id.*

¹⁷³ *Bilski*, 545 F.3d at 954 (quoting *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972)).

¹⁷⁴ *Benson*, 409 U.S. at 71.

An argument can be made . . . that this Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a “different state or thing.” . . . As in *Benson*, we assume that a valid process patent may issue even if it does not meet one of these qualifications of our earlier precedents.¹⁷⁵

As Judge Newman noted, “[t]his statement directly contravenes [the Federal Circuit’s] new requirement that all processes must meet the court’s ‘machine-or-transformation test’ or be barred from access to the patent system.”¹⁷⁶

Again, in *Diamond v. Diehr*, the Supreme Court rejected an exclusive reliance on a machine-or-transformation test in determining the subject-matter eligibility of processes:

[W]hen a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (*e. g.*, transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.¹⁷⁷

The passage does indicate that the patent laws were designed to protect processes which transform or reduce articles to different states or things, but cannot be reasonably read to suggest that only those processes performing such a transformation or reduction are patentable. As indicated by the use of “*e.g.*,” the Supreme Court clearly intended to hold that any process performing a function which the patent laws are designed to protect is eligible under section 101, and that one way, but not an exclusive way, of confirming the eligibility of a process is to determine whether it transforms an article into a different state or thing.

Far from enunciating a definitive “machine-or-transformation” test, as claimed by the *Bilski* majority,¹⁷⁸ the Supreme Court’s decisions in *Benson*, *Flook*, and *Diehr* carefully avoided reading into the Patent Act new limitations that the legislature had not expressed, and explicitly and repeatedly rejected the very limitations that the majority imposed in *In re Bilski*. As the Supreme Court reaffirmed in *Diehr*, only those patents claiming natural laws, natural phenomena, and abstract ideas are ineligible under section 101.¹⁷⁹ The Federal Circuit’s imposition of the machine-or-transformation test as the sole test of subject-matter eligibility for processes, therefore, directly contravened Supreme Court precedent and ignored both the language of the Patent Act and Congressional intent.

¹⁷⁵ *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978).

¹⁷⁶ *Bilski*, 545 F.3d at 980 (Newman, J., dissenting).

¹⁷⁷ *Diamond v. Diehr*, 450 U.S. 175, 192 (1981).

¹⁷⁸ *Bilski*, 545 F.3d at 954.

¹⁷⁹ *Diehr*, 450 U.S. at 185 (“Our recent holdings in *Gottschalk v. Benson* . . . and *Parker v. Flook*, . . . both of which are computer-related, stand for no more than these long-established principles.”).

IV. THE MACHINE-OR-TRANSFORMATION TEST

A. Uncertainty and Innovation

As recognized by Judge Rader in his dissent, the *Bilski* majority opinion unnecessarily “propagates unanswerable questions,” generating irreducible uncertainty as to which process claims remain eligible after *In re Bilski*:

What form or amount of “transformation” suffices? When is a “representative” of a physical object sufficiently linked to that object to satisfy the transformation test? (e.g., Does only vital sign data taken directly from a patient qualify, or can population data derived in part from statistics and extrapolation be used?) What link to a machine is sufficient to invoke the “or machine” prong? Are the “specific” machines of Benson required, or can a general purpose computer qualify? What constitutes “extra-solution activity?” If a process may meet eligibility muster as a “machine,” why does the Act “require” a machine link for a “process” to show eligibility? Does the rule against redundancy itself suggest an inadequacy in this complex spider web of tests supposedly “required” by the language of section 101?¹⁸⁰

“With all of its legal sophistry,” Rader wrote, “the court’s new test for eligibility . . . does not answer the most fundamental question of all: *why* would the expansive language of section 101 preclude protection of innovation simply because it is not transformational or properly linked to a machine (whatever that means)?”¹⁸¹ More simply stated: “why should some categories of invention deserve no protection?”¹⁸²

As Judge Newman noted in her concurrence in *In re Ferguson*, “uncertainty as to legal rights is as much a disincentive to commerce as is their deprivation.”¹⁸³ The industries associated with information-based and computer-related processes, precisely those processes for which patentability is most called into question by an exclusive machine-or-transformation test, “include fields as diverse as banking and finance, insurance, data processing, industrial engineering,” medicine, and software.¹⁸⁴ In 2006, a Congressional Report stated that “[a]s recently as 1978, intangible assets, such as intellectual property, accounted for 20 percent of corporate assets with the vast majority of value (80 percent) attributed to tangible assets such as facilities and equipment. By 1997, the trend reversed; 73 percent of corporate assets were intangible and only 27 percent were tangible.”¹⁸⁵ As Newman wrote in her *Bilski* dissent after noting these figures:

¹⁸⁰ *Bilski*, 545 F.3d at 1015 (Rader, J., dissenting).

¹⁸¹ *Id.* at 1012 (Rader, J., dissenting).

¹⁸² *Id.* (Rader, J., dissenting).

¹⁸³ *In re Ferguson*, 558 F.3d 1359, 1367 (Fed. Cir. 2009) (Newman, J., concurring).

¹⁸⁴ *See Bilski*, 545 F.3d at 992 (Newman, J., dissenting).

¹⁸⁵ H.R. REP. NO. 109-673, at 4 (2006).

This powerful economic move toward “intangibles” is a challenge to the backward-looking change of this court’s ruling Until the shift represented by [*Bilski*], statute and precedent have provided stability in the rapidly moving and commercially vibrant fields of the Information Age. Despite the economic importance of these interests, the consequences of our decision have not been considered. I don’t know how much human creativity and commercial activity will be devalued by today’s change in law; but neither do my colleagues.¹⁸⁶

Although the extent to which patent protection will be denied to computer-related processes as a result of *Bilski* is presently unknown, that formerly eligible computer-related processes will be denied patent protection is, as commentators have recognized,¹⁸⁷ inevitable. The appropriateness of the machine-or-transformation test as the sole measure of subject-matter eligibility in light of the importance of computer-related inventions to the economy is therefore highly questionable. Indeed, the *Bilski* majority itself expressly acknowledged not only that “future developments in technology and the sciences may present difficult challenges to the machine-or-transformation test,” but also that “the widespread use of computers and the advent of the Internet has begun to challenge it in the past decade.”¹⁸⁸

“The problem is that the ‘physical transformation’ distinction is inherently artificial when applied to technologies like computer software.”¹⁸⁹ Technically speaking, every data transformation is physical: “a computer program by its nature involves the manipulation of electrical impulses to convey information . . . [and] the operation of a computer program itself changes the arrangement of electrical gates within a computer memory.”¹⁹⁰ Indeed, as the Federal Circuit recognized in *Alappat*, loading software onto a general purpose computer necessarily creates a “new machine.”¹⁹¹ The Federal Circuit further recognized in *Arrythmia* that a computer program converting, applying, determining, and comparing data is a program implementing physical steps transforming “one physical, electrical signal into another” and that the “view that ‘there is nothing necessarily physical about signals’” is incorrect.¹⁹²

¹⁸⁶ *Bilski*, 545 F.3d at 992–993.

¹⁸⁷ See, e.g., Brief of Koninklijke Philips Elecs. N.V. as Amicus Curiae Supporting Petitioners at 17, *Bilski v. Doll*, 129 S. Ct. 2735, cert. granted, 77 U.S.L.W. 3656 (June 1, 2009) (No. 08-964), 2009 WL 559338.

¹⁸⁸ *Bilski*, 545 F.3d at 956.

¹⁸⁹ Brief of 22 Law and Business Professors as Amicus Curiae Supporting Appellants at 8, *Bilski v. Doll*, 129 S. Ct. 2735, cert granted, 77 U.S.L.W. 3656 (June 1, 2009) (No. 2007-1130), 2008 WL 1842281.

¹⁹⁰ *Id.*

¹⁹¹ *In re Alappat*, 33 F.3d 1526, 1545 (1994); see also *In re Iwahashi*, 888 F.2d 1370 (Fed. Cir. 1989). Whether the new machine created in this way qualifies as particular machine under the machine-or-transformation test remains an open question.

¹⁹² *Arrhythmia Research Tech. v. Corazonix Corp.*, 958 F.2d 1053, 1059 (1992) (quoting *In re Taner*, 681 F.2d 787, 790 (C.C.P.A. 1982)); see also *In re Nuijten*, 500 F.3d 1346, 1353 (Fed. Cir. 2007) (acknowledging the physicality of an electrical signal, but holding that the “transitory” signal itself was not statutory subject matter).

Despite that, the *Bilski* majority contrasted “the raw materials of many information-age processes, . . . electronic signals and electronically-manipulated data,” with “physical objects or substances,”¹⁹³ declaring patent eligibility for processes transforming the latter to be “virtually self-evident” while restricting eligibility to processes transforming the former to those instances in which the data transformed is representative of physical objects or substances.¹⁹⁴ As one commentator put it, “the tangibility test has gone ‘meta’: it is no longer the tangibility of jostling electrons that is of concern . . . , but the tangibility of the stuff represented by those electrons-as-symbols.”¹⁹⁵ How the tangibility of the “stuff represented by electrons-as-symbols” is pertinent to whether a claimed process preempts a fundamental principle remains open to conjecture.

Indeed, as commentators have recognized,¹⁹⁶ the *Bilski* majority failed to establish a logical connection between the exclusion from patent protection of processes failing the machine-or-transformation test and the prevention of preemption of fundamental principles. The exercise in metaphysics invited by the machine-or-transformation test seems to be, if anything, simply a distraction from the more basic and appropriate question posed by the now defunct useful, concrete, and tangible test: whether the process is directed toward a useful application of a fundamental principle, or toward the fundamental principle itself. Rather than filling an existing need in the law, the machine-or-transformation test “raises more questions than it can resolve”¹⁹⁷ and will potentially chill innovation.

B. Return to the “Doctrine of the Magic Words”?

Beyond discouragement of investment in research and development stemming from uncertainty in legal rights, the machine-or-transformation test may reduce the quality of patent disclosures by reinforcing the tendency of skilled patent prosecutors to draft computer-related patent applications in a way that emphasizes the physical nature of potential embodiments rather than the innovative features of the invention itself. “Traditionally, the case law and USPTO practice regarding software patenting have been vague, largely form over function, constantly in flux and inconsistent.”¹⁹⁸ The traditional uncertainty involved in patenting software led to what Professors Julie Cohen and Mark Lemley have called “the doctrine of the magic words.”¹⁹⁹ “Under this approach, software

¹⁹³ *Bilski*, 545 F.3d at 962–63.

¹⁹⁴ *Id.* at 962.

¹⁹⁵ Kevin Emerson Collins, *An Initial Comment on In re Bilski: Tangibility Gone Meta* (Nov. 1, 2008), available at <http://www.patentlyo.com/patent/law/collinsmetabilski.pdf>.

¹⁹⁶ See, e.g., Brief of American Intellectual Property Law Association as Amicus Curiae Supporting the Petition for a Writ of Certiorari at 16–17, *Bilski v. Doll*, 129 S. Ct. 2735 (June 1, 2009) (No. 08-964), 2009 WL 564647.

¹⁹⁷ *Id.* at 18.

¹⁹⁸ Keith E. Witek, *Developing a Comprehensive Software Claim Drafting Strategy for U.S. Software Patents*, 11 BERKELEY TECH. L.J. 363, 367 (1996).

¹⁹⁹ Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1, 9 (2001).

was patentable subject matter, but only if the applicant recited the magic words and pretended that she was patenting something else entirely.”²⁰⁰ This in turn resulted in “tortured claim drafting and an attendant increase in the transaction costs associated with patenting.”²⁰¹

Rather than disclosing and claiming software inventions in a straightforward way, skilled patent prosecutors have learned to maximize the chances of the patent issuing and surviving litigation by integrating into a single patent application “a broad mix of technical figures, explanatory text, and claim styles” emphasizing the hardware on which the software operates, even though the hardware often has little or no connection to the invention’s innovative content.²⁰² In other words, the patentee’s strategic position has traditionally been improved by emphasizing the “brawns” (hardware) rather than the “brains” (software) of computer-related processes.²⁰³

Prior to the elimination of physical transformation requirements in *Alappat* and *State Street*, identifying “signals in terms [giving] them a physical ‘flavor’” was a virtual requirement for the successful software patentee.²⁰⁴ “The software process claims typically found in issued software patents” were drafted with substantial structural limitations (reciting, for example, elements of a computer system), with physical post-processing activities, or in such a way as to emphasize external physical use or effect outside of the computer itself.²⁰⁵ “[I]f the information produced by [a] computer program is used to, for example, turn [a device] on or off,” an application might emphasize that external change, even if the invention is the program itself rather than the flipping of a switch.²⁰⁶

Although this style of strategic drafting has never entirely disappeared, *Bilski* will reinforce the need to draft claims and specifications in a way that potentially limits the quality of disclosure due to the need to emphasize the specific machines with which computer-related processes are connected and, if possible, the physical transformations engendered. By forcing patent prosecutors to engage in rhetorical sleight-of-hand, emphasizing the machine involved in a process or the physicality of a transformation rather than the innovative features of the process itself, the machine-or-transformation

²⁰⁰ *Id.*

²⁰¹ Brief of 22 Law and Business Professors as Amicus Curiae Supporting Appellants at 10, In re *Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (No. 2007-1130), 2008 WL 1842281.

²⁰² See *Witek*, *supra* note 199, at 368. Claim styles employed include: conventional structure and process, means-plus-function, article of manufacture, method of manufacture, and data structure. *Id.* at 363.

²⁰³ See generally Orin Kerr, *Computers and the Patent System: The Problem of the Second Step*, 28 RUTGERS COMPUTER & TECH. L.J. 47, 48 (2002).

²⁰⁴ R. Lewis Gable & J. Bradford Leahey, *The Strength of Patent Protection for Computer Products: The Federal Circuit and the Patent Office Refine the Test for Determining Which Computer-Related Inventions Constitute Patentable Subject Matter*, 17 RUTGERS COMPUTER & TECH. L.J. 87, 132 (1990).

²⁰⁵ *Witek*, *supra* note 199, at 386.

²⁰⁶ See Brief of 22 Law and Business Professors as Amicus Curiae in Support of Appellants at 8, *Bilski v. Doll*, 129 S. Ct. 2735, *cert. granted*, 77 U.S.L.W. 3656 (June 1, 2009) (No. 2007-1130), 2008 WL 1842281. Examples of strategic claims drafting for software inventions are provided on page 11 of the brief.

test may lead to a return to the “doctrine of the magic words.”²⁰⁷ This return might itself impede innovation by limiting the quality of information made available to the public through issued process patents.

V. CONCLUSION

The *Bilski* majority’s determination that the only test applicable “when evaluating the patent-eligibility of process claims”²⁰⁸ is the machine-or-transformation test directly contravenes Supreme Court precedent and ignores both the language of the Patent Act and Congressional intent. Far from enunciating a definitive “machine-or-transformation” test, as is claimed by the *Bilski* majority, the Supreme Court’s decisions in *Benson*, *Flook*, and *Diehr* carefully avoided reading into the Patent Act new limitations that the legislature had not expressed, and explicitly and repeatedly rejected the very limitations that the majority imposed in *In re Bilski*.

The Federal Circuit’s departure from precedent and explicit rejection of its prior tests has needlessly jeopardized innovation by creating uncertainty and has reinforced the need for patent prosecutors to engage in a style of drafting that limits the quality of disclosure. The *Bilski* majority itself expressly acknowledged that “the widespread use of computers and the advent of the Internet has begun to challenge the test.”²⁰⁹ Given the inappropriateness of the machine-or-transformation test in the context of information technology, the Federal Circuit’s departure is surprising. If anything, the exercise in metaphysics invited by the machine-or-transformation test is a distraction from the more basic and appropriate distinction made by the now defunct useful, concrete, and tangible test: whether the process is directed toward a useful application of a fundamental principle, or toward the principle itself. By unnecessarily eliminating its prior tests and adopting a standard more appropriate to the nineteenth century than the twenty-first, the Federal Circuit has taken a step backwards, a step that will impede rather than encourage innovation.

²⁰⁷ In instances in which the software being patented does not involve transformation of physical objects or substances or data representative of physical objects or substances, the machine-or-transformation test may force the prosecutor to avoid claiming the invention as a process.

²⁰⁸ *In re Bilski*, 545 F.3d 943, 964 (2008).

²⁰⁹ *Id.* at 956.