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The Post Industrial Patent System

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The Post-Industrial Patent System

John R. Thomas*

INTRODUCTION

Post-industrial society has at last come to the regime of patents. No longer content merely with the proprietization of traditional technologies, the patent bar has constructed a bold new vision of the patent system. For as we read with amusement patent instruments claiming methods for swinging a golf club, treating cancer or administering a mortgage, we come to realize that the patent law seems poised to embrace the broadest reaches of human experience.

The recent opinions in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*[1] and *AT&T Corp. v. Excel Communications, Inc.*[2] suggest that the Court of Appeals for the Federal Circuit will pass an approving glance upon much of this Patent Office work product, if called upon to do so.[3] In *State Street*, the plaintiff held a patent for a data processing system consisting of software

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1. 149 F.3d 1368 (Fed. Cir. 1998).

2. 172 F.3d 1352 (Fed. Cir. 1999).

3. The United States Court of Appeals for the Federal Circuit, created by the Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, § 101, 96 Stat. 25 (codified in scattered sections of 28 U.S.C.), possesses exclusive jurisdiction over appeals in patent acquisition and infringement cases. The Patent Office is more properly known as the United States Patent and Trademark Office. *See* 35 U.S.C. § 1 (1994).

for managing a stock mutual fund. The Federal Circuit not only held that data transformation through a series of mathematical calculations presented patentable technique, it took the opportunity to obliterate the venerable proscription on patenting so-called "methods of doing business."[4]

The *Excel* opinion came next, holding that a technique for arranging information "comfortably" fell within the scope of patentable subject matter.[5] In the process the court obliterated the venerable requirement that an invention work a "physical transformation" in order to be patentable.[6] In its place the Federal Circuit required only that a claimed process achieve a useful result, an exceptionally lenient standard that appears to place few limitations on the possibilities for private appropriation. Keenly aware of these holdings, applicants have besieged the Patent Office with applications ranging from financial software to Internet-based business models.[7]

State Street and *Excel* present the latest in a series of cases testing the boundaries of the "useful arts," the constitutional expression of subject matter appropriate for patenting.[8] Embodying the current understanding of this term to mean the "technological arts,"[9] the patent statute further refined patentable subject matter to

4. 149 F.3d 1368 (Fed. Cir. 1998).

5. *Excel*, 172 F.3d at 1361.

6. *Id*.

7. *See* Jonathan Bick, *Adapting Process Patents to Cyberspace*, N.Y.L.J., Nov. 19, 1998, at 1; Mark Walsh, *Internet Companies Seek Protection: Apply For Patents to Guard Technology, But Litigation May Slow Commerce*, CRAIN'S N.Y. BUS., Dec. 21, 1998 at 3; Carol B. Oberdorfer, *Patents: 'Boom' in Business Method Patent Filings Has Followed 'State Street' Ruling, PTO Says*, BNA PAT., TRADEMARK & COPYRIGHT L. DAILY, Dec. 10, 1998, at D2 (PTO Deputy Commissioner Dickinson expects approximately 300 business method patents to issue in 1999) [hereinafter *'Boom' in Business Method Filings*].

8. U.S. CONST., Art. I, § 8, cl. 8. This provision provides both for copyright legislation, to promote the development of "science" by "authors," and for patent legislation, to promote the development of the "useful arts" by "inventors." *See In re* Bergy, 596 F.2d 952, 958 (CCPA 1979), *aff'd sub nom.*, Diamond v. Chakrabarty, 447 U.S. 303 (1980) ("[T]he constitutionally-stated purpose of granting patent rights to inventors for their discoveries is the promotion of progress in the 'useful Arts,' rather than in science.").

9. *See* Paulik v. Rizkalla, 760 F.2d 1270, 1276 (Fed. Cir. 1985) ("The exclusive right, constitutionally derived, was for the national purpose of advancing the useful arts—the process today called technological innovation."); *In re* Musgrave, 431 F.2d 882, 883

include processes, machines, manufactures, and compositions of matter.[10] The first of these terms appears the most troubling, particularly in light of its circular statutory definition as a "process, art or method."[11] For without more the scope of the statutory term "process" appears co-extensive with nearly any possible endeavor, as almost any imaginable function can be articulated in a series of steps in the fashion of a patent instrument.[12]

Determining the appropriate subject matter for patenting is important because a paucity of constraining doctrines allay the proprietary rights associated with granted patents.[13] The adjudicated infringer need not have derived the patented invention from the patentee, as liability rests solely upon a comparison of the text of the patent instrument with an accused infringement.[14] The patent law as well lacks a robust experimental use exemption in the nature of copyright law's fair use privilege.[15] The doctrine of patent misuse too has been reduced to a withered remnant of its once hale self.[16] The decision to subject particular areas of endeavor to the patent system is therefore of great moment, in effect subjecting entire industries to a private regulatory environment with constantly shifting contours. Given the contemporary movement towards an increasingly ambitious sense of patentable subject matter, further

(CCPA 1970); *In re* Waldbaum, 457 F.2d 997, 1003-04 (CCPA 1972) (Rich, J., concurring) ("The phrase 'technological arts,' as we have used it, is synonymous with the phrase 'useful arts' as it appears in Article I, Section 8 of the Constitution.").

10. 35 U.S.C. § 101 (1994).

11. 35 U.S.C. § 100(b) (1994).

12. *See* Pamela Samuelson, Benson *Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1033-34 (1990) (urging that the extent of patentable subject matter should not be understood to overlap with the ordinary, and exceptionally broad, meaning of the term "process").

13. *See* 35 U.S.C. § 271(a) (1994) (the patentee has the exclusive right to make, use, sell, offer to sell, or import into the United States the patented invention).

14. *See* MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW 860-61 (1998).

15. *See* Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1023 (1989); Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177, 222 (1987).

16. *See* Note, *Is the Patent Misuse Doctrine Obsolete?*, 110 HARV. L. REV. 1922 (1997); Mark A. Lemley, *The Economic Irrationality of the Patent Misuse Doctrine*, 78 CALIF. L. REV. 1599 (1990).

reflection upon the appropriate grasp of the patent system appears worthwhile.

This Article takes as its focus patentable processes as discussed in *State Street* and *Excel*. Part I of this Article briefly reviews the history of process patents, from early case law under the Statute of Monopolies to the more recent tumult concerning computer-implemented mathematical algorithms. It then traces the rise of patents on computerized business models and their confirmation in *State Street*. Casting a critical eye towards that opinion, Part I concludes that the patent eligibility inquiry has been reduced to one of mere utility. This trend is a disturbing one, for unlike breakthroughs in computer or biotechnologies, business methods are vastly older than the patent system itself. Yet only recently have we come to understand that such techniques lie within the ambit of the patent system.

In Part II, this Article explores the broad ramifications of the *State Street* and *Excel* opinions. With the Patent Office open for business method applications, few constraints appear to bar the grant of patents on other sorts of processes capable of achieving a pragmatic result. Disconnected from particular physical apparatus, such patents will set forth not so much technical artifacts, but a broad category of proprietary modes of analysis, techniques and protocols from disciplines ranging from the social sciences to the law. Yet surely the constitutional directive that patents apply to the "Useful Arts," as well as our long-held sense of the reach of the patent system, must somehow cabin the extent of patentable subject matter. We have come to this place, this Article reasons, because of our near-total engagement with the artificial. Discerning the ontic dimension of technology has perplexed not only the courts, but epistemologists and the most accomplished of technological observers as well.

Resolving to develop an articulation of those aspects of human endeavor we may fairly call technological, Part II invokes contemporary thought about technology. Turning to the technological commentary of Robert McGinn, Paul W. DeVore and Carl Mitcham, this Article develops a typology of traits that distinguish technology from other forms of human activity. This Article concludes that technological activities are concerned with the produc-

tion or transformation of artifacts through the systematic manipulation of physical forces. Bounded by interaction with the external environment, technological activities expend resources and knowledge in order to fabricate or modify products, or to develop procedural systems for so doing. Last, technology presents a form of rational and systematic knowledge, oriented towards efficiency and capable of being assessed through objective criteria.

This Article continues in Part III by considering how we can move from a catalogue of characteristics to an essentialist, legally apt definition of the technological. Recent experience concerning methods of medical treatment suggests one technique: amendment of the Patent Act to create particularized patent-free spheres of activity. This Article concludes that due to the obligations of the TRIPS Agreement, the intellectual property component of the World Trade Organization treaty, such efforts are unlikely to succeed. Given the TRIPS Agreement mandate that patent rights be enjoyable without discrimination as to the field of technology, even the recent amendment concerning medical methods appears suspect.[17]

This Article finds a more favorable solution in the standard of industrial application. Long a part of many foreign laws and fully compatible with the TRIPS Agreement, the standards developed under the industrial application requirement bear a striking resemblance to contemporary thought about the scope of technological activities. By restricting patentable advances to the repeatable production or transformation of material objects, and excluding subject matter founded upon the aesthetic, social observation or personal skill, the industrial application requirement would restore a sense of patentable subject matter that matches our sensibilities.

17. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, *reprinted in* THE RESULTS OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS 365 (GATT Secretariat 1994) [hereinafter TRIPS Agreement].

I. THE PATENT ELIGIBILITY OF BUSINESS METHODS

A. *The Foundational Law of Business Methods*

From its very beginnings the patent system has struggled with the patentability of methods. The forebear of contemporary patent legislation, the English Statute of Monopolies of 1623,[18] extended the possibility of patenting only to "manufactures."[19] Although the usual sense of that term suggests human-made artifacts, the rationalization of production techniques brought about by the Industrial Revolution led courts to entertain a widening conception of patentable subject matter. By the mid-Nineteenth century the English patent system had extended fully to both products and processes.[20] Yet discomfort with the potential scope of process protection remains today. Commonwealth courts that continued to interpret the term "manufactures" sought to limit the patent system to so-called "manual arts,"[21] an "artificially created state of affairs,"[22] or the production or preservation of vendible products.[23]

Seemingly aware of the English experience, the United States Congress expressly declared a "useful art" to be within the scope of the 1790 Patent Act.[24] Section 101 of the current legislation, the Patent Act of 1952, extends patentability to "any new and useful process, machine, manufacture, or composition of matter."[25] The statute circularly defines the term "process" to mean any "process, art or method," including "a new use of a known process, machine, manufacture, composition of matter, or material."[26] Supreme

18. 21 Jam. 1, c. 3 (1623). *See generally* Chris R. Kyle, *But a New Button to an Old Coat: The Enactment of the Statute of Monopolies*, 19 J. LEGAL HIST. 203 (1998).

19. The Statute prohibited the Crown from granting monopolies except "to the true and first inventor or inventors" of "any manner of new manufactures, within this realme . . . ." 21 Jam. 1, c. 3, § 6.

20. *See* Crane v. Price, 134 Eng. Rep. 239 (1842).

21. *See* Maeder v. Bush, 59 C.L.R. 684 (1938).

22. *See* National Research Dev. Corp.'s Application, [1961] RPC 134 (Austl. 1964).

23. *See* Boulton v. Bull, 126 Eng. Rep. 651, 661 (1795).

24. U.S. CONST., Art. I, § 8, cl. 8 authorizes Congress "To promote the Progress of Science and the useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

25. 35 U.S.C. § 101 (1994).

26. 35 U.S.C. § 100(b) (1994).

Court elaborations of this definition have included "a method of doing a thing,"[27] "a mode of treatment of certain materials to produce a given result,"[28] and "some practicable method or means of producing a beneficial result or effect."[29]

While the United States courts possessed a firmer statutory grounding for processes than their common law peers, they too experienced difficulties in adjudicating disputes involving process patents.[30] Patented processes are often practiced in secret, with only the product of the process available to the public. The inchoate nature of processes makes it difficult to evaluate their impact upon the public domain,[31] assess whether they have been infringed or not,[32] and determine how they can be physically marked.[33]

But particularly troubling within the sphere of processes is the demarcation of the limits of patentable subject matter. Seemingly any sort of communicable technique can be articulated as a series of steps and expressed in the style of a patent claim.[34] This sense is reinforced by the legislative history of the current patent statute, which the Supreme Court read as holding "that Congress intended statutory subject matter to 'include anything under the sun that is made by man.'"[35]

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27. Expanded Metal Co. v. Bradford, 214 U.S. 366, 383 (1909).

28. Cochrane v. Deener, 94 U.S. 780, 788 (1877).

29. Corning v. Burden, 56 U.S. 252, 268, 15 How. 252, 268 (1853).

30. *See* Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 963 (1986) (noting the problems encountered in interpreting the meaning of "process"). Earlier treatments can be found at Herman Berman, *Method Claims*, 17 J. PAT. OFF. SOC'Y 713, 789 (1935); William B. Whitney, *Patentable Processes*, 19 HARV. L. REV. 30 (1905).

31. *See, e.g.*, Metallizing Eng'g Co. v. Kenyon Bearing & Auto Parts Co., 153 F.2d 516 (2d Cir.), *cert. denied*, 328 U.S. 840 (1946).

32. The Process Patents Amendment Act of 1988 is incorporated into the Omnibus Trade and Competitiveness Act of 1988 , Pub. L. No. 100-418, §§9001-07,102 Sts. 1107, 1563-67 (1988) (codified at 35 U.S.C. §§154,271,287, and 295 (1998)). *See generally* Eli Lilly & Co. v. American Cyanamid Co., 82 F.3d 1568 (Fed. Cir. 1996); W. Bradley Haymond, *The Process Patent Amendments Act of 1988: Solving An Old Problem, But Creating New Ones*, 1989 BYU L. REV. 567; Glenn E.J. Murphy, Note, *The Process Patent Amendments Act of 1988*, 9 J. L. & COM. 267 (1989).

33. *See, e.g.*, American Med. Sys., Inc. v. Medical Eng'g Corp., 6 F.3d 1523 (Fed. Cir. 1993), *cert. denied*, 511 U.S. 1070 (1994).

34. *See* Samuelson, *supra* note 12, at 1033.

35. Diamond v. Diehr, 450 U.S. 175, 182 (1981) (quoting S. Rep. No. 1979, 82d Cong., 2d Sess. 5 (1952); H.R. Rep. No. 1923, 82d Cong., 2d Sess. 6 (1952)). *But see*

Perhaps realizing the expansive grasp of proprietization made possible by the patent system, the courts developed sundry doctrines to cabin its reach. Variously expressed as bars to patents on business methods,[36] as well as such things as "mental steps," "algorithms," and "printed matter," these doctrines purported to hold certain subject matter unpatentable *per se*.[37] Chief among these limitations was the longstanding sentiment that "[a]n idea of itself is not patentable."[38] "While a scientific truth, or the mathematical expression of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be."[39] Although the policy underpinnings of this restriction were never articulated well, the Supreme Court once suggested that such abstractions comprised "the basic tools of scientific and technological work,"[40] too central to the process of technological development to be appropriable. Just as the copyright law limits itself to protection of expression and permits an author's ideas to enrich the public domain,[41] so too did the patent law concern the physical instantiation of technological knowledge rather than that knowledge itself.

The bar on patents directed towards business methods represented an extension of the prescription on patenting abstract principles. As early as 1868, the Patent Commissioner sensed that "[i]t

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DONALD S. CHISUM, CHISUM ON PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY, AND INFRINGEMENT § 1.01 at 5 (Cumulative Supp. June 1999) ("Theoretical or abstract discoveries are excluded as are discoveries, however practical and useful, in non-technological arts, such as the liberal arts, the social sciences, theoretical mathematics, and business and management methodology."); Giles S. Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 393-94 (1960) ("Of course, not every kind of an invention can be patented. Invaluable though it may be to individuals, the public, and national defense, the invention of a more effective organization of the materials in, and the techniques of teaching a course in physics, chemistry or Russian is not a patentable invention . . . . Also outside that group is one of the greatest inventions of our times, the diaper service.")

36. *See generally* E. Robert Yoches & Howard G. Pollock, *Is the "Method of Doing Business" Rejection Bankrupt?*, 3 FED. CIR. B.J. 73 (Spring 1993); Geo. E. Tew, *Method of Doing Business*, 16 J. PAT. OFF. SOC'Y 607 (1934).

37. *See* Chisum, *supra* note 30 at 964-71.

38. Rubber-Tip Pencil Co. v. Howard, 87 U.S. (20 Wall.) 498, 507 (1874).

39. Mackay Radio & Tel. Co. v. Radio Corp. of Am., 306 U.S. 86, 94 (1939).

40. Gottchalk v. Benson, 409 U.S. 63, 67 (1972).

41. 17 U.S.C. § 102(b) (1994).

is contrary to the spirit of the law . . . to grant patents for methods of book-keeping."[42] Nineteenth century courts also opined that "a method of transacting common business"[43] or "a mere contract"[44] were unpatentable. Yet it was not until the Second Circuit's 1908 opinion in *Hotel Security Checking Co. v. Lorraine Co.*[45] that the proscription on business method patents was secured in the treatises.[46]

The patent at issue in *Hotel Security Checking* concerned a "method of and means for cash-registering and account-checking" designed to prevent fraud by waiters and cashiers.[47] The system employed certain forms that tracked sales and ensured that waiters submitted appropriate funds at the close of business. The Second Circuit invalidated the patent on the basis of prior knowledge, finding that the patented technology "would occur to anyone conversant with the business."[48] However, the court further observed that:

> It is manifest that the subject-matter of the claims is not a machine, manufacture or composition of matter. If within the language of the statute at all, it must be as a "new and useful art." One of the definitions given by Webster of the word "art" is as follows: "The employment of means to accomplish some desired end; the adaptation of things in the natural world to the uses of life; the application of knowledge or power to practical purposes." In the sense of the patent law, an art is not a mere abstraction. A system of transacting business disconnected from the means of carrying out the system is not, within the most liberal interpreta-

42. *Ex parte* Abraham, 1868 Dec. Comm'r Pat. 59.

43. United States Credit Sys. Co. v. American Credit Indemnity Co., 53 F. 818, 819 (C.C.S.D.N.Y. 1893).

44. *In re* Moeser, 27 App. D.C. 307, 310 (1906).

45. 160 F. 467 (2d Cir. 1908).

46. *See* State Street Bank & Trust Co. v. Signature Fin. Group Inc., 149 F.3d 1368, 1376 (Fed. Cir. 1998) (noting that *Hotel Security Checking* is "the case frequently cited as establishing the business method exception to statutory subject matter"); Rinaldo Del Gallo, III, *Are "Methods of Doing Business" Finally Out of Business as a Statutory Rejection?*, 38 IDEA 403, 405 (1998).

47. 160 F. at 467.

48. *Id.* at 471.

tion of the term, an art.[49]

To similar effect had been the earlier statement of the Commissioner in *Ex parte Turner*, which held that "a plan or theory of action which, if carried into practice, could produce no physical results proceeding direct[ly] from the operation of the theory or plan itself is not an art within the meaning of the patent laws."[50] Thus both court and Patent Office hinged the patentability of processes upon the presence of a "physical tangible facility" for practicing the patented technique.[51] Importantly, both tribunals also held that mere "printed matter"—information inscribed upon a substrate for purposes of presentation—would not suffice to fulfill the requirement. Only a physical structure exhibiting a functional relationship between the substrate and written material would enter the realm of the patentable.[52]

Numerous decisions applied this standard while denying patents on business-oriented inventions. Citing a lack of physical structure other than printed matter, the courts struck down patents claiming a method for transferring writings from manuscript form to printed publication form;[53] a system of blank checks and stubs useful in a combined checking/savings account;[54] and a system for national coordination of firefighting efforts.[55] Some patents were upheld: a railway ticket consisting of a base and separable attachment was held not to "relat[e] merely to 'a method of transacting business,'" but to involve a unique physical structure.[56]

The requirement of physical instantiation is not an illogical one. It ties the relatively abstract proprietary interests created by the patent law to the corporeal things that form the traditional objects of property. The identifiable boundaries that result better en-

49. *Id.* at 469.

50. 1894 Dec. Comm'r Pat. 36, 37-38.

51. Rand, McNally & Co. v. Exchange Scrip-Book Co., 187 F. 984, 986 (7th Cir. 1911).

52. *See In re* Bernhart, 417 F.2d 1395 (CCPA 1969); *In re* Jones, 373 F.2d 1007 (CCPA 1967); Morton C. Jacobs, Editorial Note, *The Patentability of Printed Matter: Critique and Proposal*, 18 GEO. WASH. L. REV. 475 (1950).

53. *In re* Bolongaro, 62 F.2d 1059 (CCPA 1933).

54. *In re* Sterling, 70 F.2d 910 (CCPA 1934).

55. *In re* Patton, 127 F.2d 324 (CCPA 1942).

56. Cincinnati Traction Co. v. Pope, 210 F. 443, 446 (6th Cir. 1913).

able individuals to complete transactions, form markets and determine the sorts of conduct that will be judged permissible. The stricture that processes generate embodied results also places appropriate limits upon infringement liability, for the courts may far more readily observe the market impact of manipulated objects than trace the effect of more rarefied teachings. In all these matters the patent law reflected the precepts of the copyright law, which offers protection only to works fixed in a tangible medium of expression.[57]

B. *Computer-Implemented Methods*

The demand for physical structure proved a serviceable patent eligibility standard for most of the history of the patent system. But the rise of computer technology would sorely test whether the presence of physical structure was a useful discriminant between those processes which could be patented and that which could not. Applicants in the computer arts urged that electronic circuits and the software to command them were as industrial in character as more traditional technologies. But examiners initially cast an extremely wary eye at their applications. They recognized that much of the precedent exempting abstract ideas from the patent system would be swept away by allowing patents on computers programmed to perform newly invented mathematical algorithms.[58]

57. 17 U.S.C. §§ 101, 102(a) (1994); *See* Wendy J. Gordon, *An Inquiry into the Merits of Copyright: The Challenges of Consistency, Consent, and Encouragement Theory*, 41 STAN. L. REV. 1343, 1380-82 (1989).

58. The bookshelves groan under the weight of numerous articles discussing the early interaction between computer technologies and the patent system, as well as the subsequent debate over the patenting of computer-related inventions. More recent publications on this topic include: Brian Richard Yoshida, *Claiming Electronic and Software Technologies: the Effect of the Federal Circuit Decisions in* Alappat, Warmerdam, *and* Lowry *on the Claiming of Mathematical Algorithms and Data Structures*, 45 BUFF. L. REV. 457 (1997); Stephen G. Kunin, *Patentability of Computer Related Inventions in the United States Patent and Trademark Office*, 77 J. PAT. & TRADEMARK OFF. SOC'Y 833 (1995); Maximilian R. Peterson, Note, *Now You See It, Now You Don't: Was It a Patentable Machine or an Unpatentable "Algorithm"? On Principle and Expediency in Current Patent Law Doctrines Relating to Computer-Implemented Inventions*, 64 GEO. WASH. L. REV. 90 (1995); Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM. L. REV. 2308 (1994).

The Supreme Court entered this debate when it granted certiorari in *Gottschalk v. Benson* in 1972.[59] There the applicant claimed a method of converting numerals from binary-coded decimal to pure binary format. The steps of the method comprised mathematical operations that shuffled a sequence of bits in order to express appropriately a particular number. The application contained claims both reciting the method as performed by a computer, and the abstract performance of the method without regard to any particular physical means. The method had broad application in data processing tasks, ranging from "the operation of a train to verification of drivers' licenses to researching [the] law books" in the words of the Court.[60]

In a cryptic opinion, the Court upheld the Patent Office's rejection of the application. The Court first recited the traditional requirement that patentability hinged upon the "[t]ransformation and reduction of an article 'to a different state or thing.'"[61] Arguably, at least those claims reciting computer implementation of the numerical conversion method did involve some sort of physical conversion. 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. Yet the Court found this hardware insufficient, drawing its analysis to a close with a self-styled "nutshell":

> It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.[62]

Thus the Court held that computerization of mathematical

59. 409 U.S. 63 (1972).
60. *Id.* at 68.
61. *Id.* at 70.
62. *Id.* at 71-72.

equations could not shift them from the realm of ideas to that of industry. Internal circuitry operations were not enough to uphold even those claims reciting computer hardware, for barring the presence of an idiot savant or enormous mechanical computer to perform the claimed conversions rapidly, a digital computer presented the only context in which the equations had meaning. The digital computer amounted only to "nominal apparatus" that placed no meaningful limitations upon the scope of the claims.[63]

The Court of Customs and Patent Appeals had numerous opportunities to follow the lead of the Supreme Court. In *In re Maucorps,*[64] the applicant had claimed a "computing system for processing data" that determined the optimum number of sales representatives for a given organization as well as the number of times they should visit customers over a period of time.[65] The invention consisted of various formulae that Maucorps had derived from sales experience and implemented via software written in the Fortran programming language. The court affirmed the rejection of the application, reasoning that the "claimed invention as a whole comprises each and every means for carrying out a solution technique for a set of equations wherein one number is computed from a set of numbers."[66]

In re Meyer[67] was to similar effect. Meyer's application described a computer-based expert system for aiding a neurologist in diagnosing patients. His claims were drafted broadly, calling for a more generalized "process for indentifying [*sic*] locations of probable malfunction in a complex system."[68] In essence Meyer called for test data to be accumulated and conclusions reached in accordance with statistical formulae. The court again affirmed the rejection of the application, quoting with approval the Patent Office's conclusion that the "process recited is an attempt to patent a mathematical algorithm rather than a process for producing a

63. *See* Richard H. Stern, *Tales from the Algorithm War:* Benson *to* Iwahashi, *It's Deja Vu All Over Again*, 18 AM. INTELL. PROP. L. ASS'N Q.J. 371 (1991).

64. 609 F.2d 481 (CCPA 1979).

65. *Id.* at 482.

66. *Id.* at 486.

67. 688 F.2d 789 (CCPA 1982).

68. *Id.* at 792.

product."[69]

This early resistance to patents on computer-related inventions faded over time, however. By the early 1980's, Patent Office examiners found more favor in computer-related inventions, and the courts seemed more willing to uphold the issued patents.[70] While the omnipresence of computer technology and its significance to the United States economy may have carried the day, one suspects that both the Patent Office and courts grew weary of the relentless argumentation of a bar that has scant motivation to favor restraints upon the scope of patenting. Also influential was the 1980 opinion in *Diamond v. Chakrabarty*,[71] a Supreme Court decision that opened the patent system to biotechnology.

That opinion involved the Patent Office rejection of Dr. Ananda Chakrabarty's application claiming an artificially generated microorganism. At the Supreme Court, chief among the arguments of the Patent Office Solicitor was that because genetic technology could not have been foreseen at the time the patent statute was drafted, the resolution of the patentability of such inventions should be left to Congress. En route to reversing the Patent Office decision, the Court disagreed: "A rule that unanticipated inventions are without protection would conflict with the core concept of the patent law that anticipation undermines patentability."[72]

The difficulty with this reasoning is that it mixes two logical classes, that of individual technologies with the entire domain of invention. As neatly illustrated by Bertrand Russell in his famous debate with Father Copleston, the fact that every person has a mother does not lead to the conclusion that the human race as a whole must have a mother.[73] And simply because the patent statute in part judges patentability through an anticipation standard hardly suggests that we lack other principles to govern the extent of patentable subject matter.

69. *Id.* at 794.

70. *See, e.g.*, *In re* Deutsch, 553 F.2d 689 (CCPA 1977); *In re* Chatfield, 545 F.2d 152 (CCPA 1976).

71. 447 U.S. 303 (1980).

72. *Id.* at 316.

73. *See* Bertrand Russell & F.C. Copleston, *A Debate on the Existence of God, reprinted in* BERTRAND RUSSELL ON GOD AND RELIGION 123, 131 (Al Seckel ed., 1986).

However apparent the weaknesses of this aspect of *Chakrabarty*, the Supreme Court leaned heavily upon its reasoning in its 1981 opinion in *Diamond v. Diehr*.[74] The *Diehr* applicants claimed a process for operating a rubber-molding press with the aid of a digital computer. Their computer continuously monitored the temperature within a press and employed the well-known Arrhenius equation to calculate the amount of time required to cure rubber placed within the press. When the computer calculated that the elapsed time equaled the actual molding time, it signaled a device to open the press.[75]

At the Patent Office, the examiner considered that the process steps that were implemented in computer software were nonstatutory. The examiner further reasoned that the "remaining steps—installing rubber in the press and the subsequent closing of the press—were 'conventional and necessary to the process and cannot be the basis of patentability.'"[76] The Court of Customs and Patent Appeals reversed the rejection, however. Following a grant of *certiorari*, the Supreme Court affirmed.[77] Relying upon *Chakrabarty*, the Court explained that the applicants:

> do not seek to patent a mathematical formula. Instead, they seek patent protection for a process of curing synthetic rubber. Their process admittedly employs a well-known mathematical equation, but they do not seek to pre-empt the use of that equation. Rather, they seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process. These 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.[78]

A number of difficulties attend the *Diehr* Court's analysis as

74. 450 U.S. 175 (1981).
75. *Id*. at 177-78.
76. *Id*. at 180-81.
77. *Chakrabarty*, 450 U.S. at 193.
78. *Id*. at 187.

well. The advancement offered by the *Diehr* applicants consisted of mathematical computations. The physical steps on which so much depended—reading a thermometer and signaling a press door to open—were trite. Allowing patentability to hinge upon the minimal recitation of these steps within the claims seems unfounded, for they merely stated the only valid technical context in which the mathematics would operate. They did not present meaningful limitations upon the scope of the claims. To the extent that the prohibition against patenting ideas presents sound policy, allowing applicants to avoid these limitations through artful claim drafting appears unwise.

The patent bar nonetheless proved attentive to the lessons of *Diehr*. Technologists proved increasingly adept at claiming newly formulated mathematical equations alongside some sort of physical manifestation. In response the Court of Customs and Patent Appeals formed the two-part *Freeman-Walter-Abele* test. Initiated in 1978 by the *In re Freeman*[79] decision, the court refined the test in the 1980 opinion *In re Walter*.[80] Following the Supreme Court's issuance of its *Diehr* decision,[81] the court once again modified the standard in its 1982 decision *In re Abele*.[82] As the Federal Circuit later described:

> 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.[83]

79. 573 F.2d 1237 (CCPA 1978).

80. 618 F.2d 758 (CCPA 1980).

81. *See supra* notes 79-80 and accompanying text.

82. 684 F.2d 902 (CCPA 1982).

83. Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 1058 (Fed. Cir. 1992).

The Federal Circuit employed the *Freeman-Walter-Abele* test both to reject[84] and allow[85] various applications as patentable subject matter. But its decisions demonstrated an increasingly permissive tenor, and a glance through the Patent Office Gazette showed a growing number of issued patents directed towards computer-related inventions.

Emboldened by this state of affairs,[86] applicants eventually abandoned even the pretext of tying the mathematics to a traditionally industrial process such as curing rubber. Instead the tangible thing upon which patentability was keyed was the combination of a computer and the software-driven electrical signals employed to instruct it. Because general purpose computers could be conceived as special purpose computers once instructed by software, virtually any fragment of software code could be viewed as statutory subject matter.[87]

Although this reasoning had been impliedly rejected in *Benson*,[88] it met with great success in the Federal Circuit's en banc decision in *In re Alappat*.[89] There, the court considered a claimed apparatus useful for generating smooth and continuous lines for display on an oscilloscope. Alappat's invention completed various mathematical computations in order to convert so-called "vector list data" into "pixel illumination intensity data"; that is, it converted one set of numbers into another set of numbers.[90] The majority held that the claimed invention comprised statutory subject matter:

Although many, or arguably even all, of the means ele-

84. *In re* Grams, 888 F.2d 835 (Fed. Cir. 1989).

85. *In re* Iwahashi, 888 F.2d 1370 (Fed. Cir. 1989).

86. *See Arrhythmia*, 958 F.2d 1053; *Iwahashi*, 888 F.2d 1370. *But see In re* Grams, 888 F.2d 835 (Fed. Cir. 1989).

87. This argument was successful in *In re* Bernhart, 417 F.2d 1395, 1400 (CCPA 1969). *See also In re* Prater, 415 F.2d 1393, 1403 n.29 (CCPA 1969).

88. *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972).

89. 33 F.3d 1526 (Fed. Cir. 1994). *See also* John A. Burtis, Comment, *Towards a Rational Jurisprudence of Computer-Related Patentability in Light of In re* Alappat, 79 MINN. L. REV. 1129 (1995); Sang Hui Michael Kim, *In re* Alappat*: A Strict Statutory Interpretation Determining Patentable Subject Matter Relating to Computer Software?*, 13 J. MARSHALL J. COMPUTER & INFO. L. 635 (1995); W. Wayt King, Jr., Recent Development, *The Soul of the Virtual Machine: In re* Alappat, 2 J. INTELL. PROP. L. 575 (1995).

90. 33 F.3d at 1537-39.

> ments 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.[91]

The *en banc* court also quickly distinguished *Maucorps*[92] and *Meyer*.[93] According to the court, "*Maucorps* dealt with a business methodology for deciding how salesmen should best handle respective customers and *Meyer* involved a 'system' for aiding a neurologist in diagnosing patients. Clearly, neither of the alleged 'inventions' in those cases falls within any § 101 category."[94]

Reconciliation of *Alappat* with *Benson* appears difficult. Both inventions concerned data transformations performed by a computer using mathematical calculations. Yet, according to the Federal Circuit, the *Benson* Court had instead attempted to express the 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."[95] That the applicant in *Benson* could have circumvented the Supreme Court's objection simply by naming one practical application for his algorithm seems quite implausible, particularly since the Court took pains to catalogue some of the many uses of that algorithm in its opinion.[96]

After *Alappat*, the long-running saga concerning the patentability of computer-related inventions seemed of little more than his-

91. *Id.* at 1544 (footnotes omitted).
92. 609 F.2d 481; *see supra* text accompanying notes 64-66.
93. 688 F.2d 789; *see supra* text accompanying notes 67-68.
94. 33 F.3d at 1541.
95. *Id.* at 1543 (footnote omitted).
96. *See supra* text accompanying notes 59-62.

torical interest. Seemingly any applicant who drafted patent claims within the strictures of the vitiated physicality standard could obtain a patent on nearly any data processing technique. That the advance was found not in computer circuitry or programming techniques was besides the point; so long as the technique could be performed by a computer and was so characterized, then a patent could issue.

Given that many such techniques are only practically realizable when performed on a computer, this minimal stricture was one many applicants could live with. Yet few failed to realize that the artful claims drafting inspired by *Diehr* and *Alappat* comprised little more than a charade.[97] Although a robust physical transformation requirement was itself quite defensible, its hobbled remnant proved so provocative of contorted claims drafting that it appears scarcely worth maintaining.[98] Some jurists seemed willing to abandon the requirement of physicality in favor of a more expansive vision of patentability, as suggested by Judge Newman's view in a 1994 dissent that:

> [A] statutory "process" is limited only in that it must be technologically useful. . . . All mathematical algorithms transform data, and thus serve as a process to convert initial conditions or inputs into solutions or outputs, through transformation of information. . . . The test is simply whether the mathematical formula or equation is all that is claimed, or whether the procedures involving the specified mathematics are part of a useful process. When the latter requirement is met the subject matter is statutory.[99]

Only four years would elapse before a view of statutory subject matter that embraced the "transformation of information" would make its way from the dissent to the majority. The occasion was the inevitable resolution of the conflict between the venerable case law on business methods and more recent developments on computer-related inventions, the Federal Circuit decision in *State Street*

97. *See Alappat*, 33 F.3d at 1564 (Archer, C.J., dissenting).

98. *See* John R. Thomas, *Of Text, Technique, And The Tangible: Drafting Patent Claims Around Patent Rules*, 17 J. MARSHALL J. COMPUTER & INFO. L. 219 (1998).

99. *In re* Schrader, 22 F.3d 290, 297 (Fed. Cir. 1994) (Newman, J., dissenting).

Bank & Trust Co. v. Signature Financial Group, Inc.[100]

C. *Computer-Implemented Business Methods*

Signature Financial Group held the patent at suit.[101] Directed to a "Data Processing System for Hub and Spoke Financial Services Configuration," it described a data processing system for implementing an investment structure known as a "Hub and Spoke" system. This system allowed individual mutual funds (Spokes) to pool their assets in an investment portfolio (Hub) organized as a partnership. According to the patent, this investment regime provided the advantageous combination of economies of scale in administering investments coupled with the tax advantages of a partnership.[102]

Maintaining a proper accounting of this sophisticated financial structure proved difficult. Indeed, due to "the complexity of the

100. 149 F.3d 1368 (Fed. Cir. 1998). Also of note was the district court opinion in Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith, Inc., 564 F. Supp. 1358, 1364, 1369 (D. Del. 1983) (holding that Merrill Lynch's claimed "system for processing and supervising a plurality of composite subscriber [investment] accounts" comprised "statutory subject matter because the claims allegedly teach a method of operation on a computer to effectuate a business activity"). *Paine, Webber* is discussed in Samuelson, *supra* note 12, at 1120-21.

101. United States Patent No. 5,193,056 (March 9, 1993). The first claim of the '056 patent provided:

> 1. A data processing system for managing a financial services configuration of a portfolio established as a partnership, each partner being one of a plurality of funds, comprising:
>
> (a) computer processor means for processing data;
>
> (b) storage means for storing data on a storage medium;
>
> (c) first means for initializing the storage medium;
>
> (d) second means for processing data regarding assets in the portfolio and each of the funds from a previous day and data regarding increases or decreases in each of the funds, [sic, funds'] assets and for allocating the percentage share that each fund holds in the portfolio;
>
> (e) third means for processing data regarding daily incremental income, expenses, and net realized gain or loss for the portfolio and for allocating such data among each fund;
>
> (f) fourth means for processing data regarding daily net unrealized gain or loss for the portfolio and for allocating such data among each fund; and
>
> (g) fifth means for processing data regarding aggregate year-end income, expenses, and capital gain or loss for the portfolio and each of the funds.

Id.

102. 149 F.3d at 1370.

calculations, a computer or equivalent device is a virtual necessity to perform the task."[103] Signature's patented system purported to allow administrators to "monitor and record the financial information flow and make all calculations necessary for maintaining a partner fund financial services configuration."[104] In addition it tracked "all the relevant data determined on a daily basis for the Hub and each Spoke, so that aggregate year end income, expenses, and capital gain or loss can be determined for accounting and for tax purposes for the Hub and, as a result, for each publicly traded Spoke."[105] Crucially, Signature's invention marked no advance in computer technology or mathematical calculations. The basis for patentability was the uniqueness of the investment package Signature claimed in its patent.

Following issuance of the patent, Signature entered into licensing negotiations with a competitor, State Street Bank, that ultimately proved unsuccessful. State Street then brought a declaratory judgment action against Signature, seeking the invalidity of the patent. The district court granted summary judgment in favor of State Street under two alternative grounds.[106] First, the court applied the *Freeman-Walter-Abele* test,[107] concluding that:

> At bottom, the invention is an accounting system for a certain type of financial investment vehicle claimed as means for performing a series of mathematical functions. Quite simply, it involves no further physical transformation or reduction than inputting numbers, calculating numbers, outputting numbers, and storing numbers. The same functions could be performed, albeit less efficiently, by an accountant armed with pencil, paper, calculator, and a filing system.[108]

The court then buttressed its holding by turning to "the long-established principle that business 'plans' and 'systems' are

103. *Id.* at 1371.

104. *Id.*

105. *Id.*

106. State Street Bank and Trust Co. v. Signature Fin. Group, Inc., 927 F. Supp. 502 (D. Mass. 1996).

107. *Id.* at 512-15.

108. *Id.* at 515.

not patentable."[109] The court judged that "patenting an accounting system necessary to carry on a certain type of business is tantamount to a patent on the business itself. Because such abstract ideas are not patentable, either as methods of doing business or as mathematical algorithms," the patent was held invalid.[110]

On appeal, the Federal Circuit reversed in a magisterial opinion. Writing for a three-judge panel, Judge Rich found the patent claimed not an abstract idea but a programmed machine that produced a "useful, concrete, and tangible result."[111] "This renders it statutory subject matter, even if the useful result is expressed in numbers, such as price, profit, percentage, cost, or loss."[112] According to the court, "[t]he question of whether a claim encompasses statutory subject matter should not focus on *which* of the four categories of subject matter a claim is directed to—process, machine, manufacture, or composition of matter—but rather on the essential characteristics of the subject matter, in particular, its practical utility."[113] The court further trumpeted that:

> Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result"—a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.[114]

The Federal Circuit then turned to the district court's business methods rejection, opting to "take [the] opportunity to lay this ill-conceived exception to rest."[115] According to Judge Rich, restrictions upon patents for methods of doing business were ill-conceived from the start and no longer the law under the 1952 Pat-

109. *Id.* (citation omitted).
110. *Id.* at 516.
111. 149 F.3d at 1373 (quoting *In re* Alappat, 33 F.3d 1526, 1544 (Fed. Cir. 1994).
112. *Id.* at 1375.
113. *Id.* at 1375 (footnote omitted).
114. *Id.* at 1373.
115. *Id.* at 1375.

ent Act. Following issuance of the *State Street* opinion, methods of doing business were to be subject only to the same patentability analysis as any other sort of process.[116]

State Street is a curious opinion on a number of fronts. First, the court's characterization of the patented invention as generating a "final share price" appears inaccurate.[117] Neither the term "final share price" nor its reasonable approximation appears in any of Signature's claims, which are instead directed towards the processing of data relating to portfolio income, expenses and net gain or loss.[118] This interpretation seems especially odd in light of an earlier opinion by Judge Rich, *In re Iwahashi*,[119] which admonished that the precedents have "held some claims statutory and other claims nonstatutory, depending entirely on what they said. We have to do the same here."[120]

The *State Street* court also squarely stated that the district court had erred by applying the *Freeman-Walter-Abele* test. According to the court, "[a]fter *Diehr* and *Chakrabarty*, the *Freeman-Walter-Abele* test has little, if any, applicability to determining the presence of statutory subject matter."[121] As a matter of chronology this statement is plainly false: the Supreme Court issued *Chakrabarty* in 1980 and *Diehr* in 1981.[122] The Court of Customs and Patent Appeals authored *Abele* in 1982.[123]

This aberrant reinterpretation of *Diehr* and *Chakrabarty* also does a disservice to any number of Federal Circuit opinions which applied the *Freeman-Walter-Abele* test in patent eligibility determinations.[124] It further seems to misread *Chakrabarty*. There the Court relied on *Parker v. Flook*, which expressly stated that a "claim for an improved method of calculation, even when tied to a specific end use, is unpatentable subject matter under § 101."[125]

116. *Id.*
117. *See supra* text accompanying note 102.
118. *See supra* text accompanying note 101.
119. 888 F.2d 1370 (Fed. Cir. 1989).
120. *Id*. at 1374. For more on *Iwahashi*, see Thomas, *supra* note 98, at 258-59.
121. *State Street*, 149 F.3d at 1375.
122. *See supra* notes 71-78 and accompanying text.
123. 684 F.2d 902 (CCPA 1982).
124. *E.g.*, *Arrhythmia*, 958 F.2d at 1053; *Grams*, 888 F.2d at 835.
125. Parker v. Flook, 437 U.S. 584, 595 n.18 (1978).

This standard appears to provide ample basis for striking down Signature's claimed "system," which does nothing more than maintain the accounting books for a particular financial product.

As well, the Federal Circuit failed to acknowledge fully *Maucorps*[126] and *Meyer*,[127] as well as the manner in which those cases had been treated in *Alappat*.[128] Each of those opinions rejected claims quite analogous to those of Signature Financial Group's patent.[129] The *State Street* court dismissed this precedent quickly, stating only that "closer scrutiny of these cases reveals that the claimed inventions in both *Maucorps* and *Meyer* were rejected as abstract ideas under the mathematical algorithm exception, not the business method exception."[130] But this distinction tells us only that the district court's first basis for invalidating Signature's patent should have stood. It also fails to inform us why the statement of the *en banc* court in *Alappat* that "a business methodology" does not fulfill the strictures of § 101 is no longer the law.[131]

In perhaps the most telling line of the opinion, the *State Street* Court further told us that the key inquiry concerning statutory subject matter involves "the essential characteristics of the subject matter, in particular, its practical utility."[132] This remark appears to collapse the subject matter inquiry into another patentability requisite, that of utility. The utility standard has always been a minimal one, requiring only that the invention confer a "specific benefit . . . in currently available form."[133] The difficulty with this approach is that, since the early Nineteenth Century, the utility standard has been understood to present a distinct, additional hurdle to patentability.[134] Not only does this dramatic reinterpreta-

126. 609 F.2d 481 (C.C.P.A. 1979).

127. 688 F.2d 789 (C.C.P.A. 1982).

128. 33 F.3d 1526, 1540-41.

129. *See supra* text accompanying notes 64-69.

130. 149 F.3d at 1376.

131. 33 F.3d at 1541; *see supra* text accompanying notes 89-91.

132. 149 F.3d at 1375.

133. Brenner v. Manson, 383 U.S. 519, 534-35 (1966). *See also In re* Brana, 51 F.3d 1560 (Fed. Cir. 1995); Andrew T. Kight , Note, *Pregnant with Ambiguity: Credibility and the PTO Utility Guidelines in Light of* Brenner, 73 IND. L.J. 997 (1998); Michelle L. Johnson, *In re Brana and the Utility Examination Guidelines: A Light at the End of the Tunnel?*, 49 RUTGERS L. REV. 285 (1996).

134. *See* Lowell v. Lewis, 15 F. Cas. 1018 (C.C. Mass. 1817)(No. 8,568); Bedford

tion of § 101 seem to relegate that statute's recitation of categories of patentable subject matter into little more than claim formatting protocols,[135] it also presents an extremely vitiated gatekeeper to the patent system.[136]

At bottom, the Federal Circuit also said vastly more than it needed to with regard to methods of doing business. The claims of the Signature patent were not directed to methods at all, but to computer hardware programmed to perform certain calculations.[137] In fact, the court noted that the patent application as filed originally included method claims. But the applicant had abandoned them following examiner concerns over patentable subject matter.[138] Given the absence of method claims in the patent at suit, not due to happenstance but because of their knowing deletion by the applicant, this portion of the *State Street* opinion seemed nothing more than dicta. The weight accorded to this discussion would prove considerable, however, as the Federal Circuit demonstrated in its next significant patent eligibility case.

D. *Beyond State Street: AT&T v. Excel Communications*

The appeal in *AT&T Corp. v. Excel Communications Inc.*[139] arose from AT&T's efforts to enforce its '184 patent, which was directed towards the composition of billing records used in telephone networks.[140] The '184 patent expressly claimed a method

v. Hunt, 3 F. Cas. 37 (C.C. Mass. 1817) (No. 1,217).

135. *See supra* text accompanying note 20.

136. *See* Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CALIF. L. REV. 803, 811-12 (1988) (noting that the utility requirement has "devolved over the years into a rather minimal obstacle to obtaining a patent.").

137. 149 F.3d at 1371-72.

138. 149 F.3d at 1371.

139. 172 F.3d 1352 (Fed. Cir. 1999).

140. Claim 1 of the '184 patent recited:

> A method for use in a telecommunications system in which interexchange calls initiated by each subscriber are automatically routed over the facilities of a particular one of a plurality of interexchange carriers associated with that subscriber, said method comprising the steps of:
>
> generating a message record for an interexchange call between an originating subscriber and a terminating subscriber, and
>
> including, in said message record, a primary interexchange carrier (PIC) indicator having a value which is a function of whether or not the interexchange car-

for a phone company to determine whether both the caller and the recipient of a long-distance telephone subscribed to the company's network. If so, the phone company could provide a different billing treatment to such calls, most likely discounting the fee in order to encourage both individuals to subscribe to the same phone company.

The invention relied upon the fact that when a customer makes a long-distance telephone call, the telephone network contemporaneously maintains billing records. These records include such information as the originating and terminating telephone numbers, as well as the length of the call. Also associated with the call is data indicating an individual's chosen "primary interexchange carrier," or long-distance service provider.

The claimed invention called for the addition of a discrete item of data, termed the "PIC indicator," to the billing record. The value of the PIC indicator was determined by applying the logical AND function to the data identifying the primary interexchange carriers of the originator and recipient of the long-distance call. If both customers have subscribed to the same phone company, the PIC indicator is set to a logical "one." Otherwise the PIC indicator remains at the value of "zero." The phone company may then readily apply its discounted rate to any call where the PIC indicator is set to one, without more extensive data processing at the time of billing.

In an opinion issued prior to the release of *State Street*, the United States District Court for the District of Delaware held that the claimed invention was without § 101.[141] Judge Robinson described the '184 patent as "claiming an invention whereby certain information that is already known within a telecommunications system (the PICs of the originating and terminating subscribers) is simply retrieved for an allegedly new use in billing."[142] With this sense of the claimed invention, the court held that "a change in the

rier associated with said terminating subscriber is a predetermined one of said interexchange carriers.

172 F.3d at 1354.

141. AT&T Corp. v. Excel Communications, 1998 U.S. Dist. Lexis 5346 (Cov. A. 96-434-SLR) (D. Del. March 27, 1998), *rev'd*, 172 F.3d 1352 (Fed. Cir. 1999)

142. *Id.* at *20.

data's format should not serve to convert nonpatentable subject matter into patentable subject matter."[143]

Following an appeal, the Federal Circuit reversed. Writing for a three-judge panel, Judge Plager had little trouble finding that the asserted claims "comfortably" fell within the scope of patentable subject matter.[144] The Federal Circuit quickly disposed of Excel's argument that because AT&T's claims did not recite a physical transformation, they were not patentable subject matter. Judge Plager reasoned that physical transformation was not an absolute requisite for patentability, but merely one way of determining whether the patented invention achieved a "useful, concrete, tangible result."[145] Because AT&T's claimed process produced "a number which had a specific meaning," it could be employed in a discrete setting and was therefore patentable.[146]

In working this abrupt end to the physical transformation standard, long understood as the touchstone of patentability of method claims, the Federal Circuit distinguished an impressive number of earlier decisions. In particular, the court continued to toss fuel upon the funeral pyre of *Freeman-Walter-Abele*. "Whatever may be left" of the *Freeman-Walter-Abele* standard was not of value here, according to the court, because *Diehr* and *Charkrabarty* had not required that a process manipulate physical elements to be patentable.[147] The *Excel* court too did not address the unusual timing demanded by this reasoning, nor did it seem to have reviewed the text of the *Chakrabarty* opinion. Three more recent Federal Circuit opinions suggesting that AT&T's claims were unpatentable were distinguished or deemed "unhelpful."[148]

In closing the opinion, the Federal Circuit was quick to note that it had only addressed the subject of patent eligibility, and that "the ultimate validity of these claims depends upon satisfying the other requirements for patentability such as those set forth in 35

143. *Id.* at *22.

144. 172 F.3d at 1361.

145. *Id.* at 1357 (quoting *State Street*, 149 F.3d at 1373).

146. *Id.* at 1359 (citing *Arrythmia*, 958 F.3d at 1060).

147. *Id.* at 1359.

148. *Id.* (discussing *In re* Grams, 885 F.2d 835; *In re* Schrader, 22 F.3d 794; *In re* Wamerdam, 33 F.3d 1354).

U.S.C. §§ 102, 103, and 112."[149] Yet the claims at issue in these two opinions call into question the extent that § 103, the provision demanding the nonobviousness of patented inventions, and § 112, a statute that in part requires the drafting of definite claims, are being enforced. In *Excel*, one wonders why a skilled artisan would not have found obvious the use of the logical AND standard to the data representing the primary interexchange carrier.

The claims at issue in *State Street* also appear deficient. By merely reciting a menu of available data operations, each of Signature's claims presents no more than an unpatentable aggregation. Such claims fail to state how the various claimed means elements interact with each other, either functionally or structurally. The case law has interpreted § 112 to demand a showing of the relationship among the elements of Signature's inventions, perhaps through the recitation of a data bus wired to various hardware capable of performing the claimed functions.[150] That Signature's claims do not comply with § 112 seems particularly troubling, for if a claim is not presented in a manner cognizable to the patent law, then it would seem difficult to determine whether that subject matter complies with § 101 or not.

Despite these weaknesses in the *State Street* and *Excel* opinions, each issue of the Patent Office Gazette appears to have taken these two opinions into account. As but one example of recent Patent Office work product, consider the following claim:

> A method for remodeling an existing building, said method comprising:
>
> cataloging design ideas that utilize predetermined building products;

149. *Id.* at 1361.

150. *See* ADELMAN ET AL., *supra* note 14, at 645 (noting this familiar requirement of claims drafting). *See In re* Worrest, 201 F.2d 930, 934 (CCPA 1953) (The court defined an unpatentable aggregation as "a device having two or more unrelated, independent units or elements, each of which performs its function separately, uninfluenced by and indifferent to the action of the other units. There is no essential or inherent correlation, or cooperation, or coordination of elements which mutually contribute to a common purpose or result, other than mere convenience due to juxtaposition or collection of the units in a common setting.").

> presenting the design ideas to a client;
>
> allowing the client to select a design idea . . . ;[and]
>
> preparing a visual image . . . representing the building remodeled with the design idea selected by the client.[151]

Wholly divorced from particular artifacts, this claim broadly appropriates an architectural services technique. Recently issued Patent Office Guidelines further suggest that other business, artificial intelligence and mathematical processing applications are firmly within the grasp of the patent system.[152]

Of course, it is the fate of the Patent Office to lead the courts on patentability standards.[153] In some sense *State Street* merely presents the latest in a series of cases confirming Patent Office practice as to the subject matter appropriate for patenting. But in many ways *State Street* presents the most disturbing episode yet. It seems one thing for courts to place biotechnologies and computer-related inventions within the patent system, but quite another to hold that business methods may be patented. One need only recall the techniques of the Hanseatic League[154] or the theory of mercan-

151. United States Patent No. 5,668,736 (Sept. 16, 1997).

152. *See* UNITED STATES PATENT AND TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE ch. 2100 (7th ed. 1998) (available at <http://www.uspto.gov/web/offices/pac/mpep/index.html>).

153. As Judge Mayer noted in *Morton Int'l, Inc. v. Cardinal Chem. Co.*, 5 F.3d 1464, 1472 (Fed. Cir. 1993) (Mayer, J., concurring):

> Every year about 100,000 new patents are issued, resulting in well over 1,000,000 patents in force in this country at any time. These patents are issued by the Patent and Trademark Office clothed in a presumption of validity as a matter of law and of practicality. The Patent and Trademark Office, after all, consumes a tremendous annual budget, nearly a half billion dollars, and employs thousands of highly trained individuals working to insure that only deserving patents are issued. This court, on the other hand, might see only one hundred and fifty or so contested patents a year, including repeaters. We therefore see at most no more than 0.015% of the patents in force.
>
> (citations omitted).

Id.

154. *See* T.H. LLOYD, ENGLAND AND THE GERMAN HANSE, 1157-1611: A STUDY OF THEIR TRADE AND COMMERCIAL DIPLOMACY (Cambridge University Press, 1991); JOHANNES SCHILDHAUER, THE HANSA: THEIR HISTORY AND CULTURE (Katherine Vanovitch trans. 1985).

tilism[155] to realize that such methods are far older than the patent system itself. Yet only recently have we been made to understand that this sort of practical knowledge may be appropriated via the regime of patents.[156] The remainder of this Article discusses the appropriate range of patentable subject matter, next exploring the expansive patenting opportunities suggested by *State Street* and *Excel*.

II. THE EXTENT OF THE TECHNOLOGICAL ARTS

That the dialogue of the patent law itself scarcely limits the possibilities of patenting presents a source of concern. If the only remaining restraints upon patentable subject matter are the lenient strictures of novelty or utility, then the pretensions of the patent system have expanded vastly beyond its traditional province of industrial technologies.[157] For although the patent system is caught up with technology, it has done little to refine its sense of its own subject matter other than to say that patents properly canvas the entire waterfront of technique. In the regime of patents technology has become not merely artificial object or industrial activity, but the entire body of human knowledge unencumbered by further

155. *See* LARS MAGNUSSON, MERCANTILISM: THE SHAPING OF AN ECONOMIC LANGUAGE (1994); LEONARD GOMES, FOREIGN TRADE AND THE NATIONAL ECONOMY: MERCANTILIST AND CLASSICAL PERSPECTIVES (1987).

156. In this regard, *State Street* holds particularly unsettling possibilities for inventors that maintained their business methods as trade secrets. Under the rule articulated by Judge Learned Hand in *Metallizing Eng'g Co. v. Kenyon Bearing & Auto Parts*, 153 F.2d 516 (2d Cir. 1946), *cert. denied*, 328 U.S. 840 (1946), a firm that put a business method into commercial practice for more than one year, but maintained the method as a trade secret, is barred from obtaining a patent on the invention. Moreover, third parties are free to patent the method. *See* D.L. Auld Co. v. Chroma Graphics Corp., 714 F.2d 1144 (Fed. Cir. 1983). Because business method innovators may have opted for trade secret protection based upon the traditional rule that such methods were unpatentable, a practical effect of *State Street* may be to convert the first inventors of business methods into infringers.

Congress attempted to respond to this concern by enacting the First Inventor Defense Act of 1999, which was signed into law on November 19, 1999. Pub. L. No. 106-113 (1999). This statute creates a defense available to those charged with infringing "a method of doing or conducting business" who reduced the invention to practice one year before the effective filing date of the patent, and who "commercially used" that subject matter in the United States before the effective filing date. *See Signing of IP Reforms Amends Work-for-Hire, Leaves 'First Inventor Defense' Unclear*, 59 PAT., TRADEMARK & COPYRIGHT J. (BNA) 330, 331-332 (Dec. 2, 1999).

157. *See supra* Part IA.

qualification.

Among the more reviled Patent Office grants has been its 1968 patent on a method of swallowing a pill.[158] Now we need scant imagination to envision patents on corporate ingestion of poison pills as well. With business and medical techniques[159] firmly under wing, and patents on sports methods[160] and procedures of psychological analysis[161] trickling out of the Patent Office, patents appropriating almost any sort of communicable practice seem easily attainable. Claims to methods within the disciplines of sociology, political science, economics and the law appear to present only the nearest frontier for the regime of patents. Under increasingly permissive Federal Circuit case law, techniques within such far-flung disciplines as language,[162] the fine arts,[163] and theology[164] appear as well to be within the realm of patentability.

We have good reason to doubt whether such innovations lie within the "useful arts," the constitutional stricture concerning patentable subject matter.[165] The sparse materials we possess regarding this term suggests that the Framers were unlikely to see every

158. United States Patent No. 3,418,999 (Dec. 31, 1968).

159. *See infra* notes 232-244 and accompanying text.

160. *See generally* Carl A. Kukkonen, III, *Be a Good Sport and Refrain from Using My Patented Putt: Intellectual Property Protection For Sports Related Movements*, 80 J. PAT. & TRADEMARK OFF. SOC'Y 808 (1998).

161. United States Patent No. 5,190,458 (Mar. 2, 1993) ("Character assessment method").

162. *See* United States Patent No. 4,864,503 (Sep. 5, 1989) ("Method of using a created international language as an intermediate pathway in translation between two national languages"); *See also The Wired Diaries*, 7.01 WIRED 97, 135 (Jan. 1999) (Attributing to Norman Fischer, abbot, Green Gulch Farm Zen Center the observation that "[t]he real technology—behind all of our other technologies—is language. It actually creates the world our consciousness lives in.").

163. *See* United States Patent No. 5,730,052 (Mar. 24, 1998) ("Method of high resolution silk screen printing"). *But see* Greenewalt v. Stanley Co. of Am., 54 F.2d 195, 196 (3d Cir. 1931) ("We do not find authority in the law for the issuance of a patent for results dependent upon such intangible, illusory, and nonmaterial things as emotional or aesthetic reactions.").

164. *See* United States Patent No. 5,734,795 (Mar. 31, 1998) ("System for allowing a person to experience systems of mythology").

165. *See* Vincent Chiappetta, *Patentability of Computer Software Instruction as an "Article of Manufacture:" Software as Such as the Right Stuff*, 17 J. COMPUTER & INFO. L. 89, 129-34 (1998).

created thing as encompassed within it.[166] They undoubtedly contemplated the industrial, mechanical and manual arts of the late Eighteenth Century, in contrast to the seven "liberal arts" and the four "fine arts" of classical learning.[167] The Framers were also likely aware of the English experience leading to the Statute of Monopolies.[168] The principal aim of that legislation was to proscribe grants of monopolies except for any letters patent providing the exclusive right "of the sole working or making of any manner of new manufactures within this realme, to the true and first inventor . . . ."[169] In a passage especially worthy of consideration following *State Street*, the Court of Customs and Patent Appeals explained that the inclusion of the patent and copyright clause in the Constitution "doubtlessly was due to the fact that those who formulated the Constitution were familiar with the long struggle over monopolies so prominent in English history, where exclusive rights to engage even in *ordinary business activities* were granted so frequently by the Crown . . . ."[170]

Whether the *State Street* panel has respected the policy concerns that animated the Statute of Monopolies remains questionable. Yet, in fairness to the Federal Circuit, articulation of a useful typology between technology and other aspects of human culture has proven exceptionally difficult. Human engagement with the artificial has become so complete that distinguishing technological things from those that are not has perplexed not only the courts, but even epistemologists and the most accomplished of technologi-

166. *See* THE FEDERALIST No. 43, at 309 (James Madison) (Benjamin Fletcher-Wright, ed. 1961) ("The copyright of authors has been solemnly adjudged in Great Britain to be a right of common law. The right to useful inventions seems with equal reason to belong to the inventors. The public good fully coincides in both cases with the claims of individuals."). Madison's reference to contemporary British law hardly suggests a radical view of patentable subject matter.

167. *See* Robert I. Coulter, *The Field of the Statutory Useful Arts*, 34 J. PAT. OFF. SOC'Y 487, 494-96 (1952). "The seven historic 'liberal arts' were: grammar, logic (dialectics), rhetoric, arithmetic, geometry, music and astronomy. The four 'fine arts' were: painting, drawing, architecture and sculpture; to which were often added: poetry, music, dancing and drama." *Id.* at 494.

168. *See* Edward C. Walterscheid, *To Promote the Progress of Useful Arts: American Patent Law and Administration, 1787-1836 (Part 2)*, 80 J. PAT. & TRADEMARK OFF. SOC'Y 11, 26-27 (1998).

169. Statute of Monopolies, 21 Jam. 1, ch. 3 §6 (1623).

170. *In re* Shao Wen Yuan, 188 F.2d 377, 380 (CCPA 1951) (emphasis added).

cal observers.[171]

Economic analysis may offer some suggestions about the propriety of patents within particular areas of endeavor. Following *State Street*, economists may be able to tell us whether the patent system would benefit or harm particular industrial sectors by influencing such factors as the engagement in unproductive activity, rate of innovation or market concentration. An initial sense of the financial services industry would not appear optimistic. In-house use of financial products appears extremely difficult to track, for the only observable throughput consists of profits and losses on investor balance sheets.[172] The policing of financial services patents would seemingly require costly infringement searches, just the sort of activity a sound patent system should discourage.

Economic analysis might also suggest the impact of the surprisingly strong correlation between the claims of Signature's patent and portions of the Internal Revenue Code.[173] Commentators have expressed concerns over the attempted privatization of the law by such efforts as claiming copyright in jump citations.[174] But such an effort appears enfeebled when compared with the more robust property right afforded by the patent grant. If, as the Federal Circuit noted in *State Street*, the only practical tax code compliance mechanism for sophisticated financial products consists of computerized accounting,[175] then economists may well possess the best set of tools for predicting the impact of patents resembling that of Signature.

The difficulties with such attempted analyses should be apparent, however. Legal economists simply possess no experience

171. CARL MITCHAM, THINKING THROUGH TECHNOLOGY: THE PATH BETWEEN ENGINEERING AND PHILOSOPHY 154-60 (1994).

172. *See supra* text accompanying notes 101-105.

173. *See* I.R.C. § 706(d) (1994); IRS Reg. §§ 1.704-1(b), 1.704-1(f). *See* Richard Stern, *Scope-of-Protection Problems with Patents and Copyrights on Methods of Doing Business* 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 105, 132 (1999).

174. *See* Alfred C. Yen, *The Danger of Bootstrap Formalism in Copyright*, 5 J. INTELL. PROP. L. 453 (1998); James H. Wyman, Comment, *Freeing The Law: Case Reporter Copyright And The Universal Citation System*, 24 FLA. ST. U. L. REV. 217 (1996); Robin Lee Pedersen, Comment, *West Publishing Co. v. Mead Data Central, Ins. (Lexis)*, 14 RUTGERS COMPUTER & TECH. L.J. 359 (1988).

175. 149 F.3d at 1371.

whatsoever with patents of this sort and appear disinclined to seek out empirical evidence that might sustain their analysis. Lacking any data whatsoever as to the potential effect of the patent system in the financial service and other professional communities, much economic evaluation of this issue would seem reducible to thought experiments offered in the same vein as traditional legal analyses. While we should be grateful for whatever insights logical reasoning from such fundamental propositions as the downward-sloping demand curve can give us, so too should we call for data-gathering and refinement when economic analysis is applied to the discipline of intellectual property.[176]

This Article instead draws support from comparative legal studies and that body of thinking fashioned as the philosophy of technology. It takes a sympathetic reading of previous attempts to explain the place of technological activities within the whole of human endeavor. While not the place to develop a comprehensive metaphysics of human undertakings, this Article does attempt to apply this learning to consider the legitimacy of the view of the *State Street* court that any technique that achieves pragmatic results is patentable.

In doing so this Article follows the tack of many courts by employing the word "technology" synonymously with the constitutional term "useful art."[177] For although "technology" is not a term the Framers would likely have commonly employed, it has come to dominate its historical predecessor. Derived from the Greek word "techne,"[178] the first appearances of the term "technology" in English documents occurred only at the start of the seventeenth cen-

176. *See* George L. Priest, *What Economists Can Tell Lawyers About Intellectual Property*, *in* 8 RESEARCH IN LAW AND ECONOMICS: THE ECONOMICS OF PATENTS AND COPYRIGHTS 19, 19-20 (John Palmer & Richard O. Zerbe, Jr. eds., 1986) ("The ratio of empirical demonstration to assumption in the literature [applying economic analysis to the field of intellectual property] must be very close to zero . . . . I do not believe it is unfair to say that the . . . literature of which I am aware [has] consisted of little more than assumptions. As a consequence, this literature has taught us almost nothing, not has it guided research or thinking so that an approach with a firmer empirical base could be developed.").

177. *See supra* text accompanying note 9.

178. *See* DON IHDE, *Philosophy of Technology: An Introduction*, *in* PARAGON ISSUES IN PHILOSOPHY 26 (1993).

tury. A 1706 dictionary defining technology as "a Description of the Arts, especially in the Mechanical," suggests the identity of these terms.[179] Use of the term "technology" not only offers a less cumbersome terminology, it promotes the application of a diversity of thought about this most dominant aspect of contemporary society.

A. *From Applied Science to Rational Action*

The first English work to employ the term "technology" in its title, Jacob Bigelow's 1831 ELEMENTS OF TECHNOLOGY, serves as a good starting point for exploring the meaning of that term. Bigelow explained that technology involved "the principles, processes, and nomenclatures of the more conspicuous arts, particularly those which involve applications of science."[180] Bigelow's view of technology as applied science remains popular today, enlisting such supporters as Joseph Henry,[181] Vannevar Bush,[182] and John Kenneth Galbraith.[183] Even the Patent Office has adopted this position, defining technology as "the application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions, or at least to improve human efficiency in some respect."[184]

But the simple view of technology as applied science cannot withstand a sustained analysis. Historical technologists constructed artifacts ranging from arches to airplanes without any systematic knowledge of statics or aerodynamics.[185] Contemporary scientific disciplines from astronomy to particle physics further suggest that this definition is skewed, for they rely so heavily upon instrumental technologies that they could fairly be described as ap-

179. *See* MITCHAM, *supra* note 171, at 114, 130.

180. Jacob Bigelow, Elemenrs of Technology (1831).

181. *See* E.T. Layton, Jr., *American Ideologies of Science and Engineering*, 17 TECHNOLOGY AND CULTURE 688, 69 (1976).

182. *See* SUBRATA DASGUPTA, TECHNOLOGY AND CREATIVITY 151 (1996).

183. *See* JOHN KENNETH GALBRAITH, THE NEW INDUSTRIAL STATE 12 (2d rev. ed. 1971).

184. UNITED STATES PATENT AND TRADEMARK OFFICE, EXAMINATION GUIDELINES FOR COMPUTER-RELATED INVENTIONS, 61 FED. REG. 7478, 7488 (Feb. 28, 1996) [hereinafter SOFTWARE GUIDELINES].

185. *See* GEORGE BASALLA, THE EVOLUTION OF TECHNOLOGY 27-28 (1988).

plied technologies.[186] And historians have demonstrated that over-reliance upon scientific knowledge has sometimes hindered technological development, as successful product design proceeds more often from "bottom-up" development than "top-down" extension of scientific theories.[187]

Last, this position also fails to appreciate the extraordinary differences between the tools, attitudes and experimental methods of scientific and engineering practice.[188] Although some of the theoretical tools for engineering design derive from science, many do not and some are even problematic to the scientific community. In particular, the set of idealized artifacts, technical skills and pragmatic considerations indigenous to engineering practice have little place in scientific endeavors. Technology is much more than applied scientific knowledge, but is itself a distinct form of knowledge.[189]

Dissatisfied with a science-based definition, individuals have sought other bases for reasoning about technology. In an era of intensive individual interaction with the artificial, we should not be surprised to find exceptionally broad definitions of what comprises the technological. Standard dictionaries explain that technology concerns "bodies of skills, knowledge, and procedures for making, using and doing useful things"[190] or "systematic knowledge and action, usually of industrial processes but applicable to any recurrent activity."[191] Essayist Daniel Bell tells us that "[t]echnology is the instrumental ordering of human experience within a logic of ef-

186. *See* Don Ihde, *Technics and Praxis in* (1979) Boston Studies in The Philosophy of Science (Robert S. Cohen and Mark W. Wartofsky, eds., 1979).

187. *See* Ronald Kline, *Science and Engineering Theory in the Invention and Development of the Induction Motor, 1880-1900*, 28 TECHNOLOGY AND CULTURE 283 (1987).

188. *See* DASGUPTA, *supra* note 182, at 152-56; MITCHAM, *supra* note 171, at 199-204.

189. *See, e.g.* I.C. Jarvie, *Technology and the Structure of Knowledge*, *in* PHILOSOPHY AND TECHNOLOGY: READINGS IN THE PHILOSOPHICAL PROBLEMS OF TECHNOLOGY 54, 55 (Carl Mitcham & Robert Mackey eds., 1972); MITCHAM, *supra* note 171, at 203.

190. 15 INTERNATIONAL ENCYCLOPEDIA OF THE SOCIAL SCIENCES 576 (1968).

191. MCGRAW-HILL CONCISE ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY 1876 (3d ed. 1994).

ficient means";[192] commentator Frederick Ferré would go further to define technology merely as the "practical implementations of intelligence."[193] And as Marshall McLuhan mused, on his way to concluding that individual communications media present their own message:

> It makes no difference whether one considers as artifacts . . . things of a tangible "hardware" nature such as bowls and clubs or forks and spoons, or tools and devices and engines, railways, spacecraft, radios, computers and so on; or things of a "software" nature such as theories or laws of science, philosophical systems, . . . forms or styles in painting or poetry or drama or music, and so. All are equally artifacts, all equally human.[194]

Paradigmatic of this embracing vision of technology is the discipline of cybernetics.[195] Since its emergence from early research in neurophysiology and gradual expansion into information theory and artificial intelligence, cybernetics has considered its subject matter "the domain of all possible machines."[196] Disinterested in whether that machine is "electronic, mechanical, neural, or economic," cybernetics pursues the goal of communication and control of any regular, determinate or reproducible behavior.[197] The cybernetic vision of a device as a series of linked information stages expands the possibilities of technological knowledge to dizzying heights. For cybernetics offers nothing less than "the framework on which all individual machines may be ordered, related, and understood"[198]— a unified theory of material, social and mental phenomenon.[199]

192. DANIEL BELL, THE WINDING PASSAGE: ESSAYS AND SOCIOLOGICAL JOURNEYS 1960-1980, 20 (1980).

193. FREDERICK FERRÉ, PHILOSOPHY OF TECHNOLOGY 26 (1988).

194. MARSHALL MCLUHAN & ERIC MCLUHAN, UNDERSTANDING MEDIA: THE EXTENSIONS OF MAN 3 (2d ed. 1965).

195. *See* NORBERT WIENER, CYBERNETICS, OR CONTROL AND COMMUNICATION IN THE ANIMAL AND THE MACHINE (2d ed. 1961).

196. *See* W. ROSS ASHBY, AN INTRODUCTION TO CYBERNETICS 2 (1956).

197. *Id.*

198. *Id.*

199. *See* MITCHAM, *supra* note 171, at 205. *See also* Allan Newell, *Response: The Models Are Broken, The Models Are Broken!*, 47 U. PITT. L. REV. 1023 (1985) (collaps-

The view of patentable subject matter expressed in *State Street* fairly reflects these developments in our philosophy of technology.[200] Judging methods of doing business as within the ambit of the patent system too presents a pretentious view of technological activity, one that has come to reject a scientific backdrop and instead concluded that the term "technology" connotes any form of rational human action. Any technique for achieving efficiency in any sphere of human endeavor appears amenable to patenting, so long as that method is communicable and capable of achieving a useful result.

Yet few of us would suppose that inventions within the domain of business, the law or fine arts constitute technology, and in particular patentable technology. The standpoint of cybernetics is hardly in the mainstream. Its constructions of technology often amount to little more than provocative slogans that naively equate all forms of knowledge and assume that all human endeavor is susceptible to rational manipulation. Other definitions appear to suffer from their conciseness, presenting as well an extreme view of technological phenomenon.[201] Still others are purposive, forming part of the effort to subject technological issues to philosophical inquiry, or, even worse, contemporary society to withering commentary.[202]

Surely we can articulate a more refined sense of that set of actions and objects that we might judge as technological in character.[203] A reasoned epistemology of human activity, reflective both of our sense of the technological order and the traditions of the

ing distinctions between the study of human behavior and computer science).

200. *See supra* text accompanying notes 111-116.

201. *See* N. Bruce Hannay & Robert E. McGinn, *The Anatomy of Modern Technology: Prolegomenon to an Improved Public Policy for the Social Management of Technology*, 109 DAEDALUS 25, 26 (Winter 1980) ("The nascent field of technology studies is littered with unsuccessful attempts to capture and display the supposed Platonic essence of technology in a succinct phrase or two.").

202. *See* LEWIS MUMFORD, THE MYTH OF THE MACHINE: THE PENTAGON OF POWER (1970); JACQUES ELLUL, THE TECHNOLOGICAL SOCIETY (John Wilkinson trans., 1964); HERBERT MARCUSE, ONE-DIMENSIONAL MAN: STUDIES IN THE IDEOLOGY OF ADVANCED INDUSTRIAL SOCIETY (1964).

203. *But see* Rachel Laudan, *Introduction*, *in* THE NATURE OF TECHNOLOGICAL KNOWLEDGE: ARE MODELS OF SCIENTIFIC CHANGE RELEVANT? 1, 5 (1984) (noting that attempts to demarcate technology from other activities are "probably fruitless").

patent system, would allow us to better define that subject matter which could be patented and that which could not. This Article next takes up this effort, turning to several discussions of the ontic dimension of technology.

B. *Towards a Refined View of Technology*

As a central aspect of modern life, technology has attracted a justifiable amount of concern and commentary. Yet divergence concerning the scope of this phenomenon has often hindered discourse. Engineering, epistemological, sociological, anthropological and phenomenological perspectives have lent the term "technology" connotations varying from artifacts, to knowledge, to sociotechnical systems of manufacture and use.[204] Despite the ubiquity of the technological encounter, no recognized taxonomy of technological characteristics exists.

Perceptive commentators have attempted to lend congruency and structure to this dialogue by unpacking the term "technology."[205] A review of this literature holds promise for the patent system as well. As the principal legal response to technological change, the regime of patents too has suffered from its inability to develop a coherent sense of its own subject matter. This Article turns first to the sustained effort by Robert McGinn to define the technological.

In several publications addressing technology policy, McGinn has consistently identified technology as a manifestation of human culture that takes its place alongside art, sport, philosophy and other endeavors.[206] Technology is not the same as these activities, however, and may be distinguished by several traits. In an early article, *What is Technology?*, McGinn observed that technological

204. *See* PAUL W. DEVORE, TECHNOLOGY: AN INTRODUCTION 220-22 (1980); Michael Fores, *Some terms in the discussion of technology and innovation*, 6 TECHNOLOGY AND SOC'Y no.2, 56 (Oct. 1970).

205. *See* Stephen J. Kline, *What is Technology?*, 1 BULL. SCIENCE, TECHNOLOGY & SOCIETY 215 (1988).

206. *See* ROBERT E. MCGINN, SCIENCE, TECHNOLOGY AND SOCIETY 16 (1991); Hannay & McGinn, *supra* note 201, at 26; Robert E. McGinn, *What is Technology?*, *in* 1 RESEARCH IN PHILOSOPHY AND TECHNOLOGY: AN ANNUAL COMPILATION OF RESEARCH 179, 180 (Paul T. Durbin, Ed.,1978) [hereinafter McGinn, *What is Technology?*].

activity is a purposive, methodological enterprise that fabricates or is constitutive of material outcomes.[207] According to McGinn, technology should also be seen as a resource-based and resource-expending endeavor that necessarily utilizes or generates knowledge. He further suggests a rubric of "material product-making or object-transforming activity" to distinguish that which is technological.[208]

McGinn and his colleague, N. Bruce Hannay, further developed this analysis by assessing technology in terms of its content and form. Hannay and McGinn judged the content of technology to be "the complex of knowledge, methods, and other resources used in making a particular kind of product or in creating a particular procedural system."[209] That technologies could be used to manufacture products seems straightforward enough, but some ambiguity surrounds their sense of a "procedural system." Do they wish to connote discrete production techniques, or do they mean to invoke the entire social and physical environment that surrounds that making? While proceeding to describe the systems context of modern technologies, Hannay and McGinn suggest the former:

> Many products of modern technology, whether exhibiting interior systematic complexity or not, are intimately intertwined with, if not embedded in, complex sociotechical support systems on which their manufacture, use, and maintenance depend, for example, telephones and cars. To purchase such items is to gain admission into a web of complex sociotechnical systems. To buy a car is, in a real sense, to buy into a complex road, energy supply, parts distribution, maintenance, registration, insurance, police, and legal systems.[210]

To Hannay and McGinn, then, the fact that technologies are inevitably embedded in cultural contexts does not render all human endeavors into technologies themselves.

Hannay and McGinn also identified several aspects of the form

207. McGinn, *What is Technology?*, *supra* note 206, at 180.
208. *Id.* at 181.
209. *See* Hannay & McGinn, *supra* note 201, at 27.
210. *Id.* at 28.

of technology that contrast it with other human activities. The inputs to technological processes consist of raw or already processed material along with bodies of information. Technology involves the use of knowledge of the properties of its input resources, along with energy, information, tools, and perceptual and neuromuscular skills, to generate material products and procedural systems. The function of technology is the production, management and use of material objects, and for the control and enhancement of other forms of human activity. Technology is thus concerned with design, fabrication and transformation.[211]

Technology may also be distinguished by its environmental context. As described by Hannay and McGinn:

> [T]echnology differs from other activity-forms in that the natural environment –- both in respect to the meteorological and creature-related threats it poses to human survival, and the spatiotemporal obstacles it presents to human desires for communication and transport –- is a factor that more powerfully and more directly conditions technology than is the case with other cultural forms, for example, religion and art.[212]

Hannay and McGinn summarized their reasoning by characterizing technology "as that form of cultural activity devoted to the production or transformation of material objects, or the creation of procedural systems, in order to expand the realm of practical human possibility."[213]

The views of Paul W. DeVore about the nature of technology, developed in his eponymous textbook, complement those of McGinn.[214] DeVore also differentiates technological pursuits from other spheres of human activity, noting that:

> The character of thinking involved in creating a philosophical position, a new religion, or an alternate form of government is different from the character of thinking involved in technological activities. Thinking in technology is prob-

211. *Id.* at 27.
212. *Id.*
213. *Id.*
214. *See* PAUL W. DEVORE, TECHNOLOGY: AN INTRODUCTION (1980).

> lem specific and environmentally specific, concerned with efficiency and the relationship of elements in the behavior of a total system.[215]

To DeVore, the goal of acclimation to the physical environment is a paramount distinguishing trait of technology.[216] "[T]echnological knowledge is knowledge generated through activities involved in creating adaptive systems as opposed to knowledge used to create ideological and/or social systems."[217] DeVore also stresses that technology can only be understood within the social milieu in which it is situated. Yet he distinguishes technology from "the associative, ideological and environmental systems of society" and studies the relationship between technology and other disciplines.[218]

While contrasting technology and science, DeVore notes that the goal of technology is "to create new and useful products, devices, machines or systems."[219] In technological pursuits, design is the key component for resolving problems of materials, energy, information and control. DeVore identifies as technological tools, machines, techniques and technical systems of production, transportation and communication.[220]

Carl Mitcham has also recently engaged in a comprehensive discussion of the nature of technology.[221] Building upon the analysis of McGinn and his predecessors, Mitcham develops a framework for philosophical analysis that explores technology as manifested in objects, knowledge, activity and volition.[222] Most useful here is his development of a philosophy of action that embraces technology. In a discussion oriented towards patentable processes, development of the sense of technology as a behavioral engagement holds great potential for refining an ontology of technology. And while the term "technology" etymologically implies

215. *Id.* at 226.
216. *Id.* at 225.
217. *Id.*
218. *Id.* at 253.
219. *Id.* at 241.
220. *Id.* at 182-212.
221. MITCHAM, *supra*, note 171.
222. *Id.* at 157-60.

knowledge, and is perhaps most routinely conceptualized in terms of physical embodiments, the event of technology may be its most significant realization. For only technology as activity brings about the application of knowledge towards the fabrication or use of artifacts.[223]

Mitcham identifies paradigmatic technological activities as crafting, inventing, designing, manufacturing, working, operating and maintaining.[224] To Mitcham, the essence of invention—that all-important term in the patent law—is "the concrete transformation of materials—making an imagined transformation physically real."[225] He contrasts engineering design with artistic creation:

> Art also is concerned with imagining, but its images cannot be quantitatively analyzed—they are not subject to any well-developed calculus. Thus art, in contrast to engineering, appears as both more intuitive and more dependent on the senses. Although artists too are concerned to design artifacts, they necessarily do so in drawings and models that remain much closer in their reality to the final product. Compare, for instance, a Rembrandt sketch for a painting with an engineering drawing of a building. Even the Rembrandt sketch is art; the engineering drawing is simply thrown away.[226]

Mitcham would also distinguish between technology and technique. He suggests that the technological stresses the rational manipulation of external artifacts, while technique concerns the training of the human body and mind.[227] Thus we can speak of the techniques, but not the technologies, of hitting a baseball or organizing a political party. While technique contains unrationalized components, technology is concerned with the conscious articulation of rules and principles. To Mitcham, the core of the technological project concerns the desire to transform the heuristics of technique into the algorithms of practice.[228]

223. *Id.* at 209.
224. *Id.* at 210.
225. *Id.* at 216.
226. *Id.* at 230.
227. *Id.* at 236.
228. *Id.* at 236.

Mitcham also cautions against viewing all human behavior as technology. While exploring the possibilities of technological usings, he notes that:

> Although one *can* speak of walking on a sidewalk as using the sidewalk, of living in a house as using the house, of looking at a painting as using the painting, of reading a book of poetry as using the book, of playing the violin as using the violin, and of driving a car as using the car, in each case the connotations are quite different. Those human activities that have a self-contained quality about them, such as looking at a painting, reading a book, or playing the violin, seem most incorrectly described simply as use; indeed, to do so is common only when the user has missed the point of the objects concerned, that is, has failed to engage them in the proper manner. If a person is described as "using a book" one would be likely to think that he was doing something other than reading it—sitting on it, maybe. It is noteworthy that many usings, perhaps the less technological ones, have their own proper names, as with looking at works of art, reading books, or playing musical instruments.[229]

A review of commentators such as McGinn, DeVore and Mitcham illustrates that we can achieve a structured definition of technology. Although embedded in social systems, technology is an endeavor that both intuition and sustained analysis would distinguish from other aspects of human society. In brief, technology may be characterized as knowledge that is applied towards material enterprise, guided by an orientation to the external environment and the necessity of design. In its next Part, this Article attempts to apply these studies to the patent project, moving from a characterological to a definitional strategy.

III. STATUTORY SOLUTIONS TO PATENTABLE SUBJECT MATTER

Contemporary thought demonstrates that we can achieve a refined sense of that set of activities that are properly conceived as

229. *Id.* at 232.

technological. Yet applying this learning to the patent project is by no means straightforward. This Article reviews two possible mechanisms for affirming our sense of the technological in the patent law. The first is piecemeal in character. As exemplified by the recent United States experience regarding patents on methods of medical treatment,[230] we might selectively prohibit patenting or constrain the remedies available to patentees in certain areas of endeavor. Another possibility is the adoption of an essentialist definition that more completely captures our sense of the technological. Taking as its touchstone the so-called "industrial application" standard prevalent in the world's patent statutes,[231] this Article also explores the possibility of incorporating this standard into United States patent law.

A. *Patents and the Professions: The Medical Experience*

A broad sense of patentable subject matter brings forward a set of concerns not just of the technological sense, but also of the pursuit of the professions. Few doubts should surround the sorts of persons who should be newly attracted to the patent system. Bounded by the requirement of nonobviousness, the patent law concerns disciplinary understandings that exceed the state of the art.[232] In contemporary society this sort of knowledge is often held not just by any follower of a particular occupation, but by a member of a profession. Such occupations as medicine, law, teaching and the ministry, the so-called "liberal professions," are marked by some criteria that suggest an enthusiasm for patenting: raw materials drawn from systematic learning; their practical application; and a communicable technique.[233]

Yet other professional norms suggest that traditionally patent-free professions may resist the prospect of extensive appropriation of their techniques. Patents have the potential to constrain profes-

230. *See* American Medical Association, Council on Ethical and Judicial Affairs, *Ethical Issues in the Patenting of Medical Procedures*, 53 FOOD & DRUG L.J. 341 (1998).

231. *See* Todd F. Volyn, *Agreement Consummation in International Technology Transfers*, 33 IDEA: J.L. & TECH. 241 (1993).

232. *See* 35 U.S.C. § 103(a) (1994).

233. *See* MIKE W. MARTIN & ROLAND SCHINZINGER, ETHICS IN ENGINEERING 155-56 (1983).

sionals in the exercise of autonomous responsibility in their practices. Further, the ability of the profession to serve the public good may also be affected by patenting, which could alter the willingness of professionals to disseminate and put into practice new learning. Most significantly, the tendency of professions to organize suggests that a vocal and established lobby will be on hand to debate the place of patenting within their community.[234]

The patent system has experienced this phenomenon before. Medical practitioners have for decades obtained patents on methods of medical treatment ranging from administering insulin to treating cancer.[235] Although traditionally few patentees had attempted to enforce such patents,[236] in the early 1990's Dr. Samuel Pallin alleged that another physician infringed his patented cataract surgery procedure.[237] The lawsuit led to a raging debate that questioned the impact of patents upon medical ethics, patient care and professional autonomy. Although some urged that such patents offered individuals incentives to invent and disclose new medical methods, others pointed to the possibility that patents might restrict access to life-saving techniques, lead to invasions of patient privacy, and override the culture of disclosure and peer review that pervades the medical community.[238]

Following the condemnation of patents on methods of medical treatment by the American Medical Association House of Delegates, Congress reacted by amending the Patent Act. As codified in § 287(c), the new statute deprives patentees of remedies against medical practitioners engaged in infringing "medical activity."[239]

234. *See id.*

235. *See* William D. Noonan, *Patenting Medical and Surgical Procedures*, 77 J. PAT. & TRADEMARK OFF. SOC'Y 651 (1995); United States Patent No. 5,364,838 (Nov. 15, 1994) (method of intrapulmonary administration of insulin); United States Patent No. 5,456,663 (Oct. 10, 1995) (method of treating cancer).

236. Chris J. Katopis, *Patients v. Patents?: Policy Implications of Recent Patent Legislation*, 71 ST. JOHN'S L. REV. 329, 354-55 (1997).

237. *See* Pallin v. Singer, Civ. No. 5:93-202, 1995 WL 608365 (D. Vt. May 1, 1995).

238. *See* Beata Gocyk-Farber, *Patenting Medical Procedures: A Search for a Compromise Between Ethics and Economics*, 18 CARDOZO L. REV. 1527 (1997).

239. 35 U.S.C. § 287(c) (1994). *See* Gerald J. Mossinghoff, *Remedies Under Patents on Medical and Surgical Procedures*, 78 J. PAT. & TRADEMARK OFF. SOC'Y 789 (1996).

Although the Patent Office may still issue patents on medical methods, the inability of such instruments to provide their owner with any relief essentially renders them a legal nullity.[240]

The response of the medical establishment may serve as a good predictor of the reaction of other professions that are newcomers to the patent system. Already members of the business community have expressed disbelief at the large number of patented business methods issuing from the Patent Office, particularly those concerning Internet business models.[241] Whether business and other professionals will also possess the wherewithal to persuade Congress to create particularized patent-free spheres of activity remains to be seen, however. Few occupations are as well-organized, imbued with a sense of profession and capable of employing the rhetoric of public service as the practice of medicine.

But a more forceful impediment to further amendments of the patent statute is not practical, but legal in character. Among the requirements of the TRIPS Agreement, a component of the recently executed World Trade Organization treaty, is that "patents shall be available and patent rights enjoyable without discrimination as to . . . the field of technology."[242] That agreement goes on to provide that signatories may exclude from patentability "diagnostic, therapeutic and surgical methods for the treatment of humans or animals."[243] Under a strict reading of the TRIPS Agreement, § 287(c) presents a violation: signatories may deny such patents altogether but not discriminate against any issued patents.

Of course, this argument is rather technical. Recalling the maxim *non debet cui plus licet, quod minus est non licere*–a form of the maxim "the greater includes the lesser"—the holders of

240. Gocyk-Farber, *supra* note 238, at 1528.

241. *See, e.g.*, Teresa Riordan, *E-commerce Patents Reopen Legal Questions from the Past Debate: Should a Business Method Be Made Property?*, CHI. TRIB. (Jan. 11, 1999) at 2; Richard A. Kaplan, *Intellectual Property: Patenting Business Methods a More Viable Option*, 22 CHI. LAW. 7 (Jan. 1999); Bruce W. Foudree & Peter K. Trzyna, *Patenting In Insurance Starts Shaping Up As Robust Discipline*, NATIONAL UNDERWRITER LIFE & HEALTH-FINANCIAL SERVICES EDITION (Dec. 14, 1998); Robert M. Kunstadt, *Sneak Attack on U.S. Inventiveness*, NAT'L L.J., NOV. 9, 1998, at A21.

242. TRIPS Agreement art. 27.

243. *Id.*

medical method patents may not feel particularly aggrieved.[244] Not so for inventors within other disciplines. It appears that the solution reached in § 287(c) will remain unique to the medical community. With piecemeal legislative reactions to an increasingly receptive patent system out of the question, we must seek other mechanisms for obtaining sound parameters of patentable subject matter. This Article turns to this task next, seeking a more refined view of technological activity from comparative legal analysis.

B. *Industrial Application*

A second method of limiting the scope of patent eligibility to the technological would be to legislate an essentialist definition into our patent statute. In this regard we can receive guidance from two of the world's great patent statutes, the European Patent Convention[245] and the Japanese Patent Act.[246] Each of these laws require that inventions be susceptible of so-called "industrial application" in order for patent protection to be forthcoming.[247] Concise, proven and compatible with the TRIPS Agreement, the requisite of industrial applicability provides an apt way to limit the patent system to what we understand to be technological.

The requirement of industrial application has long been part of the German patent law.[248] As originally conceived, industrial application required that patented technologies involve the treatment

244. A more accurate translation of this phrase, attributed to the Roman jurist Ulpian, is: "He to whom the greater is lawful ought not to be debarred from the less as unlawful." BLACK'S LAW DICTIONARY 1052 (6th ed. 1990). The most famous use of the phrase in the patent law occurred in Justice Holmes' noteworthy dissent in *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 519-20 (1917).

245. Convention on the Grant of European Patents, as amended by Decision of the Administration Council of the European Patent Organization of December 21, 1978, *reprinted in* 13 I.L.M. 268 [hereinafter "European Patent Convention"]. The European Patent Convention creates a centralized mechanism for granting a set of national patents effective in the contracting states.

246. Japanese Patent Act, Law No. 121 of 1959, *reprinted in* 6 EHS Law Bulletin Series Japan SA-A1 (1994) [hereinafter Japanese Patent Act].

247. *See* European Patent Convention, *supra* note 245, at Art. 52; Japanese Patent Act, *supra* note 246, at Art. § 29.

248. David L. Cohen, *Article 69 and European Patent Integration*, 92 NW.U. L. REV. 1082 (1998).

or processing of raw materials through mechanical or chemical means.[249] The requirement has been more recently read to require a "technical rule for the control of natural forces,"[250] or, stated somewhat differently, "a teaching for systematic activity using controllable natural forces for the attainment of a causally predictable result."[251]

Currently the European Patent Convention presents the most fulsome articulation of the industrial applicability standard. Article 52 of the European Patent Convention stipulates that the following shall not be considered patentable inventions:

> (a) discoveries, scientific theories and mathematical methods;
>
> (b) aesthetic creations;
>
> (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;
>
> (d) presentations of information.[252]

Article 57 of the European Patent Convention goes on to provide that "[a]n invention shall be considered as susceptible of industrial application if it can be made or used in any kind of industry, including agriculture."[253] In its Examination Guidelines, the European Patent Office describes Article 57 as a reinforcing provision that excludes from patentability few inventions not set forth in Article 52.[254]

That Article 52 expressly excludes "programs for computers" may seem implausible to many, especially those familiar with the

249. Rainer Moufang, *Methods of Medical Treatment Under Patent Law*, 24 INT'L REV. INDUS. PROP. & COPYRIGHT L. 18, 22 (1993).

250. A.E.K. v. Federal Patent Office, 15 INT'L REV. INDUS. PROP. & COPYRIGHT L. 82, 83 (1984) (reporting the September 21, 1982 opinion of the Swiss Supreme Court).

251. Gert Kolle, *The Patentable Invention in the European Patent Convention*, 5 INT'L REV. INDUS. PROP. & COPYRIGHT L. 140, 146 (1974).

252. European Patent Convention, *supra* note 245, art. 52.

253. European Patent Convention, *supra* note 245, art. 57.

254. *See* GUIDELINES FOR EXAMINATION IN THE EUROPEAN PATENT OFFICE, Part C at 40 (1994).

European Patent Office Gazette. In fact, the European Patent Office has drawn a distinction between computer software *per se* and its application towards the resolution of technical problems, and excluded from patentability only the former class of inventions.[255] Thus such inventions as manufacturing control software, signal processing and CAD/CAM systems have been held patentable.[256] The European Patent Office has also granted claims relating to the functioning of the computer as such, including programs concerning memory management, data organization and operating systems.[257] However, computer-related inventions relating to such matters as processing text[258] or learning to play a keyboard instrument[259] have been rejected as lacking a technical effect.

The Japanese Patent Office has also issued extensive guidelines on the industrial application requirement.[260] That agency views the requirement of industrial application to complement the Japanese Patent Act's definition of a statutory invention, the "creation of technical ideas utilizing natural laws."[261] Inventions claiming discoveries or natural laws as such, mere discoveries, personal skill, the mere presentation of information, aesthetic creations and matter contrary to natural laws are judged to be nonstatutory.[262]

The Japanese Patent Office Guidelines also identify a number of inventions that fail to fulfill the standard of industrial application. Methods of medical treatment and inventions utterly incapable of practical deployment, such as the method of preserving the ozone layer by covering the entire surface of the earth with ultraviolet light-absorbing film, fall within this category.[263] In addition, the Japanese Patent Office also denies patentability to inventions

255. *See* Sean J. Hackett, *Patent Protection in Europe For Software Inventions*, 479 PLI/Pat 889 (May 5, 1997).

256. VICOM, Decision T 208/84, [1987] OJ EPO 14 (July 15, 1986).

257. *See Data processor network/IBM*, T 6/83, [1990] O.J. EPO 5 (Oct. 6, 1988).

258. *See Document abstracting and retrieving*, T 22/85, [1990] O.J. EPO 12 (Oct. 5, 1988).

259. *See Marker/BEATTIE*, T 603/89, 1992 O.J. EPO 230 (July 3, 1990).

260. *See* JAPANESE PATENT OFFICE, IMPLEMENTING GUIDELINES FOR EXAMINATION OF INDUSTRIALLY APPLICABLE INVENTIONS (April 1, 1997) [hereinafter Japanese Patent Office Guidelines]..

261. Japanese Patent Act, *supra* note 246, at Art. 2(1).

262. JAPANESE PATENT OFFICE GUIDELINES, *supra* note 260, at 1-4.

263. *Id.* at 4-7.

that lack a commercial character. Among such inventions are those limited to individual use, such as a method of smoking a cigarette.[264]

Although the European and Japanese patent systems share a sense of the industrial applicability requirement, their congruence with the informed views of technological philosophy does not appear promising at first glance. Patent laws and regulations lack the quality of disciplined reflection apparent in the writings of technological philosophy. Indeed, the pronunciative and succinct nature of these administrative texts contrasts strongly with the sustained and reasoned discussion of other observers in delimiting that which is technological.

But despite the differing purposes and perspectives of these authors, the industrial application standard appears very much in keeping with the characterizations of technology offered by contemporary technological thinking. In essence both regimes recognize their own subject matter by its distinguishing traits: production or transformation of artifacts; interaction with the external environment; systematic manipulation of physical forces; and the presence of design. Technological activities expend resources and knowledge in order to fabricate or modify products, or to develop procedural systems for so doing. Last, technology presents a form of rational and systematic knowledge, oriented towards efficiency and capable of being assessed through objective criteria.[265]

As in other contexts, to include some things is to exclude others. The touchstone of industrial application would exempt from the patent system matters of social observation or human behavior. Along with techniques from economics, psychology and the social sciences, methods of doing business would also lack the requisite of industrial applicability. Business methods may be amenable to reasoned analysis and motivated towards efficient practice, but they are not transformative in character. They do not manipulate physical forces to achieve the production or transformation of material objects. Such methods engage economic principles rather than the laws of physics, chemistry or biology. They do not com-

264. *Id.* at 7.

265. *See supra* Part II.B.

prise technology, and should not be within the grasp of the patent system.

The industrial application standard would also remove from the patent system matters of the aesthetic or personal skill. Culturally and historically, we would not count endeavors in such fields as athletics, dance or surgery as technological, and neither should our patent system. To view these things as technology is, as Mitcham says, to approach them in an improper manner.[266] However such methods as swinging baseball bats, performing dance steps or dressing wounds call for the manipulation of external objects, these aspects of human society are principally acquired through personal experience. They do not involve the creation or transformation of material objects and are not repeatable in an industrial sense. We also appear to lack objective mechanisms for evaluating this subject matter in light of the requisites of patentability.

The bearing of the industrial application standard towards claims drafted in artifact format appears more complex. The *State Street* opinion provides a fine example of this difficulty, for the claims at issue there were drafted not in method format, but in terms of a "data processing system" consisting of hardware elements.[267] This orientation towards artifacts proved to be particularly deft claim drafting, for the Federal Circuit reposed great confidence in this characterization and repeatedly spoke of Signature's invention as a "machine" within the grasp of the patent statute.[268] A machine, unlike a pure process claim directed towards a business method, would at first blush appear susceptible to industrial application. Yet if our sense of patent eligibility becomes wholly subject to artful claim drafting, we have little hope of confining the patent system to the technological.[269]

The decision of the United Kingdom Patent Courts in *Merrill Lynch* presents a sensible resolution of this question.[270] Of course, the patent law of the United Kingdom reflects that of the European Patent Convention in requiring that patentable inventions be capa-

266. *See supra* text accompanying note 229.
267. 149 F.3d at 1371.
268. *See supra* text accompanying note 111.
269. *See* Thomas, *supra* note 98, at 257-61.
270. Merrill Lynch Inc.'s Application, [1988] RPC 1.

ble of industrial application.[271] Further, the application at issue, directed towards an automatic securities trading system, was analogous to that of the patent in *State Street*. Merrill Lynch's application described a computerized system that allowed customers to buy and sell stocks. The patent claims were set forth in functional terms, reciting a data processing system for enabling a securities trading market.[272]

Following a rejection of the application by the examiner, Merrill Lynch requested a hearing at the United Kingdom Patent Office. The principal examiner affirmed in reasoning that appears fully applicable to the facts in *State Street*:

> If the task performed is non-technical, for example a mathematical calculation or a business method, then the mere fact that it is being performed by a suitable machine, whether or not this involves a program, does not of itself provide a technical feature. I consider this to be a logical extension of the generally accepted view that there is no invention in merely stating that a known manual function is performed automatically even if this is expressed in terms of "means" for performing the essential parts of the function.
>
> I consider that the "means" specified . . . relate to features which either would be present in a conventional business computer system or define essential features required for the performance of the business method. Consequently this claim contains nothing which could be considered to constitute a new technical structure or to produce a technical effect . . . . I conclude therefore that this claim does not constitute a patentable invention.[273]

The Patents Court once again affirmed on appeal. Applying Article 52 of the European Patent Convention, the court noted the argument of counsel that:

> whether a patent could be obtained for a computer program,

271. *Id.*
272. *Id.*
273. Merrill Lynch Inc.'s Application, [1988] RPC 1.

> itself novel and not obvious, would be a matter of drafting, depending on the form of claim drafted. If claimed as a computer program it would not be patentable as excluded under [Article 52]; but a computer programmed to carry out that program would be patentable even though a conventional computer operating in a conventional manner when carrying out the various steps of the program. That seems to me to be a result that cannot have been intended by Parliament.[274]

Similar analysis should apply to "system" claims drafted to convey the sense of a hardware embodiment. If we mean to exclude methods of doing business from the regime of patents, then we should as well reject claims reciting computerized methods where the only patentable teaching lies in the realm of business rather than technology. To do otherwise is to exalt form over substance, an argument that has been made extensively elsewhere.[275]

The United States Patent Office's recently issued Software Guidelines appear to urge similar results. The Guidelines recognize that because "[t]here is always some form of physical transformation within a computer because a computer acts on signals and transforms them during its operation and changes the state of its components during the execution of a process," such activity alone is not determinative.[276] The Guidelines instead provide that the "utility of the invention must be within the technological arts" for it to be patentable, pointing to the familiar requirements of physical transformation and practical application.[277] Based on this and other text within the Guidelines, at least one commentator concluded that the Guidelines would render most computer-implemented business methods unpatentable.[278]

The Patent Office Deputy Commissioner took a different position, however, instead considering the Federal Circuit's *State*

274. Merrill Lynch's Application, [1989] RPC 561.

275. Most articulately in Stern, *supra* note 63. *See also* Richard H. Stern, *Solving the Algorithm Conundrum: After 1994 In the Federal Circuit, the Patent Law Needs a Radical Algorithmectomy*, 22 AM. INTELL. PROP. L. ASS'N Q.J. 167 (1994).

276. SOFTWARE GUIDELINES, *supra* note 184, at 7484.

277. *Id.* at 7479, 7483.

278. *See* Del Gallo, *supra* note 46, at 425-27.

Street opinion to have "ratified the validity of the approach taken" in the Guidelines.[279] Given the "Delphic" character of the Guidelines[280] and their inability to dictate examiner decisions,[281] overreliance upon the Guidelines seems inappropriate. The fact remains that the Patent Office has experienced a "boom" in applications claiming business methods and, following *State Street*, appears obliged to allow them to mature into granted patents.[282]

A legislative approach appears the best possibility for reminding the patent system that not everything we do is technological. Congress would do well to import the requirement of industrial applicability into United States patent law. This touchstone not only parallels much of the teachings of contemporary thought concerning technology, it would provide a proven criterion that already effects the majority of the world's issued patents. And not only does the TRIPS Agreement expressly allow signatories to impose this requirement,[283] its adoption would move the United States further in the direction of global patent harmonization.[284]

Of course, no claim can be made that industrial application would offer a panacea for our patent eligibility ills. The European Patent Office has arguably drifted from the reasoning of *Merrill Lynch* in a handful of recent opinions involving computer-implemented methods.[285] The Japanese Patent Office too seems

279. *See* Oberdorfer, *supra* note 7.

280. Richard H. Stern, *On Defining the Concept of Infringement of Intellectual Property Rights in Algorithms and Other Computer-Related Ideas*, 23 AM. INTELL. PROP. L. ASS'N Q.J. 401, 408 n.17 (Summer 1995).

281. *See* SOFTWARE GUIDELINES, *supra* note 184, at 7479 ("These Guidelines do not constitute substantive rulemaking and hence do not have the force and effect of law.").

282. *See* Oberdorfer, *supra* note. 7.

283. TRIPS Agreement, *supra* note 17, at art. 27(1).

284. *See* HAROLD C. WEGNER, PATENT HARMONIZATION § 2300 (1993).

285. In particular see the controversial decision *General-Purpose Management System/SOHEI*, T 769/92, 1995 OJ EPO 525 (May 31, 1994). The lengthy claims at issue before the European Patent Office Board of Appeal defined computer hardware, data storage files, and a plurality of processing means for controlling the hardware and for storing, updating, reading and outputting the data. The patent application described the system as useful for financial and inventory management, and in particular construction management. Thus the system might, for example, track the work to be done on a particular site within the construction industry.

According to the Board, the claimed invention involved technical considerations because it involved a novel use of different files to cause the computer to perform different

favorably disposed towards the patenting of known computer hardware that does no more than process data in a novel way.[286] But adoption of the industrial application standard here would render the current patentability debate a far more sober one. Rather than remain paralyzed by the complex issues surrounding the patentability of computer-related inventions, we should recognize that a broader movement is afoot. The stewards of our patent system would do well to consider informed responses to our increasingly ambitious scope of patenting, rather than rely upon the patent bar to stage an informed debate on the appropriate vision of appropriable subject matter.

CONCLUSION

Each issue of the Patent Office Gazette seems to include proprietary processes from an unlikely collection of disciplines. Although we once might have relegated these claims to some popular compilation of unusual patents,[287] the Federal Circuit opinions in *State Street* and *Excel* have imbued them with a newfound vitality. With the Patent Office open to patents on business method and data transformation, the frontiers of the patent system appear virtually without limit. The patent system now seems poised to impact callings ranging from the arts, to the social sciences, to the law itself.

There is much to commend the adoption of the standard of industrial application in the United States patent law. For our patent law should comport with our perception of what technology is, not defy it. By restoring a patentablility standard firmly grounded in industrial applicability, rather than equating technology with any-

tasks. Moreover, the Board noted that management of construction sites was comparable to the management of traditional manufacturing processes. The claimed invention could therefore not be considered a method of doing business excluded from patentability by the European Patent Convention. Although arguably quite a different case than *Merrill Lynch*, the reasoning of the *SOHEI* Board offers ample possibilities for artful claims drafters to overcome the restrictions upon patentable subject matter within the European Patent Convention.

286. *See* JAPANESE PATENT OFFICE, IMPLEMENTING GUIDELINES FOR INVENTIONS IN SPECIFIC FIELDS, *Computer Software Related Inventions*, § 2.2.1, (c)-2 (iii) (1997) (AIPPI).

287. *See e.g.*, RICK FEINBERG, PECULIAR PATENTS (1994).

thing artificial, we would also maintain the patent system in its proven paths. We would recognize our own humanity by refusing to identify our entire universe as technological in character.[288] However central to contemporary life and worthy of nurturing through the patent system, technology is but one manifestation of the human experience, not the only one.

288. The writings of Martin Heidegger suggest this concern. *See* Martin Heidegger, *The Question Concerning Technology*, *in* BASIC WRITINGS, 287, 308 (David Farrell Krell trans., 1977) ("As soon as what is unconcealed no longer concerns man even as object, but exclusively as standing-reserve, and man in the midst of objectlessness is nothing but the orderer of the standing-reserve, then he comes to the very brink of a precipitous fall, that is, he comes to the point where he himself will have to be taken as standing-reserve."); MARTIN HEIDEGGER, DISCOURSE ON THINKING 56 (John M. Anderson & E. Hans Freund trans., 1966) ("the approaching tide of technological advancement in the atomic age could so captivate, bewitch, dazzle, and beguile man that calculative thinking may someday come to be accepted and practiced *as the only* way of thinking.").