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ALCHEMY AND PATENTABILITY: TECHNOLOGY, "USEFUL ARTS," AND THE CHIMERICAL MIND-MACHINE

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I. INTRODUCTION

On July 7, 2005, the European Parliament voted overwhelmingly to reject the Council of the European Union's common position for adoption of a European Directive on the Patentability of Computer-Implemented Inventions (Directive).¹ This decisive and historic action on the part of the European Parliament finally brought an end to protracted debate over the Directive, returning Europe to its uneasy status quo with respect to the patentability of software and computer-related inventions.² However, based on the rhetoric that has accompanied the Directive since its introduction in 2002,³ it would appear that there is little consensus as to what the status quo in Europe actually is.⁴ In fact, the only point of agreement amongst the participants

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1. See Michael Rocard, *No Directive on Software Patents*, EUR. PARL. DAILY NOTEBOOK, July 6, 2005. The vote was 648 to 14 for rejection, with 18 abstentions. *Id.*

2. See *Intellectual Property: European Parliament Buries Software Patents Directive*, EUR. REP., July 9, 2005. The action is historic because it is the first time that the European Parliament rejected a proposed directive at this relatively early stage, prior to a conciliation procedure. See *id.* See *infra* notes 459-465, 473-479 and accompanying text for a description of the relevant procedure for enactment of directives in the European Union.

3. See *infra* note 455 and accompanying text.

4. Organizations of European small businesses, as well as participants in the open source software community, lobbied heavily against the Directive, arguing that its enactment would stifle innovation and impose unnecessary costs on small businesses. See Andreas Gauger & Marten Mickos, *NoSoftwarePatents.Com Issues Call to Action*, LINUX GRAM, Mar. 28, 2005; Lucia Kubosova, *MEPs Draw Up Battle Lines for Software Patent Vote*, EUOBSERVER.COM, July 5, 2005. Statements on the part of such organizations and participants often indicated a belief that the Directive would inaugurate the granting of patents on software and computer-related inventions in Europe. See *Intellectual Property: European Parliament Buries Software Patents Directive*, *supra* note 2; *NoSoftwarePatents.Com Issues Call to Action*, *supra*. In fact, the European Patent Office's Technical Board of Appeal has

in the debate concerning the Directive seems to be this: to the extent one can delineate a *European* approach to the patentability of software and computer programs, that approach is different from the approach in the United States of America and Japan and should remain so.⁵

The essence of the widely-perceived difference between the European approach and the American approach to patentability of software and computer-related inventions is that, in the case of the former, such patentability hinges on whether the invention has an identifiably “technical character.”⁶ In the case of America, on the other hand, recent jurisprudence of the Court of Appeals for the Federal Circuit (Federal Circuit) indicates that patentability hinges on the sole requirement of “usefulness.”⁷ However, in the case of America, it is important to remember that the Constitution of the United States of America (Constitution) imposes a fundamental limitation on the legislative power to enable patent grants, and this limitation is that patents may only be granted where they “promote the Progress of . . . useful Arts.”⁸ Inferentially, then, the American Constitution imposes a limi-

upheld the granting of such patents by the European Patent Office since 1987, and this position is generally followed in the United Kingdom and Germany. See Case T 208/84, *VICOM/Computer-Related Invention*, [1987] E.P.O.R. 74, construed in *In re Fujitsu Ltd.*, [1996] R.P.C. 511 (Pat.) (Eng.) [hereinafter *VICOM*]; Peter Mole & David Booton, *The Action Freezes? The Draft Directive on the Patentability of Computer Implemented Inventions*, 3 *INTELL. PROP. Q.* 289, 296-302 (2002). Several commentators have indicated that, rather than broaden the availability of patents for software and computer-related inventions, the Directive would have slightly restricted such availability if adopted in the form proposed by the Commission of the European Communities. See *id.*; Justin Hill, *Computer-Implemented Inventions in Europe*, *MONDAQ BUS. BRIEFING*, June 1, 2005.

5. See EUR. PARL. DOC. (A6-0207) 11 (2005), available at http://europa.eu.int/prelex/detail_dossier_real.cfm?CL=en&DosId=172020; ROBERT HART ET AL., REPORT TO THE EUROPEAN COMMISSION: STUDY CONTRACT ETD/99/B5-3000/E/106: THE ECONOMIC IMPACT OF PATENTABILITY OF COMPUTER PROGRAMS 6-8, 24 (1999), http://europa.eu.int/comm/internal_market/en/indprop/comp/study.pdf [hereinafter REPORT TO THE EUROPEAN COMMISSION].

6. See *VICOM*, [1987] E.P.O.R. at 74; EUR. PARL. DOC. (A6-0207) 11 (2005); REPORT TO THE EUROPEAN COMMISSION, *supra* note 5, at 24.

7. See *AT&T Corp. v. Excel Commc'ns*, 172 F.3d 1352 (Fed. Cir. 1999); *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998). For a thorough historical comparison of American and European approaches to software patentability, to which this Article owes much despite taking a different approach and reaching different conclusions, see John T. Soma et al., *Software Patents: A U.S. and E.U. Comparison* [sic], 8 *U. BALT. INTELL. PROP. L.J.* 1 (2000).

8. U.S. CONST. art. I, § 8, cl. 8. The complete clause states that Congress shall have the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.” *Id.* At the time this clause was drafted, in the late eighteenth century, the term “science” had a broader meaning than it does now, being roughly equivalent to terms like knowledge and learning. See *THE OXFORD DICTIONARY OF ENGLISH ETYMOLOGY* 797 (C.T. Onions ed., 1966) [hereinafter *OXFORD DICTIONARY*]. Thus, a widely accepted interpretation of this clause is

tation on the field within which patents may be granted, and this field is that of the "useful Arts."⁹

In his influential article, written the same year that the current Patent Act was enacted in America, Robert Coulter argued that the field of the useful arts is equivalent to the field of technology.¹⁰ This standard was explicitly endorsed in the context of computer-related inventions by the predecessor to the Federal Circuit, the Court of Customs and Patent Appeals (CCPA).¹¹ According to Judge Rich, "[a]ll that is necessary . . . to make a sequence of operational steps a statutory 'process' within 35 U.S.C. § 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of 'useful arts.'"¹² Although the United States Supreme Court has never explicitly affirmed this standard, it has never rejected it either.¹³ Therefore, although American and European

that it represents a so-called "balanced sentence," which was commonly used at the time. See Robert I. Coulter, *The Field of the Statutory Useful Arts (Part II)*, 34 J. PAT. OFF. SOC'Y 487, 491 (1952) [hereinafter Coulter II]. According to such an interpretation, the terms "Science," "Authors," and "Writings" all relate to one another, in parallel to the relation of "useful Arts," "Inventors," and "Discoveries." See *id.* at 491-92. Powerful evidence for this interpretation is provided by the title of the first patent act, The Patent Act of 1790, entitled An Act to Promote the Progress of Useful Arts. See *id.* at 490. The Patent Act of 1793, which replaced the Patent Act of 1790, was also so entitled. See THOMAS G. FESSENDEN, AN ESSAY ON THE LAW OF PATENTS FOR NEW INVENTIONS 193 (The Lawbook Exchange, Ltd. 2003) (1810); see also *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 100-01 (2d Cir. 1951); JOSEPH STORY, COMMENTARIES ON THE CONSTITUTION OF THE UNITED STATES 402-03 (Carolina Academic Press 1987) (1833); THE FEDERALIST NO. 43 (James Madison).

9. Coulter II, *supra* note 8, at 487.

10. See Robert I. Coulter, *The Field of the Statutory Useful Arts (Part I)*, 34 J. PAT. OFF. SOC'Y 417, 417-18 (1952) [hereinafter Coulter I]; Coulter II, *supra* note 8; Robert I. Coulter, *The Field of the Statutory Useful Arts (Part III)*, 34 J. PAT. OFF. SOC'Y 718, 737 (1952) [hereinafter Coulter III]. For a discussion of Coulter's arguments as they pertain to computer programs, which thoroughly explores the nature of technology and the art of computer programming, see Alan L. Durham, "Useful Arts" in the Information Age, 1999 BYU L. REV. 1419 (1999).

11. See *In re Musgrave*, 431 F.2d 882 (1970). Under the terms of the Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (codified as amended in scattered portions of Title 28 of the United States Code), the appellate functions of the CCPA and the United States Court of Claims were absorbed into a newly created Court of Appeals for the Federal Circuit, which assumed exclusive jurisdiction over patent appeals subject to certain limited exceptions. See 28 U.S.C. § 1295(a) (2000); Richard H. Seamon, *The Provenance of the Federal Courts Improvement Act of 1982*, 71 GEO. WASH. L. REV. 543, 551-54 (2003).

12. *Musgrave*, 431 F.2d at 893.

13. See *Diamond v. Diehr*, 450 U.S. 175, 200-05 (1981) (Stevens, J., dissenting). As noted by the Federal Circuit in *State Street Bank & Trust Co.*, the Supreme Court has several times cited Congressional Reports indicating Congress's intention that the terms "machine" and "manufacture," as used in the Patent Act of 1952, include "anything under the sun that is made by man." S. REP. NO. 82-1979, at 5 (1952); *Diehr*, 450 U.S. at 182; *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980); see *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998). Nevertheless, although this detail is not often

courts must address distinct doctrinal traditions when they render a determination as to the patentability of software and computer-related inventions, the essence of the problem they face is arguably the same: defining the boundary around what may be considered technical or technological.

The computer poses fundamental challenges to traditional definitions of technology because it combines attributes of the human mind with those of a machine and because the end results of its activities inextricably combine the physical realm of hardware and the symbolic realm of software. As the computer assumes an ever-expanding array of responsibilities traditionally performed by human beings, the difficulty of distinguishing between human beings and the technology of which they make use increases. In such a setting, moreover, determinations of patentability have broader social implications than have traditionally been acknowledged within the relatively insular world of patent examiners, attorneys, and judges.

The purpose of this Article is to trace the development of American and European jurisprudence pertaining to the patentability of software and computer-related inventions, viewing resultant doctrines as an accretion of attempts by various persons acting within differing historical contexts to define the boundaries of patentable technology. Such a historical exercise is useful, not only in demonstrating how the doctrine has come to be what it is, but also to demonstrate the difficulties faced by judges seeking to delineate patentability boundaries. The basic argument made in this Article is that the challenging patentability questions raised by computers and computer-related inventions should be addressed directly through careful consideration of the nature of technology. Currently, European jurisprudence is closer to engaging in such a consideration than American jurisprudence, by virtue of the technical character requirement. However, pressures to remain competitive with America and Japan threaten to make this requirement a mere formality. In America, it is essential that we engage in a discussion as to the constitutional boundaries of patentable technology. It is not enough to say that because distinctions are difficult to make, they should not be made.

noted, the legislative history speaks only to the terms machine and manufacture, not to the entirety of section 101 of the Patent Act. *See* S. REP. NO. 82-1979, at 5 (“A person may have ‘invented’ a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of the title are fulfilled.”). And in any case, such phraseology clearly does not (and moreover cannot) define Congress’s power under the Constitution, but rather merely purports to address Congress’s legislative intention. *See id.* at 2398-99.

II. THE CHIMERICAL MIND-MACHINE AND THE TECHNOLOGICAL ARTS

A. *The Nature of Computers and Their Programs*

General purpose computers, operating under the direction of software programs, constitute a chimerical creature, combining attributes of the human mind with attributes of a mindless machine.¹⁴ At a basic level, general purpose computers are comprised of a central processing unit, memory, and peripherals (monitor, keyboard, printer, ports, and drives).¹⁵ The machine's central processing unit can only process information according to a strict two-value (binary) logic system, and it really only understands two things: on or off.¹⁶ Nevertheless, accumulated layers of innovation enabling translation between human-comprehensible programming languages and binary logic, combined with architectural innovations enabling increased speed and memory capacity, make it relatively easy to instruct the computer to perform a multitude of tasks traditionally performed by human beings.¹⁷ Once these instructions have been effectively broken down into the computer's binary language, the machine performs many of these tasks with a speed and accuracy that far surpasses human beings. Although computers still cannot match human beings in certain areas, which might be variously described as common sense, intuition, or fuzzy logic, advances in the field of heuristics have made it possible to teach computers to learn.¹⁸ In some computers, memory is organized to imitate the behavior of neurons in the human brain.¹⁹

14. See GREGORY J.E. RAWLINS, *SLAVES OF THE MACHINE: THE QUICKENING OF COMPUTER TECHNOLOGY* 1-20 (1997). The chimera (chimæra) was a mutant creature of Greek mythology, which breathed fire and was variously described as a combination of lion, goat, dragon, and snake. See WIKIPEDIA: THE FREE ENCYCLOPEDIA, CHIMERA (CREATURE), <http://en.wikipedia.org/wiki/Chimera>. See generally THOMAS BULFINCH, *BULFINCH'S MYTHOLOGY* 117 (Modern Library ed. 1993) (1855).

15. See WILLIAM STALLINGS, *COMPUTER ORGANIZATION AND ARCHITECTURE: DESIGNING FOR PERFORMANCE* 5-10 (5th ed. 2000); GARY STIX & MIRIAM LACOB, *WHO GIVES A GIGABYTE?* 17-19 (1999).

16. See STIX & LACOB, *supra* note 15, at 12-14. See generally STALLINGS, *supra* note 15, at 27-28, 696-97. The first on/off switches were provided by vacuum tubes; but, after World War II, use of electricity was enabled by the discovery of substances (such as silicon) with properties that made them somewhat muted conductors of electricity, or "semiconductors." See *id.* at 14-17, 24-29. With the use of electricity, "on" is represented by a closed electric circuit, and "off" is represented by an open circuit. See STIX & LACOB, *supra* note 15, at 13.

17. See STIX & LACOB, *supra* note 15, at 19-24, 33-42.

18. See *id.* at 40-43, 46-49.

19. See *id.*

Advances in the ease of use and functionality of computers can be generally attributed to advances in two fields, which are only partially distinct: hardware and software.²⁰ The hardware components of a computer generally include all of the peripherals, the plastic casing of the computer, and the physical interior (memory chips and central processing unit).²¹ Conceptually, the hardware is comprised of the physical mechanisms by which the computer processes, records, and displays data: the switches (whether composed of vacuum tubes, electric circuits, or light), along with their attendant energy source, the units of memory storage (currently silicon microchips), the monitor, the keyboard, and the printer. Software, on the other hand, is the myriad of programs that instruct the computer to perform various processes.²² The essence of these programs is symbolic language, ranging from the simple, two-valued language of ones and zeros, to complex programming languages, which must ultimately be translated into the computer's binary language in order to perform their intended functions.²³

Computer programs are frequently conceptualized in terms of the functions they enable the computer to perform (operating systems, browsers, word processors, etc.), not the language of which they are comprised or the processes they actually instruct the computer to perform. And, as soon as the function of a computer program is focused upon, it becomes very difficult to distinguish between hardware and software because the function is defined in terms of what human beings observe as a result: a number, a sound, a document, a spreadsheet, or a mechanical operation. These resulting functions have only an indirect relationship to the mechanism by which the computer is actually processing data and would be relatively difficult for the non-specialist to locate within the programming code. For example, the simple representation of the letter "L" on a monitor screen requires a complicated interaction among software and hardware elements in which the application (for example, a word processor), in accordance with its programming, triggers the operating system to perform a pre-programmed function that must be translated into the binary language of the central processing unit, with the ultimate result being that several of the pixels, arranged in a grid on the screen, are appropriately illuminated.

20. See STALLINGS, *supra* note 15, at 19-35.

21. See *id.* at 53.

22. See *id.*

23. See *id.*; STIX & LACOB, *supra* note 15, at 33-40.

This difficulty of distinguishing between software and hardware, which is evident throughout the brief history in which patentability of computer-related inventions has been explored, is closely related to the much broader problem that arises in that context. This broader problem becomes evident when we recognize the challenge that computers pose to traditional classifications of knowledge and human endeavor. Ultimately, by combining attributes of the human mind with those of a machine and symbolic logic with physical materials and processes, computers fundamentally challenge the separation between abstract realms of culture and social interaction and traditionally concrete realms of craft processes and tools.

B. *Technological Versus Cultural and Social Arts*

The men who participated in drafting the Constitution and the first patent act in the United States (Patent Act of 1790) conceived of a world in which the term “arts” captured within it various skills and branches of learning.²⁴ The realm of the arts was divisible into cultural and useful arts, the former including liberal arts (grammar, logic/dialectics, rhetoric, arithmetic, geometry, music, and astronomy) and fine arts (painting, drawing, architecture, sculpture, poetry, dancing, and drama).²⁵ Certain additional arts were treated as distinct categories not within the category of useful arts, such as the arts of teaching (pedagogy), politics, war, and business.²⁶ These latter arts could be denominated together under the heading of “social arts” because their essence lies in working with people rather than things and, in working with such people, making complex judgments in the face of uncertainty.²⁷ The useful arts, then, comprised the “mysteries” of the European craft guilds; these mysteries were processes and tools used by trained human beings operating in the physical world to produce

24. See OXFORD DICTIONARY, *supra* note 8, at 52; Coulter II, *supra* note 8, at 493-94; Durham, *supra* note 10, at 1424-26, 1429-37.

25. See Coulter II, *supra* note 8, at 494-97. See generally ALEXIS DE TOCQUEVILLE, DEMOCRACY IN AMERICA 454-74 (J.P. Mayer & Max Lerner eds., George Lawrence trans., Harper & Row 1966) (1848).

26. See Coulter II, *supra* note 8, at 494-97.

27. According to Aristotelian categories, these areas of human activity were not comprised within the arts of material and technical production (*technē*), which were concerned with “making” and had an end other than themselves, but rather required excellence in action, or “practical wisdom,” which concerned itself with that which was best for human beings. See NICOMACHEAN ETHICS (1894), *reprinted in* 2 THE COMPLETE WORKS OF ARISTOTLE 1729-31, 1800-06 (Jonathan Barnes ed., Princeton Univ. Press 1984); see also PAMELA O. LONG, OPENNESS, SECRECY, AUTHORSHIP: TECHNICAL ARTS AND THE CULTURE OF KNOWLEDGE FROM ANTIQUITY TO THE RENAISSANCE 2 (2001).

physical objects generally regarded as being practically useful and marketable to other human beings.²⁸

Extrapolating from these traditional notions, two characteristics might be stated to define the technological, or useful, arts. First, they address themselves to means rather than ends.²⁹ In other words, they are primarily concerned with the processes and tools used to achieve a result that is helpful in the lives of human beings, rather than the result itself.³⁰ Second, they primarily relate to the physical world of things,

28. See Coulter II, *supra* note 8, at 496-97. The craft (*mestier, mysterie, art*) guilds of Europe can be viewed as representing a particular phase in the history of European organizations, with connections to organizational forms developed during the Roman Empire and utilized by the Church. See P.W. DUFF, *PERSONALITY IN ROMAN PRIVATE LAW* 103 (Augustus M. Kelley 1971) (1938); GEORGE UNWIN, *THE GILDS AND COMPANIES OF LONDON* 92-126 (1908); MAX WEBER, *GENERAL ECONOMIC HISTORY* 1-235 (Frank H. Knight trans., Dover Publications 2003) (1927) (compiling student notes from Weber's lectures given in winter 1919-1920 under the title *Outlines of Universal Social and Economic History*). In the City of London, these craft guilds began to emerge and differentiate themselves from older fraternities, primarily religious brotherhoods, seeking the ability to govern themselves under the City's supervision, in the thirteenth and fourteenth centuries. See *CALENDAR OF LETTER BOOKS PRESERVED AMONG THE ARCHIVES OF THE CORPORATION OF THE CITY OF LONDON AT THE GUILDHALL, LETTER BOOK G, FOLIO CXXXV b (1364), summarized and translated in CALENDAR OF LETTER BOOKS OF THE CITY OF LONDON* (Reginald R. Sharpe ed., Univ. of London & History of Parliament 1909), available at <http://www.british-history.ac.uk/source.asp?pubid=172> ("Also it is ordained that all the misteries of the City be lawfully ruled and governed, each in its kind, so that no deceit or false work be found therein by good men elected and sworn from each mistery. And if any be rebellious against them let him be fined and imprisoned in manner prescribed."); UNWIN, *supra*, at 92-126; SCRIVENERS' COMPANY COMMON PAPER 1357-1628, *ARTICLES ENROLLED IN GUILDHALL, 1357-92* (Francis W. Steer ed., Univ. of London & History of Parliament 1968), available at <http://www.british-history.ac.uk/source.asp?pubid=152>.

Item, it is ordained that all the crafts of the City of London should be loyally ruled and governed, each according to its nature in the proper manner, so that no falsehood nor wrong work nor deceit should be found in any kind of the said crafts, for the honour of the good men of the said crafts; and that, for the common advantage of the people, four or six [men] should be chosen and sworn from each craft, either more or fewer according to the needs of the craft, which men so chosen and sworn would have the full power of the Mayor to do and carry out this, well and loyally.

Id. The craft guilds were ultimately transformed through infiltration by merchants who gained control by virtue of the fact that they were needed to sell the products created by the craftsmen. See HAROLD G. FOX, *MONOPOLIES AND PATENTS: A STUDY OF THE HISTORY AND FUTURE OF THE PATENT MONOPOLY* 37-38 (1947); WEBER, *supra*, at 136-61, 230-35.

29. See *supra* notes 27-28 and accompanying text. Such a distinction is generally consistent with the meaning accorded to the German word *Technik* by Max Weber. See MAX WEBER, *ECONOMY AND SOCIETY: AN OUTLINE OF INTERPRETIVE SOCIOLOGY* (Guenther Roth & Claus Wittich eds., Ephraim Fischhoff et al. trans., Univ. of California Press 1978) (1968). Weber distinguished *Technik* from "economic action" based on the argument that the former is concerned with the means, and the latter with the end, of human activity. See *id.* at 65. Thus a choice between alternative technologies constitutes a choice between two alternative means to achieve a particular end. See *id.*

30. See *supra* notes 27-28 and accompanying text. To take the relatively trivial example of tooth-brushing, according to this distinction, the technological arts would include processes and tools for the brushing of teeth, not the result, which is (hopefully) clean teeth.

rather than the social realm of human interaction or the cultural realm of symbolic expression.³¹ Although the social and cultural arts can undoubtedly be *treated* as useful means to achieving particular ends,³² many would strongly protest that such arts should be treated as ends rather than means.³³ Any legal doctrine assuming the former treatment, absent careful consideration of historical developments, social implications, and political legitimacy, should be open to question.

C. *The Struggle to Articulate a "Meta-Jurisprudence" of Patentable Technology*

With these basic conceptions of computer programs and the useful arts as background, the struggle to delineate patentability rules applicable to computer programs can be more fully appreciated. As will be seen, the struggle played out differently in America and Europe, given differing legal and historical contexts. In America, specific doctrinal problems were presented by ambiguities concerning the patentability of processes as opposed to machines. In Europe, specific doctrinal difficulties can be attributed to the fact that basic patent law doctrines were being radically altered, as a result of harmonization, at the same time that computer-related inventions began to arise. Despite these specific differences, however, the fundamental problem of defining patentable technology runs through jurisprudential developments in both regions; in addition to addressing specific doctrinal contexts, judges were forced to address this more fundamental problem, albeit sometimes implicitly. As a result, European and American judges have subtly shaped a meta-jurisprudence of technology and patentability containing parallels that are often striking given the significant contextual differences.³⁴

31. See *supra* notes 27-28 and accompanying text; EUGEN VON BÖHM-BAWERK, *THE POSITIVE THEORY OF CAPITAL* I.II.1 (William A. Smart trans., Macmillan & Co. 1891) (1888) (stating that "[t]he end and aim of all production is the making of things with which to satisfy our wants," and that in order to produce these things, we humans "combine our own natural powers and natural powers of the external world in such a way that, under natural law, the desired material good must come into existence").

32. Weber stated that social relationships may be "valued as a potential source of present or future disposal over utilities," which he essentially defined to include all economic advantages useful in achieving economic ends. WEBER, *supra* note 29, at 68-69. Therefore, social relationships may be viewed as a means to an economic end and might arguably be included within Weber's broad definition of *Technik*.

33. See TOCQUEVILLE, *supra* note 25, at 459-68, 470-77.

34. The Greek prefix "meta" generally denotes that which goes beyond, or transcends, corresponding to the Latin prefix "trans." See OXFORD DICTIONARY, *supra* note 8, at 572-73. In computer science, it can denote a more fundamental level of analysis, as in "meta-data," meaning "data about the data." See WIKIPEDIA: THE FREE ENCYCLOPEDIA, METADATA,

III. THE AMERICAN STRUGGLE

A. *The Problem of "Processes" in American Patentability Jurisprudence (1790-1968)*

The Patent Act of 1790 provided for the patentability of "any useful art, manufacture, engine, machine, or device, or any improvement therein."³⁵ The Patent Act of 1793 retained these basic categories of patentable subject matter, while adding novelty as an explicit requirement for patentability;³⁶ and, the Patent Act of 1836 retained such categories and the novelty requirement, while introducing a Patent Office³⁷ and an examination of patentability prior to the grant of a patent.³⁸ Despite such legislative continuity in defining patentable subject matter, the term art, as used in these various patent acts, presented early interpretive problems for the Supreme Court.³⁹ Ironically, it was a patent claim pertaining to the electro-magnetic telegraph, an invention that bears haunting resemblances to modern computers and their worldwide interaction via the internet,⁴⁰ which prompted the Court to implicitly limit the statutory term art to the extent of process.⁴¹ Congress adopted this limitation in the Patent Act of 1952⁴² (1952 Patent Act), replacing the term art with the term process.⁴³

<http://en.wikipedia.org/wiki/Metadata>.

35. See Coulter II, *supra* note 8, at 500.

36. *Id.*; FESSENDEN, *supra* note 8, at 193 (stating that the Patent Act of 1793 provided for the granting of patents for "any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used before the application").

37. See Coulter II, *supra* note 8, at 500.

38. See Corning v. Burden, 56 U.S. 252, 270 (1854).

39. See *id.* at 267-68; O'Reilly v. Morse, 56 U.S. 62, 118-20, 130-34 (1854).

40. At a basic level, the internet is a global network of computers, which are connected through the international telecommunications infrastructure. See STIX & LACOB, *supra* note 15, at 53-55, 68-75. What most people think of as the internet is really the World Wide Web, which is made possible through the development of a family of programming languages based on the original hypertext markup language (HTML), as well as programs designed to recognize the "tags" created through such languages; such programs include browsers that create images on a computer screen and cause the computer to perform other functions in accordance with the instructions contained within HTML tags, and search engines that locate data housed on network servers located around the world. See *id.* at 75-77.

41. See O'Reilly, 56 U.S. at 118-20. The Court's limitation becomes clear upon reading the opinion of the dissenting Justices, who would have defined art more broadly to encompass an entire field of activity that might be created upon the discovery of a new application of a principle or law of nature. See *id.* at 128-35 (Grier, J., dissenting); see also Le Roy v. Tatham, 55 U.S. 156 (1852).

42. Patent Act of 1952, Pub. L. No. 82-593, 66 Stat. 792 (codified at 35 U.S.C. §§ 1-293 (2000)).

43. See 35 U.S.C. § 101 (2000) ("Whoever invents or discovers any new and useful

The early Supreme Court cases establishing the limitation of patentable statutory arts to processes, or methods, were founded upon a conceptual differentiation of (1) abstract principles, or laws of nature; (2) the means (processes or machines) embodying such principles that are used to achieve a result that is useful for human beings; and (3) the results achieved through the use of such means.⁴⁴ Only the second of these was regarded as constituting patentable subject matter.⁴⁵ Moreover, the Court explicitly recognized a danger inherent in claims stated in terms of processes, which was their tendency to easily conflate into a claim on either a principle or a functional result.⁴⁶ For this reason, the Court viewed the precision of the patent specification as being particularly important in the case of processes in order to keep the patent firmly tethered to patentable subject matter (that is to limit the scope of the patent) and to provide notice to others as to the boundaries over which they might not cross in seeking to accomplish the same result or apply the same principle.⁴⁷ Thus, in the case of processes, a "written description requirement" was connected at an early stage to the question of patentability, particularly to differentiate patentable processes from unpatentable principles.⁴⁸

Early decisions restricted the definition of a process to a series of physical actions or reactions, emphasizing that it is only "when the term process is used to represent the means or method of producing a result that it is patentable."⁴⁹ The Court cautioned against reading the term process in a "vague sense" whereby the term passively describes "the function of a machine, or the effect produced by it on the material

process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."); S. REP. NO. 82-1979, at 5 (1952).

44. *Le Roy*, 55 U.S. at 175; see *Corning*, 56 U.S. at 267-69; *O'Reilly*, 56 U.S. at 115-19.

45. *Le Roy*, 55 U.S. at 175.

46. See *id.*

47. *Id.* at 175-76; see *O'Reilly*, 56 U.S. at 112-21.

48. *O'Reilly*, 56 U.S. at 118. Even in the case of machines, the tendency of patent attorneys to draft claims in abstract terms led the Court to emphasize the role of the specification in determining patentability. See *Burr v. Duryee*, 68 U.S. 531, 570-72 (1863).

49. *Corning*, 56 U.S. at 267-68.

An art may require one or more processes or machines in order to produce a certain result or manufacture. The term machine includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations, are called processes.

Id. at 267.

subjected to the action of the machine.”⁵⁰ According to the Court, reading the term process in this vague sense would permit a person to patent the “function or abstract effect of a machine,” which was clearly prohibited.⁵¹

This prohibition against patenting the function of a machine is closely related to another doctrine that prohibited as functional claims describing an invention in terms of its function in order to capture as many devices or mechanisms as possible, including devices or mechanisms that the patentee might not even be familiar with or understand.⁵² In the 1952 Patent Act, Congress amended this doctrine by including in section 112⁵³ the following paragraph:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.⁵⁴

Thus, the “means-plus-function” claim was born.⁵⁵ Outside of this legislative exception, however, courts continued to state that “functional statements in a claim cannot be relied on to endow the claim with patentable subject matter”⁵⁶ and to treat the early cases prohibiting functional claims as vital.⁵⁷

Meanwhile, the Supreme Court continued to reiterate that neither principles⁵⁸ nor the function of a machine⁵⁹ are patentable. Nevertheless, definitions of patentable processes tended to broaden over time.⁶⁰

50. *Id.* at 268.

51. *See id.*

52. *See* Halliburton Oil Well Cementing Co. v. Walker, 329 U.S. 1, 8-9, 12-13 (1946); Gen. Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 371-73 (1938); Holland Furniture Co. v. Perkins Glue Co., 277 U.S. 245, 256-58 (1928).

53. 35 U.S.C. § 112 (2000).

54. *See* Edward D. Manzo, “Means” Claims in Patent Infringement Litigation, 68 J. PAT. & TRADEMARK OFF. SOC’Y 97, 99 (1986).

55. *See id.* at 99.

56. *In re* Krodel, 223 F.2d 285, 288 (C.C.P.A. 1955).

57. *See id.* at 289.

58. *Tilghman v. Proctor*, 102 U.S. 707, 724 (1880); *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 568, 570 (1863).

59. *See* *Expanded Metal Co. v. Bradford*, 214 U.S. 366, 383-86 (1909); *Boyden Power-Brake Co. v. Westinghouse*, 170 U.S. 537, 554-57 (1898); *Risdon Iron & Locomotive Works v. Medart*, 158 U.S. 68, 79 (1895); *Burr*, 68 U.S. at 568-70. Lower courts continued to cite the “function of machine” doctrine up through the 1950s. *See* *Diamond v. Diehr*, 450 U.S. 175, 196 (1981) (Stevens, J., dissenting).

60. *See* *Expanded Metal Co.*, 214 U.S. at 383-86; *Tilghman*, 102 U.S. at 728-29; *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876). In *Tilghman*, the Court acknowledged precedent establishing that only the means used to effectuate a functional result are patentable, but

Even the broader definitions, however, emphasized some physical action as characteristic of patentable processes; in *Cochrane v. Deener*,⁶¹ the Court defined a patentable process as “an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.”⁶² This language was interpreted to mean that a physical transformation of materials is necessary in order for a process to be patentable.⁶³ And so, when lower courts faced process claims that described processes of human thought or mental operations, they denied patentability on the basis that such claims did not describe a physical process of transformation, but described only certain mental steps. Where a process was essentially comprised of mental steps,⁶⁴ or where the only novel aspect of a process lay in a particular mental step,⁶⁵ patentability was routinely denied. By the early 1950s, a prohibition against patenting mental steps was regarded as settled doctrine.⁶⁶

added that “everything turns on the force and meaning of the word ‘means.’” *Tilghman*, 102 U.S. at 728. The Court further stated:

It is very certain that the means need not be a machine, or an apparatus; it may, as the court says, be a *process*. A machine is a thing. A process is an act, or a mode of acting. The one is visible to the eye,—an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. Either may be the means of producing a useful result.

Id.

61. *Cochrane*, 94 U.S. at 780.

62. *Id.* at 788.

63. *See Diehr*, 450 U.S. at 197 (Stevens, J., dissenting).

64. *See In re Bolongaro*, 62 F.2d 1059 (C.C.P.A. 1933). The invention in this case related to a method of producing a printed publication from a manuscript, involving a mathematical determination of the number of “letter spaces” for a given printed publication, dividing this by the number of lines in the publication to determine a “space factor per line” and using this to determine the printed layout of a given manuscript. *Id.* at 1059-60. Finding no cases “exactly in point,” the court nevertheless found that the case

more nearly approaches that line of cases in which the subject-matter has been held not patentable, and which has been referred to as including “a method of transacting business, a form of contract, a mode of procedure, a rule of conduct, a principle or idea, or a permissive function, predicated upon a thing involving no structural law.

Id. at 1060.

65. *See In re Heritage*, 150 F.2d 554 (C.C.P.A. 1945). The invention in this case related to a method of producing coated fiber boards “without materially impairing their porosity or acoustic properties.” *Id.* at 555. The specific methodology sought to be patented concerned testing pre-fabricated and differentially coated fiber boards to determine the ideal amount of coating for a particular desired acoustic quality. *Id.* at 555-56. The court held that the only novel aspect of the invention was “the mental process of making a selection of the amount of coating material to be used in accordance with a predetermined system” and that “[s]uch purely mental acts are not proper subject matter for protection under the patent statutes.” *Id.* at 556.

66. *See Diehr*, 450 U.S. at 195-96 (Stevens, J., dissenting); *In re Yuan*, 188 F.2d 377, 380 (C.C.P.A. 1951) (“This court has deemed it to have been thoroughly established by deci-

It was at this moment in time that the computer made its commercial debut.⁶⁷ By 1965, the computer had been miniaturized,⁶⁸ and its potential impact on society was becoming apparent.⁶⁹ That year, President Johnson appointed a commission to review the American patent system and issue recommendations.⁷⁰ The report of the commission issued in December 1966⁷¹ and, among its many recommendations, included a pragmatically-focused recommendation that patents not be extended to computer programs.⁷² Based on such recommendations, as well as contemporary understanding of American patentability doctrine, in 1968 the U.S. Patent and Trademark Office (USPTO) promulgated patentability guidelines that generally denied patentability to computer programs, whether claimed as machines or as processes.⁷³

sions of various courts that purely mental steps do not form a process which falls within the scope of patentability as defined by statute.”); *In re Abrams*, 188 F.2d 165, 168 (C.C.P.A. 1951) (“Citation of authority in support of the principle that claims to mental concepts which constitute the very substance of an alleged invention are not patentable is unnecessary. It is self-evident that thought is not patentable.”).

67. See STALLINGS, *supra* note 15, at 25. The first commercially successful computer was the UNIVAC I, which the United States Bureau of the Census purchased to perform certain calculations for the 1950 census. See *id.* IBM’s first electronic computer, the 701, became available in 1953. See *id.* at 33-34.

68. See *id.* at 24-32. The first “minicomputer,” named to evoke the miniskirt, was marketed by the Digital Equipment Corporation as the PDP-8. See *id.* at 34. Its price was approximately \$16,000. See *id.*

69. See Gabriel P. Katona, *Legal Protection of Computer Programs*, 47 J. PAT. OFF. SOC’Y 955, 955-56 (1965); *The Cybernated Generation*, TIME, Apr. 2, 1965, at 84 (“Just out of its teens, the computer is beginning to affect the very fabric of society, kindling both wonder and widespread apprehension. . . . [S]wept forward by a great wave of technology, of which the computer is the ultimate expression, human society is surely headed for some deep-reaching changes.”).

70. See Gerald D. O’Brien, *An Appraisal of the Report of the President’s Commission on the Patent System*, 49 J. PAT. OFF. SOC’Y 139, 139 (1967).

71. See Lyndon B. Johnson, Statement by the President Upon Releasing the Report of the Commission, in 2 WKLY. COMPILATION PRESIDENTIAL DOCUMENTS 1731, 1752 (1966).

72. See PRESIDENT’S COMM’N ON THE PATENT SYS., “TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS”: IN AN AGE OF EXPLODING TECHNOLOGY 13 (1966). The report focused on the limited capacity of the Patent Office to conduct reliable prior art searches. See *id.* The report pointedly noted that copyright protection was available for computer programs and that “the creation of programs has undergone substantial and satisfactory growth in the absence of patent protection.” *Id.*

73. See *Diamond v. Diehr*, 450 U.S. 175, 197-98 (1981) (Stevens, J., dissenting); Examination of Patent Applications on Computer Programs, 33 Fed. Reg. 15,609, 15,610 (Oct. 22, 1968) (“The basic principle to be applied is that computer programming per se, whether defined in the form of process or apparatus, shall not be patentable.”). The USPTO left open the possibility that where a computer program constituted just one component of an otherwise patentable process that produced a physical result and combined non-obvious elements, patentability would not be denied. See *Diehr*, 450 U.S. at 197-98.

But, 1968 was the year that the CCPA seized the opportunity to weigh in on the question of computer program patentability,⁷⁴ which it accomplished with the subtlety of the proverbial bull in the china closet. By 1970, the line of cases establishing the function of machine doctrine had been summarily dismissed as “the product of an essentially illogical distinction unwarranted by, and at odds with, the basic purposes of the patent system and productive of a range of undesirable results from the harshly inequitable to the silly.”⁷⁵ Ironically, although it was of more recent vintage, the mental steps doctrine proved more difficult to eliminate, requiring three decisions⁷⁶ by the CCPA. Nevertheless, the CCPA managed, over the strident objections of the USPTO, to eliminate the mental steps doctrine.⁷⁷ In the process, however, a jurisprudential morass was created, into which the Supreme Court would later step at its peril.

B. *Prater and Musgrave: Eliminating the Mental Steps Doctrine (1968-1970)*

The first case to squarely raise the question of computer program patentability was *In re Prater*.⁷⁸ The invention at the heart of *Prater*⁷⁹ constituted both a process and a machine to analyze and determine the chemical elements, including their respective concentrations, in a particular chemical composition.⁸⁰ The alleged novel and non-obvious aspect of the invention related to a particular “systematic method” of determining the subset of equations that would generate numerical concentration values with the least “error amplification.”⁸¹ While the machine specified in the application as implementing the claimed process was a “special-purpose analog device,”⁸² the claim itself was drafted in means-plus-function form,⁸³ and the specification disclosed

74. See *Diehr*, 450 U.S. at 194-95 (Stevens, J., dissenting); *In re Prater*, 415 F.2d 1378 (C.C.P.A. 1968) [hereinafter *Prater I*], modified on reh'g, 415 F.2d 1393 (C.C.P.A. 1969) [hereinafter *Prater II*]; *In re Tarczy-Hornoch*, 397 F.2d 856, 866-67 (C.C.P.A. 1968).

75. *Tarczy-Hornoch*, 397 F.2d at 866-67.

76. *In re Musgrave*, 431 F.2d 882 (C.C.P.A. 1970); *Prater I*, 415 F.2d 1378.

77. See *Musgrave*, 431 F.2d 882.

78. *Prater I*, 415 F.2d 1378.

79. *Prater*, without the distinction of *Prater I* or *Prater II*, refers to the entire controversy, including the *Prater I* and *Prater II* decisions, as well as the determinations of the USPTO.

80. *Prater II*, 415 F.2d at 1395.

81. *Id.* at 1396.

82. *Id.* at 1396-97.

83. See *supra* notes 52-55 and accompanying text.

a “general-purpose digital computer” as an equivalent device for implementing the process.⁸⁴ The examiner in the USPTO rejected the process claims as not comprising patentable subject matter, relying on the mental steps doctrine, and the Board of Appeals affirmed this rejection.⁸⁵ The examiner rejected the machine claim because it encompassed a general-purpose digital computer applying principles of mathematics; because the computer itself could not be novel, an analogous machine performing the same mathematic calculations would be obvious.⁸⁶ This reasoning was affirmed by the Board of Appeals.⁸⁷

The first *Prater* opinion (*Prater I*) was authored by Judge Smith and focused on a complete rejection of the notion that the patentability of process claims hinged on whether such processes “operate physically upon substances.”⁸⁸ Judge Smith attributed this rejected notion to a misunderstanding of *Cochrane v. Deener*,⁸⁹ arguing that the intention of *Cochrane* “was not to limit process patentability[,] but to point out that a process is not limited to the means used in performing it.”⁹⁰ Furthermore, Judge Smith argued that *Tilghman v. Proctor*⁹¹ had extended *Cochrane* by referring to a process as “a conception of the mind, seen only by its effects when being executed or performed,”⁹² thus “focus[ing] attention on the mental aspect of process inventions whose patentability we presently determine under the express provisions of the Patent Act of 1952.”⁹³ To Judge Smith, it was clear that process claims necessarily describe mental steps and that this had been recognized by the Supreme Court in *Tilghman* and incorporated by Congress into the 1952 Patent Act.⁹⁴ Therefore, the mental steps

84. See *Prater II*, 415 F.2d at 1397.

85. See *id.* at 1398. The examiner reasoned that the only physical steps involved in the process would involve writing on paper and that most aspects of the process would be carried out through mental calculations. Therefore, the only novel aspect of the invention related to the calculations themselves, which did not constitute patentable subject matter because they were mental acts. *Id.* The Board agreed, stating further that it was “beside the point that the solution of the mathematical problem can be done by machine. The claims has [sic] set forth nothing which cannot be performed purely as a mental exercise.” *Id.*

86. *Id.* at 1399.

87. See *id.*

88. See *Prater I*, 415 F.2d at 1387-89.

89. *Cochrane v. Deener*, 94 U.S. 780 (1876). See *supra* notes 58-63 and accompanying text.

90. *Prater I*, 415 F.2d at 1388.

91. *Tilghman v. Proctor*, 102 U.S. 707 (1880). See *supra* notes 58-63 and accompanying text.

92. *Tilghman*, 102 U.S. at 728.

93. *Prater I*, 415 F.2d at 1388.

94. See *id.* at 1387-89.

doctrine was based on a misunderstanding of precedent and properly rejected.⁹⁵ Furthermore, because the rejection of the machine claim had been based on analogous reasoning, and no references had been cited to defeat the novelty or non-obviousness of the machine, Judge Smith reversed the examiner's rejection of that claim as well.⁹⁶

Unfortunately, Judge Smith died on the same day his opinion issued, November 20, 1968; the opinion was joined by two other judges of the CCPA.⁹⁷ The court published the opinion, but simultaneously granted a petition for rehearing.⁹⁸ A blistering dissent from the grant of rehearing was authored by Judge Rich and joined by Judge Almond.⁹⁹ Judge Rich argued that a decision to allocate additional resources to the *Prater* case would divert scarce resources from other pending matters.¹⁰⁰ Moreover, in Judge Rich's opinion, the only reason the solicitor of the USPTO was urging rehearing was due to the USPTO's dislike of the *Prater I* outcome.¹⁰¹ Noting the "disrespectful [] tone" of the petition authored by the solicitor, Judge Rich stated:

Rehearing at this time can serve only to foster uncertainty in the law, to encourage the Patent Office in its policy of refusing to follow what this reviewing court has now declared the law to be and to have been, at least since 1952, and to prolong the controversy about what the law is.¹⁰²

Adding to the confusion and controversy, the second *Prater* opinion (*Prater II*), authored by Judge Baldwin, reversed the outcome of *Prater I* with respect to the process claims, affirming the USPTO's re-

95. See *id.* at 1388-89. Judge Smith also devoted a large share of his opinion to an analysis of *In re Abrams*, 188 F.2d 165, 168 (C.C.P.A. 1951), which the patent examiner had relied on heavily in rejecting the process claims at issue in *Prater*. See *Prater I*, 415 F.2d at 1382-86. Specifically, Judge Smith sought to debunk the notion that the CCPA in *Abrams* had adopted certain rules specified by *Abrams*' attorney for determining whether a process claim should be rejected under the mental steps doctrine. See *id.* at 1386. These rules sought to direct a court's attention to the presence of physical, as well as mental, aspects of a process claim. The rules would also direct a court to reject claims involving mental steps unless the claim embodied "both positive and physical steps as well as so-called mental steps," since novelty "reside[d] in" such physical steps. See *id.* Judge Smith noted language from *Abrams* wherein the court specifically stated that it was not adopting these rules as an analytical device. *Id.* While the *Abrams* court went on to support its holding by noting that it would fit within the rules as devised by *Abrams*' attorney, Judge Smith argued that this had no precedential effect and certainly could not be read as endorsing those rules for future jurisprudential analysis. See *id.*

96. See *id.* at 1389.

97. See *id.* at 1390.

98. See *id.*

99. See *id.* at 1390-93.

100. See *id.* at 1392-93.

101. See *id.* at 1390-91.

102. *Id.* at 1390.

jection of such claims. Based on his alternate analytical approach, however, Judge Baldwin agreed with Judge Smith's conclusion in *Prater I* that the USPTO's rejection of the machine claim should be reversed.¹⁰³ Rather than directly attack the mental steps doctrine, Judge Baldwin avoided it by arguing that the inclusion of a machine to implement the process at issue in *Prater* distinguished the case from prior cases where a process as disclosed could only be implemented through the human mind.¹⁰⁴ Noting that the two mental steps cases primarily relied on by the examiner in *Prater* were decided prior to the 1952 Patent Act, and expressly reserving a decision on whether the mental steps doctrine retained any vitality in the wake of that Act,¹⁰⁵ Judge Baldwin determined that the process claims at issue in *Prater* failed for indefiniteness under section 112 of the Act.¹⁰⁶ According to Judge Baldwin, by disclosing a machine capable of performing the claimed process, the applicants had gone just far enough to take their process claims outside the scope of the mental steps doctrine;¹⁰⁷ however, because the claims were broad enough to encompass performance of the process by means other than the disclosed machine (that is, by pencil and paper combined with human thought), they were not sufficiently limited to implementation through the machine and therefore failed to particularly point out and distinctly claim the subject matter of the invention as required by section 112.¹⁰⁸

Turning to the claim of the machine itself, Judge Baldwin found no barrier to patentability.¹⁰⁹ He flatly rejected the argument of the USPTO that it would be obvious to program a general-purpose computer to carry out the invention disclosed, characterizing this position as "fatally defective in that it, in effect, assumes the existence as prior art of appellants' discovery."¹¹⁰ If the purpose of the program itself was not obvious, being not a matter of prior art, it would not be obvi-

103. See *Prater II*, 415 F.2d at 1401-06.

104. See *id.* at 1401-05.

105. *Id.* at 1402. The two mental steps cases primarily relied upon by the examiner were *In re Yuan* and *In re Abrams*. See *supra* note 66 and accompanying text.

106. See *Prater II*, 415 F.2d at 1405.

107. See *id.* at 1403.

Although in view of our decision here we find it unnecessary to analyze and/or review in depth the so-called 'mental steps' doctrine, it would appear that the disclosure of apparatus for performing the process wholly without human intervention merely shows that the disclosed process does not fall within the so-called 'mental steps' exclusion.

Id. (emphasis added).

108. *Id.* at 1404-05.

109. See *id.* at 1405-06.

110. *Id.*

ous to program a computer to carry out that purpose, according to Judge Baldwin.¹¹¹ Furthermore, Judge Baldwin found no mental steps problem in the claim of the machine because he interpreted the claim as properly drafted in means-plus-function language, with sufficient limitation to exclude human thought as an equivalent means.¹¹² Therefore, the rejection of the machine claim was reversed.¹¹³

Thus, at the end of 1969, a mixed message was being sent with respect to the patentability of computer programs. Only one year earlier, the message was relatively clear, at least at the level of the USPTO, that computer programs were not patentable whether claimed as running on a machine or independently as a process.¹¹⁴ However, *Prater II* seemed to signal that such a program, if claimed as a machine programmed to carry out a non-obvious purpose, would be patentable.¹¹⁵ Moreover, the CCPA had taken the opportunity, in a footnote, to expressly signal patentability of both process and machine (apparatus) claims that included computer programs.

No reason is now apparent to us why, based on the Constitution, statute, or case law, apparatus and process claims broad enough to encompass the operation of a programmed general-purpose digital computer are necessarily unpatentable. In one sense, a general-purpose digital computer may be regarded as but a storeroom of parts and/or electrical components. But once a program has been introduced, the general-purpose digital computer becomes a special-purpose digital computer (i.e., a specific electrical circuit with or without electro-mechanical components) which, along with the process by which it operates, may be patented subject, of course, to the requirements of novelty, utility, and non-obviousness. Based on the present law, we see no other reasonable conclusion.¹¹⁶

111. *See id.* at 1406.

112. *Id.*

113. *Id.*

114. *See supra* note 73 and accompanying text.

115. This was confirmed by the CCPA in *In re Bernhart*, 417 F.2d 1395, 1400 (C.C.P.A. 1969), wherein it was stated that:

if a machine is programmed in a certain new and unobvious way, it is physically different from the machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. 101 that such improvements are statutory subject matter for a patent. It may well be that the vast majority of newly programmed machines are obvious to those skilled in the art and hence unpatentable under 35 U.S.C. 103. We are concluding here that such machines are statutory under 35 U.S.C. 101, and that claims defining them must be judged for patentability in light of the prior art.

Id.

116. *Prater II*, 415 F.2d at 1403 n.29.

Compounding the difficulty, the message as to the continuing vitality of the mental steps doctrine was hopelessly mixed. On the one hand, in *Prater I* the CCPA seemed to be signaling a willingness to reject the mental steps doctrine altogether.¹¹⁷ On the other hand, Judge Baldwin in *Prater II* explicitly reserved decision on this question, while hinting that the doctrine might only remain vital as applied through a section 112 indefiniteness inquiry.¹¹⁸ At the same time, Judge Baldwin appeared to affirm a distinction between “purely mental steps” and “purely physical steps,” thus permitting a reasonable observer to conclude that this distinction remained significant, while being desperately confused as to how it might be applied.¹¹⁹

It is not surprising, therefore, that just over one year later, in the case of *In re Musgrave*,¹²⁰ the CCPA decisively eliminated the tortured mental steps doctrine. The invention at issue in *Musgrave* related generally to a methodology for mapping the subsurface of the earth by measuring vibrations (energy) generated from exploding dynamite beneath the earth’s surface.¹²¹ More specifically, the claims at issue related to a process for correcting distortions in the electrical signals generated from such vibrations, where the distortions were caused by the linear spread of detectors along the earth’s surface.¹²² Relying solely on the mental steps doctrine, the examiner rejected the process claims for lack of statutory subject matter, and the Board of Appeals affirmed, arguing that, despite the fact that a physical reproduction (either magnetic or photographic) of the vibration signals was

117. See *Prater I*, 415 F.2d at 1388-89.

118. See *Prater II*, 415 F.2d at 1403-05.

119. See *id.* at 1402 n.22. The court stated as follows:

“Purely mental steps” are considered to be steps which may only be performed in, or with the aid of, the human mind. This is quite in contrast to “purely physical steps” which may only be performed by physical means, machinery, or apparatus. Purely mental steps (e.g., “believing”) are quite different from purely physical steps (e.g., “heating”) in many respects, not the least of which is that the former are much less susceptible to specific definition or delineation. Between the purely mental and purely physical ends of the spectrum there lies an infinite variety of steps that may be either machine-implemented or performed in, or with the aid of, the human mind (e.g., “comparing” and “determining”). In ascertaining whether a particular step is “mental” or “physical,” each case must be decided on its own facts, considering all of the surrounding circumstances, to determine which end of the spectrum that step is nearer. It may well be that the step of “comparing” may be “mental” in one process, yet “physical” in another. *Disclosure of apparatus for performing the process without human intervention may make out a prima facie case that the disclosed process is not mental and is, therefore, statutory.*

Id. (emphasis added).

120. *In re Musgrave*, 431 F.2d 882 (C.C.P.A. 1970).

121. See *id.* at 882-84.

122. See *id.* at 882-85.

necessary for the process to operate, the essential novelty of the invention lay in the correction method itself, which was drafted broadly enough to include "mere mental processing."¹²³ If the mere presence of a physical apparatus was sufficient to take claims outside the mental steps doctrine, the Board argued,

then methods of telling fortunes or predicting the activities of the stock market would be patentable providing one included the use of playing cards or a desk calculator in a claim that otherwise is for a non-statutory algorithm, such as the hypothesized principles underlying human behavior or the fluctuating values of the stock market.¹²⁴

In reversing the determination of the USPTO, Judge Rich, writing for the majority, stated definitively that simply because a claimed process delineates steps that could be taken in the human mind, the claimed process is not therefore rendered non-statutory.¹²⁵ According to Judge Rich, "[a]ll that is necessary . . . to make a sequence of operational steps a statutory 'process' within 35 U.S.C. § 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of 'useful arts.'"¹²⁶ In other words, according to a majority of the CCPA, the scope of patentable subject matter under the 1952 Patent Act is as broad as permitted by the Constitution and is defined by the limits of what may be considered to constitute "technological arts." While the majority in *Musgrave* did not explicitly state its rejection of the mental steps doctrine, such a rejection was logically clear from the position taken by the majority, as was noted by Judge Baldwin in his concurring opinion.¹²⁷

123. See *id.* at 885-88. The Board also noted that certain of the claims represented a "method of processing data," which it deemed non-statutory both based on the mental steps doctrine and as a solution to a mathematical algorithm. See *id.* at 888.

124. *Id.* at 886.

125. See *id.* at 892-93. Judge Rich also reiterated that the rules articulated by Abrams' attorney in *In re Abrams* had not been adopted by the CCPA and, moreover, were rejected by the CCPA. See *id.* at 888-90; *supra* note 95.

126. *Id.* at 893. Although the majority acknowledged the importance of a section 112 indefiniteness inquiry, it did not see that inquiry as determinative for the *Musgrave* claims. See *id.*

Of course, to obtain a valid patent the claim must also comply with all the other provisions of the statute, including definiteness under 35 U.S.C. § 112. A step requiring the exercise of subjective judgment without restriction might be objectionable as rendering a claim indefinite, but this would provide no statutory basis for a rejection under 35 U.S.C. § 101. Moreover . . . the claims here on appeal clearly contain no steps of that type.

Id.

127. See *id.* at 894 (Baldwin, J., concurring).

By taking the position that statutory subject matter extended to the full range of the technological arts, it may be inferred that the *Musgrave* majority believed it had solved the vexing problems of determining whether process claims encompassed mental steps, in addition to disabusing the USPTO of the notion that it could utilize a “point of novelty approach,”¹²⁸ separately analyzing the individual steps of a particular claim and rejecting the claim on the basis that its only novel steps were mental.¹²⁹ In reality, as Judge Baldwin noted in his concurring opinion, the *Musgrave* majority had substituted new definitional problems, including the problem of divining the meaning of technological arts, for the familiar definitional problems relating to mental steps.¹³⁰

C. Replacing “Mental Steps” with “Algorithms”—The Supreme Court Steps in (1972-1981)

In *Gottschalk v. Benson*,¹³¹ the Supreme Court recognized the opportunity to opine directly on the patentability of computer software and seized it. The invention at issue in *Benson* was a computer program for converting decimal numerals (numbers 0 and 1-9, ordered to reflect conventional numbers, for example, 192) into “computer-readable” binary numerals, combinations of 0 and 1.¹³² The program was claimed as a process, operating in a general-purpose computer, and the claims were not otherwise limited to a particular application.¹³³ The USPTO, apparently clinging to its 1968 Guidelines and the familiar mental steps doctrine, rejected the claims as lacking patentable subject matter.¹³⁴ The CCPA reversed, noting that it had dealt “at length” with the mental steps doctrine in the *Prater* and *Musgrave*

128. Using the point of novelty approach, an examiner identified the particular aspects of a claim that were novel and, if the only novel aspects comprised non-statutory items (for example, mental steps), rejected the entire claim as “nonstatutory” under § 101. *Diamond v. Diehr*, 450 U.S. 175, 201 n.15 (1984) (Stevens, J., dissenting).

129. See *Musgrave*, 431 F.2d at 893.

In considering the patentability of a process consisting of a plurality of steps we think it is immaterial to the question whether the combination is a statutory ‘process’ that individual steps are old. The whole process could be old and yet be statutory; a fortiori, it matters not that one or more steps are old.

Id.

130. See *id.* at 893, 895.

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

132. See *id.* at 63-67.

133. *Id.* at 64.

134. See *In re Benson*, 441 F.2d 682, 684-86 (C.C.P.A. 1971), *rev’d sub nom. Benson*, 409 U.S. at 63.

decisions, but relying primarily on the fact that the processes disclosed were clearly contemplated to be carried out by a machine and therefore did not necessarily implicate steps carried out by a human mind.¹³⁵ Alluding once again to the scope of statutory subject matter as equated with useful arts, meaning technological arts, the CCPA took the opportunity to state as follows:

It seems beyond question that the machines—the computers—are in the technological field, are a part of one of our best-known technologies, and are in the “useful arts” rather than the “liberal arts,” as are all other types of “business machines,” regardless of the uses to which their users may put them. How can it be said that a process having no practical value other than enhancing the internal operation of those machines is not likewise in the technological or useful arts?¹³⁶

Returning to a familiar theme, the Supreme Court reversed, stating that “the clue to the patentability of a process claim that does not include particular machines” is the “[t]ransformation and reduction of an article ‘to a different state or thing.’”¹³⁷ Citing *Tilghman v. Proctor*,¹³⁸ the Court thus revived the basic reliance on physical transformation as the hallmark of patentable subject matter,¹³⁹ in direct contrast to Judge Smith in *Prater I* who had relied on that same case in rejecting the notion that the patentability of process claims hinged on whether such processes “operate physically upon substances.”¹⁴⁰ Denying that the Court was wholly precluding patentability of computer programs or “leaving no room for the revelations of the new, onrushing technology,” Justice Douglas (writing for a unanimous Supreme Court) argued that permitting a patent on the claims in *Benson* would be equivalent to patenting an idea.¹⁴¹ The Court expressed concern with the potential scope of such a patent, stating that because the “mathematical formula” at issue in the application had “no substantial practical application” other than in a computer, a “patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.”¹⁴² The Court noted the rec-

135. *See id.* at 686-88.

136. *Id.* at 688.

137. *Benson*, 409 U.S. at 70.

138. *Tilghman v. Proctor*, 102 U.S. 707 (1880).

139. *See Benson*, 409 U.S. at 70; *supra* notes 49, 61-63.

140. *Prater I*, 415 F.2d at 1387-89.

141. *See Benson*, 409 U.S. at 71.

142. *See id.* at 71-72.

ommendation of the 1965 President's Commission and called on Congress to address these technological problems as a policy matter.¹⁴³

Following *Benson*, the USPTO essentially replaced mental step with algorithms in rejecting claims implicating computer programs, and the CCPA reacted by systematically limiting the scope of exclusion. First, the CCPA determined that *Benson* only applied to process claims.¹⁴⁴ Thus, in accordance with holdings prior to *Benson*,¹⁴⁵ where a computer program was claimed as a machine specially programmed to carry out a non-obvious purpose, it would be patentable as "structurally different from a machine without that program."¹⁴⁶ Second, the CCPA interpreted *Benson* narrowly as it applied to process claims, finding those claims to fail for lack of statutory subject matter only where allowing their patentability "would pre-empt all uses of an algorithm or mathematical formula."¹⁴⁷

However, the USPTO strenuously objected to the direction taken by the CCPA, and in 1978, the Supreme Court attempted once again to intervene.¹⁴⁸ The invention at issue in *Parker v. Flook* generally related to the calculation by a computer of an "alarm limit" to signal abnormal conditions in the process of catalytic conversion.¹⁴⁹ More specifically, the applicants claimed a process to make use of a mathematical formula in order to continuously update the alarm limit based on changing conditions throughout the catalytic conversion process.¹⁵⁰ Noting that the industrial applications of this process were widely dispersed, the Supreme Court nevertheless found that the claims "do not . . . cover every conceivable application of the formula."¹⁵¹ Thus, in reversing the determination of the CCPA¹⁵² and holding that the applicant's claims failed as lacking statutory subject

143. See *id.* at 72-73.

144. See *In re Noll*, 545 F.2d 141, 149 (C.C.P.A. 1976); *In re Johnston*, 502 F.2d 765, 771 (C.C.P.A. 1974), *rev'd on other grounds*, *Dann v. Johnston*, 425 U.S. 219 (1976).

145. See, e.g., *In re Bernhart*, 417 F.2d 1395, 1400 (C.C.P.A. 1969).

146. *In re Noll*, 545 F.2d at 148.

147. *Diamond v. Diehr*, 450 U.S. 175, 203 (1981) (Stevens, J., dissenting); see *In re Chatfield*, 545 F.2d 152, 156, 158-59 (1976). In order to identify this narrow class of mathematical formulae and algorithms, *In re Freeman*, 573 F.2d 1237 (1978), articulated a two-part test, under which a determination was first to be made whether an "algorithm" was recited or implicated by the process claims. *Id.* at 1245. If so, the claim was to be "further analyzed to ascertain whether in its entirety it wholly preempts that algorithm." *Id.*

148. See *Parker v. Flook*, 437 U.S. 584, 587-88 (1978) (describing the certiorari petition of the Acting Commissioner of Patents and Trademarks).

149. See *id.* at 585.

150. See *id.* at 585-86.

151. *Id.* at 586.

152. *Id.* at 596.

matter under section 101,¹⁵³ the Supreme Court clearly signaled its disapproval of the CCPA's narrow interpretation of *Benson*.

Moreover, the Supreme Court held that the mere fact that the calculation resulted in a specific usable outcome (alarm limit), and thus implicated "post-solution" physical activity, was not sufficient to make the claims statutory under section 101 in light of *Benson*.¹⁵⁴ Writing for the majority, Justice Stevens reiterated the need to distinguish patentable processes from unpatentable principles¹⁵⁵ and, citing *Cochrane v. Deener*,¹⁵⁶ hinted that the Court might only recognize statutory processes where the particular process "either was tied to a particular apparatus or operated to change materials to a 'different state or thing.'"¹⁵⁷ Thus, the Supreme Court appeared to return to physical transformation as the key to delimiting the scope of patentable processes.

Unfortunately, the Court did not limit its holding to these points, but proceeded further to articulate a test to determine a process "new and useful" and therefore statutory under section 101.¹⁵⁸ In making this determination, the Court directed that a mathematical algorithm recited in the claims should be "treated as though it were a familiar part of the prior art."¹⁵⁹ Using this analytical tool, the Court determined that the claims at issue in *Parker* did not recite statutory subject matter because only the calculation method was new and useful.¹⁶⁰ This mode of argument left the Court vulnerable to two significant criticisms; these were, first, that it was improperly confusing the question of statutory subject matter with the questions of novelty and non-obviousness and, second, that it was separately analyzing the various

153. *Id.* at 589-90, 594.

154. *Id.* at 589-90.

The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance. A competent draftsman could attach some form of post-solution activity to almost any mathematical formula; the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques.

Id. at 590.

155. *Id.* at 589. "The line between a patentable 'process' and an unpatentable 'principle' is not always clear. Both are 'conception[s] of the mind, seen only by [their] effects when being executed or performed.'" *Id.* (citing *Tilghman v. Proctor*, 102 U.S. 707, 728 (1880)).

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

157. *See Parker*, 437 U.S. at 588 n.9.

158. *See id.* at 591-92.

159. *Id.* at 592.

160. *Id.* at 594-95.

elements of a claim, utilizing the same point-of-novelty analysis as had the USPTO in applying the mental steps doctrine.¹⁶¹

The holding in *Parker* did very little to resolve the disagreement between the CCPA and the USPTO.¹⁶² The CCPA was highly critical of the *Parker* opinion¹⁶³ and, other than adding a slight modification to its two-part test for determining whether a process claim was non-statutory for including a mathematical algorithm,¹⁶⁴ continued to treat process claims as statutory even where the only new element was implemented through a computer program.¹⁶⁵ At the same time, the USPTO continued to treat the exclusion for algorithms as functionally equivalent to the exclusion for mental steps, rejecting computer programs as unpatentable under section 101 of the Patent Act and pursuant to the 1968 Guidelines.¹⁶⁶

The Supreme Court returned to the troublesome issue of software patents one last time in 1981, in the case of *Diamond v. Diehr*.¹⁶⁷ The invention at issue in *Diehr* generally involved a process for “curing” synthetic rubber into a usable product by applying heat to a mixture of rubber chemical components and curing agents inside a mold.¹⁶⁸ More specifically, the applicants’ claims related to a process whereby the temperature inside the mold was continuously measured and fed into a computer, which updated the cure time, based on application of a familiar mathematical formula, and opened the mold at the moment indicated by the calculation.¹⁶⁹ The examiner rejected the claims based on the Supreme Court’s decision in *Gottschalk v. Benson*, arguing that they clearly contemplated the use of a computer program and interpreting *Benson* as standing for the proposition that such claims were unpatentable in the absence of Congressional action to resolve the question of computer program patentability.¹⁷⁰ The Board of Appeals

161. Both these points were raised in the dissenting opinion of Justice Stewart, which was joined by Justice Rehnquist and Chief Justice Burger. See *id.* at 599-600 (Stewart, J., dissenting). Justice Stevens’ dissent in *Diamond v. Diehr* explicitly acknowledged that “this analysis is functionally the same as the point-of-novelty analysis used in conjunction with the mental-steps doctrine.” *Diamond v. Diehr*, 450 U.S. 175, 204 n.22 (1981) (Stevens, J., dissenting).

162. See Soma et al., *supra* note 7, at 14.

163. See *In re Bergy*, 596 F.2d 952, 964-67 (C.C.P.A. 1979).

164. *In re Walter*, 618 F.2d 758, 766-67 (C.C.P.A. 1980).

165. *Diehr*, 450 U.S. at 204-05.

166. See Soma et al., *supra* note 7, at 14.

167. *Diehr*, 450 U.S. 175.

168. See *id.* at 177 & n.1.

169. See *id.* at 178-79.

170. See *In re Diehr*, 602 F.2d 982, 984 (C.C.P.A. 1979).

affirmed based on a determination that the heart of the invention was an "algorithm solving a mathematical problem in the sense" of *Parker v. Flook*; according to the Board, the only points of novelty in the invention lay in the steps of the claim relating to the application of the mathematical algorithm.¹⁷¹ Noting, based on *Parker*, that the mere presence of post-solution physical activity is not sufficient to render statutory a claim relating to a mathematical algorithm, the Board decided that the invention was essentially a computer program and that under the Supreme Court's holdings in *Benson* and *Parker*, the invention did not constitute statutory subject matter.¹⁷²

The CCPA reversed, finding fault with the examiner's reasoning that all computer programs were non-statutory subject matter and with the Board of Appeals' use of the point of novelty approach.¹⁷³ Looking at the claimed process as a whole, the CCPA characterized it as "fundamentally different from" the process at issue in *Parker*, where the applicant was "claiming a process for merely generating a new number by calculation."¹⁷⁴ According to the CCPA, because the calculations at issue in *Diehr* were "intimately entwined" with a physical process, the claims viewed as a whole were directed to statutory subject matter under *Benson* and *Parker*.¹⁷⁵

For the first time, the Supreme Court affirmed the determination of the CCPA based on nearly identical reasoning.¹⁷⁶ Returning to the early cases interpreting art to mean process under the Patent Act of 1793¹⁷⁷ and reciting the mantra that "Congress intended statutory subject matter to 'include anything under the sun that is made by man,'"¹⁷⁸ the Court held that "a physical and chemical process for molding precision synthetic rubber products falls within the section 101 categories of possibly patentable subject-matter."¹⁷⁹ Tracing through its prior cases distinguishing statutory subject matter from non-statutory "laws of nature, natural phenomena, and abstract ideas," the Court stated that "a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathe-

171. *Id.*

172. *See id.*

173. *See id.* at 985-89.

174. *Id.* at 988-89.

175. *See id.*

176. *See Diamond v. Diehr*, 450 U.S. 175, 192-93 (1981).

177. *See id.* at 182-84; *supra* notes 41-51, 58-62 and accompanying text.

178. *Diehr*, 450 U.S. at 182.

179. *Id.* at 184.

mathematical formula, computer program, or digital computer.”¹⁸⁰ Relying yet again on physical transformation to distinguish patentable claims from those seeking to patent an idea or principle, the Court held that

when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.¹⁸¹

Characterizing the applicants’ claims as being drawn to such a patentable “industrial process” (molding rubber products), the Court affirmed the judgment of the CCPA.¹⁸²

Moreover, the Court took the opportunity to firmly reject the point of novelty approach, stating that a determination of whether a process claim states statutory subject matter must proceed based on an evaluation of the process as a whole and should not involve considerations of novelty or non-obviousness.¹⁸³ Refusing to acknowledge that it was overruling *Parker* in this regard, the Court simply stated that to accept the point of novelty approach “would, if carried to its extreme, make all inventions unpatentable because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious.”¹⁸⁴

By focusing on the “transformation or reduction of an article to a different state or thing” as the hallmark of the useful arts and eliminating point of novelty analysis, the Court synchronized its approach with that of the CCPA, as articulated in *Musgrave* over ten years previously.¹⁸⁵ Although this signaled a welcome consistency between the Supreme Court and the CCPA, it pointed the way to the very same constitutional questions that Judge Baldwin had noted in his concur-

180. *Id.* at 187.

181. *Id.* at 192.

182. *See id.* at 192-93.

183. *See id.* at 188-90.

It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis. This is particularly true in a process claim because a new combination of steps in a process may be patentable even though all the constituents of the combination were well known and in common use before the combination was made. The ‘novelty’ of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.

Id. at 188-89.

184. *See id.* at 189 n.12.

185. *See supra* notes 125-29 and accompanying text.

ring opinion in *Musgrave*.¹⁸⁶ The nature of technology remained indeterminate.

D. Eliminating the Connection to "Physical Transformation" (1982-Present)

In 1982, the Federal Circuit replaced the CCPA.¹⁸⁷ Recognizing the Supreme Court's validation of the CCPA's general approach in *Diehr*, the Federal Circuit continued to rely on the CCPA's pre-*Diehr* doctrines for identifying non-patentable algorithms, albeit refined somewhat as a result of *Diehr*.¹⁸⁸ In effect, this meant that a computer program cleared the section 101 hurdle where it could be characterized as effecting a physical transformation of some kind, whether claimed as an apparatus¹⁸⁹ or as a process.¹⁹⁰ However, problems arose where a computer program or software was claimed directly because, under this approach, apparatus claims might succeed by virtue of their connection to physical elements of the computer,¹⁹¹ while

186. See *supra* note 130 and accompanying text.

187. See *supra* note 11 and accompanying text.

188. The two-part test recited in *In re Freeman*, 573 F.2d 1237, 1245 (C.C.P.A. 1978) and *In re Walter*, 618 F.2d 758, 766-67 (C.C.P.A. 1980) was modified by *In re Abele*, 684 F.2d 902 (C.C.P.A. 1982). See *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1058 (Fed. Cir. 1992); *supra* notes 147, 164 and accompanying text. The resultant *Freeman-Walter-Abele* test was applied by first determining:

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 § 101 are met.

Arrhythmia Research Tech., 958 F.2d at 1058.

189. See *Arrhythmia Research Tech.*, 958 F.2d at 1060-61 ("The computer-performed operations transform a particular input signal to a different output signal, in accordance with the internal structure of the computer as configured by electronic instructions. 'The claimed invention . . . converts one physical thing into another physical thing just as any other electrical circuitry would do.'" (quoting *In re Sherwood*, 613 F.2d 809, 819 (C.C.P.A. 1980)) (alteration in original)).

190. See *id.* at 1059 (characterizing the process steps as "physical process steps that transform one physical, electrical signal into another" and the *Freeman-Walter-Abele* standard as met because "the steps of [applicant's] method comprise an otherwise statutory process whose mathematical procedures are applied to physical process steps").

191. See *In re Iwahashi*, 888 F.2d 1370 (Fed. Cir. 1989). Because the apparatus claim was drafted in means-plus-function form, the Federal Circuit held that the procedural elements of the claim should be interpreted as limited by the physical structures recited in the specification, pursuant to section 112, paragraph 6 of the 1952 Patent Act. See *id.* at 1375. Under this holding, as long as the specification recited physical structures, the means-plus-function claim form operated to establish patentability. Soma et al., *supra* note 7, at 19.

process claims might fail due to their characterization as a mathematical algorithm.¹⁹²

In 1994, the Federal Circuit initiated the move away from physicality as the key to patentability through its decision in *In re Alappat*.¹⁹³ The invention at issue in *Alappat* concerned a mechanism for producing smooth waveform displays on a screen similar to a television screen.¹⁹⁴ More specifically, the applicants claimed an apparatus (a rasterizer), described in means-plus-function form, which adjusted the illumination intensity of pixels on the screen in order to accurately represent the vector (linear direction) of the wave.¹⁹⁵ In reversing the patent rejection by the USPTO,¹⁹⁶ the Federal Circuit followed its prior precedents, finding patentability based on the connection of claimed means with supporting structures recited in the specification.¹⁹⁷ Significantly, however, the Federal Circuit did not emphasize the physical aspect of these structures, but rather focused on a determination that the claimed invention, when viewed as a whole, was not a “disembodied mathematical concept.”¹⁹⁸ Finding that “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,”¹⁹⁹ the Federal Circuit held that “[t]his 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*.”²⁰⁰ Moreover, the Federal Circuit reiterated that a general-purpose computer programmed to

192. *See id.* at 18-19.

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

194. *See id.* at 1537.

195. *See id.* at 1537-38.

196. *Id.* at 1545.

197. *Id.* at 1540-41.

198. *Id.* at 1544. Having reviewed the precedent relating to mathematical algorithms, the Federal Circuit concluded that

the proper inquiry in dealing with the so called mathematical subject matter exception to § 101 alleged herein is to see whether the claimed subject matter as a whole is a disembodied mathematical concept, whether categorized as a mathematical formula, mathematical equation, mathematical algorithm, or the like, which in essence represents nothing more than a “law of nature,” “natural phenomenon,” or “abstract idea.”

Id.

199. *Id.*

200. *Id.* (emphasis added).

carry out such a result "in effect becomes a special purpose [machine] once it is programmed."²⁰¹

Although the *Alappat* case was delivered by a fractured en banc panel of the Federal Circuit, it constituted an essential step away from physical transformation as the key to patentability under section 101 to "useful, concrete, and tangible" as the key to such patentability. The following year, the USPTO published new proposed guidelines relating to the treatment of "Computer-Implemented Inventions,"²⁰² which were finalized in 1996²⁰³ and incorporated in the Manual of Patent Examining Procedure (MPEP)²⁰⁴ as section 2106 in 1998.²⁰⁵ Under these Guidelines, computer-implemented inventions were generally treated as patentable subject matter as long as they had a "practical application": "[o]nly when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. § 101."²⁰⁶ The examiner bore the burden to demonstrate that there was no conceivable practical application in the technological arts.²⁰⁷

That same year, the Federal Circuit decided *State Street Bank & Trust Co. v. Signature Financial Group*.²⁰⁸ Viewed in light of the above-described historical developments, the *State Street* decision comprised merely the next logical step, but it is enormously significant in expressly eliminating physicality as a defining aspect of technology. The invention at issue in *State Street* was generally described as a "data processing system" relating to a particular investment structure of mutual funds, identified under the trademark Hub and Spoke[®], whereby spoke funds would "pool their assets in [the hub] investment

201. *Id.* at 1545.

202. Request for Comments on Proposed Examination Guidelines for Computer-Implemented Inventions, 60 Fed. Reg. 28,778 (June 2, 1995).

203. Examination Guidelines for Computer-Related Inventions, 61 Fed. Reg. 7,478 (Feb. 28, 1996).

204. PATENT AND TRADEMARK OFFICE, U.S. DEP'T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE (7th ed. 1998), available at <http://www.uspto.gov/web/offices/pac/mpep/indexold.htm> [hereinafter PATENT EXAMINING PROCEDURE 7th ed.].

205. See Soma et al., *supra* note 7, at 23-24.

206. PATENT EXAMINING PROCEDURE 7th ed, *supra* note 204, § 2106(II)(A), at 2100-5 to -6.

207. See *id.*; cf. PATENT AND TRADEMARK OFFICE, U.S. DEP'T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE § 2106(IV) (8th ed. 2001), available at <http://www.uspto.gov/web/offices/pac/mpep/mpep.htm> [hereinafter PATENT EXAMINING PROCEDURE 8th ed.].

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

portfolio.”²⁰⁹ The overall structure was organized as a partnership for tax purposes and provided the added benefit of “economies of scale” in administration costs, due to the fact that changes in value for accounting and tax purposes could be calculated solely from the perspective of the investment hub and then attributed to each spoke based on the share of investment in the hub’s assets.²¹⁰ As noted by the Federal Circuit, “the complexity of the calculations” involved meant that “a computer or equivalent device is a virtual necessity to perform the task.”²¹¹

State Street reached the Federal Circuit as an appeal from a grant of partial summary judgment by the U.S. District Court for the District of Massachusetts, which had granted the motion in favor of State Street Bank & Trust Co. (State Street), finding as a matter of law that Signature Financial Group’s (Signature’s) patent on the Hub and Spoke[®] “data processing system” was invalid under section 101 of the Patent Act.²¹² Apparently, Signature entered into licensing negotiations with State Street, but these negotiations broke down.²¹³ The application originally contained both process and apparatus claims, but the process claims were withdrawn prior to the appeal to the Federal Circuit.²¹⁴ The district court determined the apparatus claims, drafted in means-plus-function form, to be invalid under section 101 because it concluded that they fell within the mathematical algorithm and “business method” exceptions to statutory subject matter.²¹⁵

The Federal Circuit responded by summarily laying the “ill-conceived [business method] exception to rest”²¹⁶ and determining that so long as a mathematical algorithm is “applied in a ‘useful’ way,” it constitutes patentable subject matter under section 101.²¹⁷ In rejecting the business method exception to statutory subject matter, the Federal Circuit essentially took the position that the technology by which modern business is carried out cannot be separated from the business methodologies that make use of that technology and that, therefore,

209. *Id.* at 1370.

210. *Id.* at 1370-71.

211. *Id.* at 1371.

212. *Id.* at 1370; *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 927 F. Supp. 502, 502 (D. Mass. 1996).

213. *State St. Bank & Trust*, 149 F.3d at 1370.

214. *Id.* at 1371.

215. *See id.* at 1372.

216. *Id.* at 1375.

217. *See id.* at 1373-75.

the latter is patentable to the same degree as the former.²¹⁸ Citing *In re Alappat*'s holding that a mathematical algorithm is patentable under section 101 so long as it produces a "useful, concrete and tangible" result,²¹⁹ the Federal Circuit proceeded to effectively eliminate the "tangible" aspect of that test, stating that "[u]npatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not 'useful.'"²²⁰ The 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," produced by the apparatus, a data processing system claimed in means-plus-function form, was useful; the fact that such result was a number rather than a physical thing did not interfere with its patentability under section 101 of the 1952 Patent Act.²²¹

This logic was extended one year later in *AT&T Corp. v. Excel Communications*.²²² The invention claimed by AT&T Corp. in this case concerned a system by which a long-distance telephone service subscriber could be identified by the service to which he/she had subscribed, enabling differential billing based on whether the subscriber was calling someone who subscribed to the same or a different service.²²³ This system operated by virtue of a "PIC" indicator (identifying the service provider of a particular subscriber and the person he/she was calling), and the process claimed merely connected subscribers' PICs through application of Boolean algebra.²²⁴ However, "[b]ecause the . . . process applies the Boolean principle to produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle," the Federal Circuit found no barrier to patentability under section 101.²²⁵

Most significantly, the Federal Circuit explicitly rejected the notion that a physical transformation is required for patentability under section 101, stating that a physical transformation "is not an invariable

218. See *id.* at 1376 n.13 ("Any historical distinctions between a method of 'doing' business and the means of carrying it out blur in the complexity of modern business systems."). The court's legal argument proceeded on the basis that the business method exception had never been solidly established and that each of the decisions that recited it actually relied on a different basis in finding a claimed invention unpatentable. See *id.* at 1375-76.

219. See *supra* note 200 and accompanying text.

220. See *State St. Bank & Trust*, 149 F.3d at 1373.

221. *Id.* at 1373, 1375.

222. *AT&T Corp. v. Excel Commc'ns, Inc.*, 172 F.3d 1352 (Fed. Cir. 1999).

223. *Id.* at 1353-54.

224. *Id.* at 1353-54, 1358.

225. *Id.* at 1358.

requirement, but merely one example of how a mathematical algorithm may bring about a useful application” and finding a “physical limitations analysis . . . of little value.”²²⁶ Thus the Federal Circuit determined that its *Freeman-Walter-Abele* test,²²⁷ which was applied following *Gottschalk v. Benson* and *Parker v. Flook* to determine whether the mathematical algorithm exception prohibited patentability under section 101,²²⁸ was no longer relevant.²²⁹ According to the Federal Circuit, in cases where the presence of a mathematical algorithm brings statutory subject matter into question, the only relevant inquiries are whether a “process, machine, manufacture, or composition of matter”²³⁰ has been described in the claims pursuant to section 101 of the Patent Act and whether such “process, machine, manufacture or composition of matter” produces a result which is useful.²³¹

As America entered the twenty-first century, it thus became clear that a connection to the physical world was no longer necessary in order to demonstrate patentability under section 101 of the 1952 Patent Act. In many ways, the Federal Circuit had merely returned to Judge Smith’s holding in *Prater I*, which explicitly contemplated severance of patentability from physicality.²³² However, when viewed adjacent to early and established Supreme Court precedent, the Federal Circuit’s patentability jurisprudence leaves something to be desired; it is difficult to identify any real attempt to wrestle either with the nature of technology or with what may divide such technology, or useful arts, from cultural and social arts. Even more concerning is the absence of any acknowledgement that good reasons may exist to exclude cultural and social arts, as well as principles, from patentable subject matter.²³³ Unquestionably, the American attempt to wrestle with patentability questions pertaining to computer programs has produced a meta-

226. *Id.* at 1358-59.

227. See *supra* note 188 for a discussion of the *Freeman-Walter-Abele* test.

228. See *supra* note 188.

229. See *AT&T*, 172 F.3d at 1359-60.

230. 35 U.S.C. § 101 (2000).

231. See *AT&T*, 172 F.3d at 1359-60.

232. See *supra* notes 88-94 and accompanying text.

233. Given the enormous utility of calculus, one might be tempted to conclude that under the Federal Circuit’s *State Street Bank & Trust* and *AT&T* holdings, it would be patentable. Although it is impossible to know what the impact upon subsequent intellectual developments would have been had Sir Isaac Newton or Gottfried Leibniz been able to patent calculus, it is sobering to consider the possibility. The question of whether calculus could have been protected under a patent system, and the impact that this may have had, was recently raised by Alan Greenspan, Chairman of the United States Federal Reserve System, at a conference held in Georgia. See *Greenspan Mulls Patent Problems*, BBC NEWS, Apr. 4, 2003, <http://news.bbc.co.uk/2/hi/business/2918691.stm>.

jurisprudence of patentability. If one were to characterize that meta-jurisprudence as it appears today, the characterization may be as follows: anything may be patented, regardless of the field or human endeavor to which it may relate, so long as it is useful,²³⁴ new,²³⁵ non-obvious,²³⁶ and adequately disclosed.²³⁷ In attempting to free itself from potentially-outdated definitions of technology, the Federal Circuit may have, in effect, defined technology to encompass the entire range of human activity.

IV. THE EUROPEAN STRUGGLE

The European struggle to determine whether computer programs should be patentable is better comprehended with an appreciation of the varying patent law frameworks that existed in Europe prior to the 1960s and the degree to which these frameworks were undermined by the rapid pace of legal and economic integration that occurred between 1960 and 1973. As has been shown, the question of computer program patentability posed enormous challenges in America, which enjoyed the benefits of a relatively stable patent law framework throughout the nineteenth and twentieth centuries. In the case of Europe, the challenge of computer programs arose during a period of significant legal instability and thus was even more acute. However, as will be seen, Europe also enjoyed the benefits of later-developed patent systems, particularly the German system, which emphasized technical character as a prerequisite to patentability. Although technical character has proven difficult to define, it has permitted European judges to articulate limits to patentability without necessarily relying on physicality to define those limits.

A. *Patentability Across Europe Prior to 1960*

Prior to the 1960s, the nation-states of Europe maintained relatively distinct legal frameworks for the granting of patents, which reflected varying historical experiences and philosophies relating to "industrial property."²³⁸ In the United Kingdom, the patent law

234. 35 U.S.C. § 101 (2000).

235. 35 U.S.C. § 102 (2000).

236. 35 U.S.C. § 103 (2000).

237. 35 U.S.C. § 112 (2000). These are the basic requirements for patentability, in addition to the requirement of patentable subject matter. See ROBERT P. MERGES ET AL., *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 112 (3d ed. 2003).

238. Thomas M. Meshbesh, *The Role of History in Comparative Patent Law*, 78 J.

framework was determined by the constitutional history of that nation, particularly the titanic battle over royally-granted monopolies, as evinced by the remaining foundational relevance of the Statute of Monopolies of 1623.²³⁹ This connection to a statute of such age resulted in the necessity of continually harmonizing legal development with older principles and on the whole tended to make English patent law relatively conservative and resistant to change.²⁴⁰ France, on the other hand, did not hesitate to break with the past as it emerged out of the Revolution and articulated a law of industrial property founded on the Rights of Man.²⁴¹ Nevertheless, the patent law framework developed in 1790 constituted a basic pattern for French patent law that survived until the late 1960s.²⁴² In the case of Germany, the emergence of a patent law rooted in the nation-state had to await the emergence of that nation-state; neither would occur until the nineteenth century.²⁴³ Partly because it developed relatively late, the patent law of the German nation contained certain features that distinguished it from the older patent laws of its neighbors.²⁴⁴

As additional European nation-states developed, they tended to imitate one of the three established patterns: English, French or German, to varying degrees. Thus, Italy, which led the European development of patent law during the fifteenth century, but did not form a

PAT. & TRADEMARK OFF. SOC'Y 594 (1996); David L. Cohen, Comment, *Article 69 and European Patent Integration*, 92 NW. U. L. REV. 1082, 1092-1112 (1998).

239. See PETER MEINHARDT, *INVENTIONS PATENTS AND MONOPOLY* 30-32 (1946). Section 6 of the Statute of Monopolies of 1623 provided an exception to the general prohibition against monopolies for "letters patent and grants of privilege for the term of fourteen years or under . . . of the sole working or making of any manner of new manufactures within this Realm, to the true and first inventor of such manufactures." *Id.* at 31 (quoting Statute of Monopolies § 6 (1623) (UK)). Through the Patents Act of 1949, the patent law of the United Kingdom continued to reference section 6 of the Statute of Monopolies in defining what constituted a patentable invention. See Patents Act of 1949, 1949, c. 87, § 101(1) (Eng.) ("['Invention' means any manner of new manufacture the subject of letters patent and grant of privilege within section six of the Statute of Monopolies and any new method or process of testing applicable to the improvement or control of manufacture, and includes an alleged invention.>").

240. See Meshbesh, *supra* note 238, at 601-02.

241. See Frank D. Prager, *A History of Intellectual Property From 1545 to 1787*, 26 J. PAT. OFF. SOC'Y 711, 756-57 (1944) (quoting the Industrial Property Statute of 1790 (Fr.)).

242. See Z. Weinstein, *Changes in Patent and Trademark Laws in France in the Last Ten Years*, 53 J. PAT. OFF. SOC'Y 778, 778-88 (1971).

243. See Cohen, *supra* note 238, at 1103-04. The German history of granting exclusive privileges to inventors is much older than the modern German state. See Frank D. Prager, *The Early Growth and Influence of Intellectual Property*, 34 J. PAT. OFF. SOC'Y 106, 122-26 (1952).

244. See Cohen, *supra* note 238, at 1103-11; Friedrich-Karl Beier, *Future Problems of Patent Law*, 3 INT'L REV. INDUS. PROP. & COPYRIGHT L. 423, 424-28 (1972). The first German patent statute was enacted in 1877. See *id.* at 424-25.

unified nation-state until the nineteenth century, followed the French pattern of patent law established in 1790 and perpetuated through the law of 1844.²⁴⁵ Similarly, the Belgian patent law of 1854 was strongly influenced by the French law of 1844.²⁴⁶ On the other hand, the Scandinavian and Nordic countries, Sweden, Denmark, Norway and Finland, as well as the Netherlands, followed the German approach.²⁴⁷ Switzerland did not develop anything beyond a very limited patent law until the early twentieth century,²⁴⁸ but the Swiss patent law that eventually developed seems to have been heavily influenced by the German approach, at least as far as patentability was concerned.²⁴⁹

The substantive feature common to all European patent laws, prior to the 1960s, was an emphasis on novelty and invention; the normative framework, as evinced in the various laws, was that patents should only be granted for new inventions.²⁵⁰ Application of this framework over the course of time, in the context of differing national histories and philosophical approaches to the law of patents, led to

245. See Mario Franzosi, *Italy*, in *EUROPEAN PATENT LAW AND PRACTICE* 33, 34 (Practising Law Institute 1971). The Italian patent law prior to the 1960s was based on an 1854 law, enacted just prior to Italian unification and “derived from French experiences.” See *id.* In 1474, the Republic of Venice enacted the first known general statute enabling the granting of exclusive rights for any “new and ingenious device” reduced to perfection in the City. See BRUCE W. BUGBEE, *GENESIS OF AMERICAN PATENT AND COPYRIGHT LAW* 22-23 (1967).

246. See Florent Gevers, *Belgium*, in *EUROPEAN PATENT LAW AND PRACTICE*, *supra* note 245, at 27.

247. See Christer Onn, *Scandinavia*, in *EUROPEAN PATENT LAW AND PRACTICE*, *supra* note 245, at 85-92; George F. van der Beek, *The Netherlands*, in *EUROPEAN PATENT LAW AND PRACTICE*, *supra* note 245, at 61-63 (describing the Patents Act of 1910, created anew after a hiatus in granting patents that began in 1869 due to strong Dutch opposition to patents generally); Host-Madsen, *Danish Patent System*, 30 *J. PAT. OFF. SOC'Y* 160 (1948) (describing the Danish Patents Act of 1894, which was the first in Denmark, and its replacement by the Patents Act of 1936).

248. See Dominique S. Ritter, *Switzerland's Patent Law History*, 14 *FORDHAM INTELL. PROP. MEDIA & ENT. L.J.* 463 (2004).

249. See Amt für Geistiges Eigentum [Swiss Office for the Protection of Intellectual Property] Sept. 3, 1968, 3055/67 (Switz.), reprinted in *English* in 1 *INT'L REV. OF INDUS. PROP. & COPYRIGHT L.* 148 (describing art. 1 par. 1 of the Patent Act as allowing patents for an “invention having industrial application”).

250. See Patentgesetz [German Patent Act], May 9, 1961, I at § 1(2)-(3), reprinted and translated in DR. J-DETLEV FRHR. VON UEXKÜLL, *GERMAN PATENT LAW, UTILITY MODEL LAW AND TRADE MARK LAW* 9 (1963) (“Patents are granted in respect of new inventions which are susceptible of industrial use.”); Patents Act of 1949, 1949, c. 87 § 101(1) (Eng.) (patents only granted for “inventions,” which are defined to be “any manner of new manufacture” within the meaning of section 6 of the Statute of Monopolies); Prager, *supra* note 241, at 756-57 (quoting the Industrial Property Statute of 1790 (Fr.) (“Any discovery or new invention, in any kind of industry, is the property of its author.”)). Even the nations that embraced socialism in the twentieth century required a *new* invention in order to grant a patent or similar inducement. See A. Vida, *The Law of Industrial Property in the Peoples' Democracies and the Soviet Union*, 12 *INT'L & COMP. L.Q.* 898 (1963).

significant differences in the additional elements articulated as requisites to patentability.

In the United Kingdom, the extension of patentability to processes and methods, in addition to "articles," meant that the historically rooted definition of invention as a "manner of new manufacture" had to be re-interpreted.²⁵¹ This led to a determination that in order to be patentable, an invention, particularly one claimed in the form of a method or process, must result in the production of some "vendible product."²⁵² Additionally, in order to be upheld as valid, an invention had to possess utility.²⁵³ The word utility captured two distinct concepts: first, an invention had to work the way it was supposed to, and second, the invention had to produce some "useful result," meaning something that in some small way was "better, cheaper, quicker," or more efficient than what had come before.²⁵⁴ Finally, a patent was upheld as valid only if the claimed invention involved an "inventive step" and was not "obvious."²⁵⁵ The requisite inventive step tended to be defined negatively; mere analogous uses of known devices or processes, combinations of known parts or devices absent "ingenuity" or a "striking result," and mere application of "common knowledge" or "public general knowledge," did not constitute inventive steps sufficient to support the validity of a granted patent.²⁵⁶

On the Continent, the tendency was to struggle directly with the nature of invention, rather than to elaborate additional, and nominally separate, requirements for patentability. In Germany, courts inter-

251. See THOMAS TERRELL, *THE LAW AND PRACTICE RELATING TO LETTERS PATENT FOR INVENTIONS* 24 (Fred B. Rothman & Co. 1991) (1884).

[T]he more modern view of the construction of the words "new manufacture" has been the result of a great deal of development. At first the judges seemed to be inclined to limit the subject-matter of letters patent to new articles produced; but as the arts and manufactures of the country progressed and increased, it was seen that by far the most important inventions were inventions in the *process* of making old and well-known articles of commerce, and so it became evident that should the construction of the words "new manufactures" be entirely limited to the production of new articles, to the exclusion of the process of manufacturing old articles by cheaper, better and more improved methods, the inducement which the common law intended to give to inventors would be curtailed to the narrowest possible limits.

Id.

252. See *In re Slee and Harris*, (1966) R.P.C. 194, 196 (Pat. Ct.) (Eng.) (discussing the holding in *In re G.E.C.*, (1943), 60 R.P.C. 1 (Pat. Ct.) (Eng.), that a method is a manufacture if it "results in the production of some vendible product"); MEINHARDT, *supra* note 239, at 41, 43-45.

253. See MEINHARDT, *supra* note 239, at 41, 47-48.

254. See *id.* at 47-48.

255. See *id.* at 41, 45-47.

256. See *id.*

preted the concept of patentable invention to require a technical effect (*technischer Effekt*) bringing an "advance in art."²⁵⁷ The "old German view" was that such a new technical effect was the characteristic that distinguished an invention from mere improvements.²⁵⁸ Over time, the absolute requirement of a new technical effect softened slightly, at least in the view of some commentators, to the requirement of a *considerable* technical advance, which contained the seeds of a focus on the *degree* of invention: "inventive level" or "inventive height" (*Erfindungshöhe*).²⁵⁹ However, the old standard did not disappear, but retained a presence in German patent law as the requirement of "technical progress/advance" (*technischer Fortschritt*), coexisting with the requirement of inventive height.²⁶⁰

Although the German Patent Act maintained the additional requirement that a patentable invention must be "susceptible of industrial use,"²⁶¹ this requirement tended to be absorbed under the requirement that an invention have a technical character, such that the emphasis in demonstrating patentability would almost always center on proof of technical advance or technical effect.²⁶² This requirement remained substantially the same whether one claimed a process or a product.²⁶³ The German emphasis on technical character or technical

257. See Cohen, *supra* note 238, at 1108 (describing an 1889 decision of the *Reichsgericht*, which is also discussed in Friedrich-Karl Beier, *The Inventive Step in Its Historical Development*, 17 INT'L REV. OF INDUS. PROP. & COPYRIGHT L. 301, 319 (1986)); Wolfgang G. Fasse, *Basic Patentability Requirements in the United States and Germany*, 44 J. PAT. OFF. SOC'Y 27, 28, 32-34 (1962); Paul B. West, *The German Analogy Process Doctrine*, 42 J. PAT. OFF. SOC'Y 621, 622-23 (1960). The memoirs of Carl Duisberg, a well-known German chemist of the nineteenth century, indicate that technical effect was a requirement for patentability under German law as early as 1885. See Peter J. Gaylor & L.F. Marx, *Carl Duisberg on Patents*, 26 J. PAT. OFF. SOC'Y 344, 349 (1944). "In order to prove a technical effect, which at that time [1885] already was important and influential for the decision on the patentability of the invention, we placed special emphasis on . . . the difference between" a new chemical compound and a known compound and on the important characteristics of the new compound. *Id.*

258. See H.E. Potts, *Invention and Graduated Validity*, 24 J. PAT. OFF. SOC'Y 629, 631 (1942) (citing KENT'S COMMENTARY 50, 108 (1906)).

259. See *id.* at 631-33 (emphasis added) (describing the evolution in Isay's *Patentgesetz* treatise between 1911 and 1926).

260. See Fasse, *supra* note 257, at 28.

261. See Patentgesetz [German Patent Act], May 9, 1961, I at § 1(2)-(3), *reprinted and translated in* DR. J-DETLEV FRHR. VON UEXKÜLL, GERMAN PATENT LAW, UTILITY MODEL LAW AND TRADE MARK LAW 9 (1963); Beier, *supra* note 244, at 425-28.

262. See Beier, *supra* note 244, at 425-28.

263. See West, *supra* note 257, at 622-24. Section 6 of the 1961 German Patent Act specifically referenced patented processes. See Patentgesetz [German Patent Act], May 9, 1961, I at § 6, *reprinted and translated in* DR. J-DETLEV FRHR. VON UEXKÜLL, GERMAN PATENT LAW, UTILITY MODEL LAW AND TRADE MARK LAW 9 (1963) ("If the patent has been granted in respect of a process, its effect shall extend to the products directly obtained by that

effect seems to have been very influential, for it appeared to varying degrees in the interpretation of other Continental patent laws, including France.²⁶⁴

As Europe entered the period of intensive integration between 1960 and 1973, the issue of patentability was increasingly seen in terms of a divergence between a British and a German approach.²⁶⁵ To be determined, then, was the degree to which an integrated European approach to patent law would adopt the standards for invention developed according to the German approach and whether the question of patentability would revolve around the nature of invention or, instead, be resolved according to formally separated inquiries of invention (interpreted broadly), novelty, utility, and inventive step, as in the British approach.

B. One Hundred Years of Integration: 1873-1973

The foundations for the integration of European patent law were laid in 1873 with the meeting of an international congress for the protection of industrial property, held in Vienna.²⁶⁶ This led, in 1883, to the execution of the Paris Convention for the Protection of Industrial Property (Paris Convention).²⁶⁷ The Paris Convention created a “Union for the protection of industrial property” amongst its member

process.”). In the field of chemical inventions, German patent lawyers distinguished between “original processes,” processes which themselves met the standards of invention through the establishment of some technical advantage resulting from the process, and “analogy processes,” processes which did not meet the standards of invention in their own right, but which resulted in a product with a superior technical effect. *See* West, *supra* note 257, at 622-23.

264. *See* Weinstein, *supra* note 242, at 787 (describing the addition of “non-obviousness” as a requirement for patentability in the new French patent law of 1968, and stating that this added a third condition of patentability, in addition to novelty and technical effect); Host-Madsen, *supra* note 247, at 164.

The Danish patent claim should characterize the invention as salient from the closest prior art In other words, if certain features are claimed as distinguishing over the prior art, it should be shown in the specification that these features as such result in a new technical effect.

Id.

265. *See* Potts, *supra* note 258, at 629.

266. *See* Michael N. Meller, *The Patent Cooperation Treaty – Utopia or Millenium*, 49 J. PAT. OFF. SOC’Y 565, 567 (1967).

267. Paris Convention for the Protection of Industrial Property, Mar. 20, 1883, 21 U.S.T. 1583, 828 U.N.T.S. 305, available at http://www.wipo.int/treaties/en/ip/paris/trtdocs_wo020.html [hereinafter Paris Convention]. *See* M. VAN EMPEL, *THE GRANTING OF EUROPEAN PATENTS* 4 (1975). At present, 169 nations are contracting parties to the Paris Convention, including the United States. *See* WIPO, *TREATIES AND CONTRACTING PARTIES*, http://www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=2 (last visited Sept. 22, 2005).

states²⁶⁸ and laid down the basic principle of “national treatment,” which required member states to accord to nationals of other member states the same treatment under patent law as accorded their own nationals.²⁶⁹ The Paris Convention established an elaborate governance structure for the Union²⁷⁰ and created an international organization to perform administrative tasks.²⁷¹ Finally, the Paris Convention specifically permitted countries of the Union to enter into additional “special agreements for the protection of industrial property,” as long as these agreements did not “contravene” the provisions of the Convention.²⁷²

The first stage in substantive harmonization of patentability requirements was achieved by the Nordic countries of Denmark, Finland, Norway, and Sweden.²⁷³ Beginning in 1938, and continuing after 1950, these nations collaborated in interpreting and unifying their patent laws.²⁷⁴ In 1968, new patent laws, with substantially identical content, went into effect in each of these countries.²⁷⁵ Under these laws, an “invention . . . susceptible of industrial exploitation”²⁷⁶ was

268. See Paris Convention, *supra* note 267, art. 1(1). “Industrial property” within the meaning of the Paris Convention includes patents, utility models, industrial designs, trademarks, trade names, service marks, indications of source or origin and the prohibition against unfair competition. See *id.* art. 1(2).

269. See *id.* art. 2; VAN EMPEL, *supra* note 267, at 4-5. In effect, this prevented states from discriminating against each other in the grant of patents to non-citizens and from requiring reciprocity in patent law before according equal treatment to non-citizens. See *id.*

270. See Paris Convention, *supra* note 267, arts. 13-16.

271. See *id.* art. 15. Between 1893 and 1967, the international organization that administered the Union was the *Bureaux Internationaux Réunis pour la Protection de la Propriété Intellectuelle* (BIRPI). See VAN EMPEL, *supra* note 267, at 7 n.29. BIRPI also administered the Union created by the Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, revised July 14, 1967, 828 U.N.T.S. 221 [hereinafter Berne Convention]. Under the Union created by the Berne Convention, member states agreed to a minimum substantive level of protection for literary, scientific, and artistic works and to reciprocal national protection at or above such minimum levels. See Laurinda L. Hicks & James R. Holbein, *Convergence of National Intellectual Property Norms in International Trading Agreements*, 12 AM. U. J. INT’L L. & POL’Y 769, 778-81 (1997). In 1967, the Paris Convention and the Berne Convention were amended to provide that WIPO would administer the conventions. See *id.* at 779, 781. WIPO was created through the execution of the multilateral Convention Establishing the World Intellectual Property Organization, July 14, 1967, 21 U.S.T. 1770, 828 U.N.T.S. 3, and presently administers twenty-three treaties and conventions relating to intellectual property. See WIPO, WIPO-ADMINISTERED TREATIES, <http://www.wipo.int/treaties/en/> (last visited Sept. 22, 2005). WIPO operates as a specialized agency of the United Nations. See WIPO, ABOUT WIPO, <http://www.wipo.int/about-wipo/en/> (last visited Sept. 22, 2005).

272. See Paris Convention, *supra* note 267, at art. 19.

273. See VAN EMPEL, *supra* note 267, at 9-10; Fredrik Neumeyer, *Unification of European Patent Legislation on the Common Market*, 24 MOD. L. REV. 725, 726 (1961).

274. See Neumeyer, *supra* note 273, at 726.

275. See VAN EMPEL, *supra* note 267, at 9-10; Onn, *supra* note 247, at 85-88.

276. Onn, *supra* note 247, at 216 (quoting Nordic Patent Act § 1).

patentable, as long as it “differ[ed] essentially from what was known before the filing date of the patent application.”²⁷⁷ The requirement of industrial exploitation was interpreted broadly, even to the extent of including governmental activities.²⁷⁸ The concept of invention was founded on the German principles emphasizing technical character and technical effect.²⁷⁹

In 1947, France and the Benelux countries of Belgium, the Netherlands, and Luxembourg, created an institute for novelty searches centered in The Hague.²⁸⁰ For France, this signaled the beginning of a shift to granting patents on the basis of an examination rather than on the basis of registration, although this shift would not be completed until 1968.²⁸¹ Most countries that followed the French approach to patents generally, including Belgium and Italy, followed the French registration system rather than conducting an examination prior to issuance of the patent.²⁸² However, the registration countries gradually realized that the lack of an examination prior to issuance tended to make their patents weaker than patents issued in countries with examination requirements.²⁸³ This created an incentive to make the transition to an examination system.²⁸⁴

In 1949, efforts directed to the development of a European patent began with the creation of the Council of Europe and the French submission of a plan for development.²⁸⁵ Although this plan was rejected,

277. *Id.* at 216-17 (quoting Nordic Patent Act § 2). Because anything made public in writing or in use, anywhere in the world, could defeat “novelty” under this provision, the Nordic countries are considered to have adopted an absolute standard of novelty. *See id.* at 219. Other countries that have adopted an absolute standard of novelty are France, Italy, and the Netherlands. *See* Kurt E. Laude, *A Step Toward a European Patent: The Common Market Patent*, 42 J. PAT. OFF. SOC’Y 698, 700 (1960).

278. *See* Onn, *supra* note 247, at 218-19.

279. *See id.* at 220-21.

280. *See* VAN EMPEL, *supra* note 267, at 6-7; Neumeyer, *supra* note 273, at 726. The institute created by the 1947 convention became known as the *Institut International des Brevets*. *See* VAN EMPEL, *supra* note 267, at 6.

281. *See* VAN EMPEL, *supra* note 267, at 5-6; Weinstein, *supra* note 242, at 781-82.

282. *See* Franzosi, *supra* note 245, at 37; Gevers, *supra* note 246, at 30-31.

283. *See* VAN EMPEL, *supra* note 267, at 6.

284. *See id.*

285. *See id.* at 10-11. The inspiration for creation of the Council of Europe was a 1946 speech given by Winston Churchill in Zürich, Switzerland, in which Mr. Churchill proposed the creation of a “United States of Europe.” *See* Winston Churchill, Prime Minister, United Kingdom, Address at the University of Zurich (Sept. 19, 1946), available at http://www.coe.int/T/e/Com/about_coe/ (last visited Sept. 22, 2005). The treaty known as the Statute of the Council of the Europe, May 5, 1949, 87 U.N.T.S. 103, was signed in London and formally established the Council of Europe. *See* COUNCIL OF EUROPE, THE COE IN BRIEF, CONVENTIONS, <http://conventions.coe.int/Treaty/en/Treaties/Html/001.htm> (last visited Sept. 22, 2005). The Council of Europe is presently comprised of forty-six member states, span-

the Consultative Assembly that formed to consider its continued meeting, and consensus began developing around the patentability harmonization proposal articulated in plans submitted in 1953 and 1954.²⁸⁶ Although consensus ultimately broke down over the institutional framework for granting and administering European patents, the substantive proposal survived.²⁸⁷ This proposal for a harmonized approach to patentability nominally included elements of both the British and German approaches, combining novelty, inventive step, and industrial application.²⁸⁸ However, in moving the focus away from the nature of invention to the separate requirement of an inventive step, the proposal was strongly influenced by the British approach.²⁸⁹ In 1963, this “harmonized” approach to patentability was embodied in the Convention on the Unification of Certain Points of Substantive Law (Strasbourg Convention),²⁹⁰ which continues to be administered by the Council of Europe.²⁹¹ Although the Strasbourg Convention did not enter into force until 1980,²⁹² it exerted a wide-ranging influence on the harmonization of patentability requirements in Europe after 1963.²⁹³

ning most of eastern and western Europe. See COUNCIL OF EUROPE, THE COE IN BRIEF, MEMBER STATES, http://www.coe.int/T/E/Com/About_Coe/Member_states/default.asp (last visited Sept. 22, 2005).

286. See VAN EMPEL, *supra* note 267, at 11.

287. See *id.* at 11-12.

288. See *id.*

289. It appears that an earlier version of the proposal may have retained the German requirements of inventive height (*Erfindungshöhe*) and technical advance (*technischer Fortschritt*). See Neumeyer, *supra* note 273, at 727 n.5.

A draft for an international (European) convention as to rules for patentability and exemptions from patentability, conditions of novelty of inventions, so-called prior right to an invention, test of sufficient technical progress (“*Erfindungshöhe*”) and shape of patent claims, has been prepared and will be discussed in the Council of Europe meeting in November 1961.

Id.

290. Convention on the Unification of Certain Points of Substantive Law, Nov. 27, 1963, 1249 U.N.T.S. 369, available at <http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=047&CM=8&CL=ENG> [hereinafter Strasbourg Convention]. Article 1 of the Strasbourg Convention provides that “patents shall be granted for inventions which are susceptible of industrial application, which are new and which involve an inventive step.” See *id.* art. 1.

291. See COUNCIL OF EUROPE, CONVENTIONS, STRASBOURG CONVENTION, <http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=047&CM=8&CL=ENG> (last visited Sept. 22, 2005).

292. See COUNCIL OF EUROPE, CONVENTIONS, STRASBOURG CONVENTION, LIST OF MEMBER STATES AND RATIFICATIONS, <http://conventions.coe.int/Treaty/Commun/CherchSig.asp?NT=047&CM=8&DF=&CL=ENG> (status as of Sept. 22, 2005).

293. See Convention Establishing a European System for the Grant of Patents, First Preliminary Draft art. 9(1), Jan. 13-Jan. 16, reprinted in 1 INT’L REV. INDUS. PROP. & COPYRIGHT L. 80, 87 [hereinafter First Preliminary Draft] (“European patents shall be granted for any in-

In 1957, the Treaty Establishing the European Economic Community (EEC Treaty)²⁹⁴ was signed in Rome by the Benelux countries, as well as Italy, France, and Germany.²⁹⁵ In 1960, Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom executed the Convention Establishing the European Free Trade Association,²⁹⁶ forming an “outer seven” to the inner six countries of the EEC Treaty.²⁹⁷ The extent of economic integration promised by these conventions naturally created a perceived need for greater substantive harmonization of industrial property law among the inner six and the outer seven.²⁹⁸ Following several years of its rumored existence, a first Draft Convention for a European Patent Law (1962 Draft Convention), providing for an integrated patent law for the EEC countries, was published and circulated.²⁹⁹ The substantive patentability requirements contained in the 1962 Draft Convention were essentially identical to those contained in the Strasbourg Convention: novelty, inventive step, and industrial application.³⁰⁰ Although the 1962 Draft Convention collapsed in 1964 due to disagreements as to how non-EEC countries might become members,³⁰¹ commentators immediately

ventions which are susceptible of industrial application, which are new and which involve an inventive step.”); MEMORANDUM ON THE SETTING UP OF A EUROPEAN SYSTEM FOR THE GRANT OF PATENTS, May 13, 1969, *reprinted in* Romuald Singer, *The European Patent Enters a New Phase*, 1 INT’L REV. INDUS. PROP. & COPYRIGHT L. 19 app. at 26-31 (stating that the rules of law concerning patentability to be provided in the proposed Convention should be based on the Strasbourg Convention as well as the Draft Convention relating to a European Patent Law of 1962); Kurt Haertel, *The Draft Conventions for a European System for the Grant of Patents and for the European Patent for the Common Market*, 1 INT’L REV. INDUS. PROP. & COPYRIGHT L. 289, 295 (1970); *see also infra* note 299 and accompanying text.

294. Treaty Establishing the European Economic Community, Mar. 25, 1957, 298 U.N.T.S. 11.

295. *See* GEORGE A. BERMANN ET AL., *CASES AND MATERIALS ON EUROPEAN COMMUNITY LAW* 7 (1993). A separate treaty establishing a European Atomic Energy Community was signed at the same time. *See id.* These two treaties became effective upon ratification by these “inner six” member states in 1958 and, together with the European Coal and Steel Community, constituted the foundation of the “European Community.” *See id.* at 5-8. The Benelux union was conceived in 1944 London by exiled leaders of Belgium, Luxembourg, and the Netherlands. *See id.* at 3. A Customs Convention between these three countries became effective in 1948 and was followed by a treaty establishing a common trading area in 1958. *See id.*

296. European Free Trade Association, Jan. 4, 1960, 370 U.N.T.S. 3.

297. *See* BERMANN ET AL., *supra* note 295, at 7.

298. *See* Laude, *supra* note 277, at 698; Neumeyer, *supra* note 273, at 725.

299. *See* Gert Kolle, *The Patentable Invention in the European Patent Convention*, 5 INT’L REV. INDUS. PROP. & COPYRIGHT L. 140, 142 (1974); Leonard J. Robbins, *The European Patent Convention—Some Present Viewpoints of the European Patent Profession*, 45 J. PAT. OFF. SOC’Y 295, 296 (1963); Singer, *supra* note 293, at 19.

300. *See* Kolle, *supra* note 299, at 142.

301. *See* Robbins, *supra* note 299; Singer, *supra* note 293, at 20.

recognized that the patentability requirements contained in the 1962 Draft Convention constituted a strange combination of national traditions, which tended nevertheless in the direction of the British approach.³⁰²

In 1967, a draft Patent Cooperation Treaty (PCT) was published and circulated.³⁰³ Unlike the 1962 Draft Convention and the Strasbourg Convention, the PCT had global ambitions.³⁰⁴ It provided for two phases, the first of which would integrate the patent application process to a limited extent, and the second of which would provide for the harmonization of international patentability requirements in accordance with the compromise reached by the 1962 Draft Convention and the Strasbourg Convention, namely the elements of novelty, industrial applicability, and inventive step.³⁰⁵ However, the PCT contained a slight revision of this compromise language specifically designed to attract the Americans: inventive step was explicitly equated with non-obviousness and industrial application was equated with usefulness.³⁰⁶ Thus, the American approach to patentability was "harmonized" with the British and German approaches.³⁰⁷ However, as with the 1962 Draft Convention, commentators recognized the difficulty inherent in an attempt to weld together several divergent patent law traditions under the rubric of an international certificate of patentability.³⁰⁸

In 1968, France enacted a substantially revised patent law, the first major revision since 1844.³⁰⁹ In addition to the introduction of

302. See Michael Klotz, *A Great Opportunity Lost?—The New Draft Relating to a European Patent Law*, 45 J. PAT. OFF. SOC'Y 416, 417 (1963). According to Mr. Klotz, "the Draft considerably raises the standard of patentability and appears to change the entire emphasis. It requires the presence of an inventive step, defined as non-obviousness over the art, rather than the presence of a new technical effect, as is the rule in the present German and Dutch practice." *Id.*

303. See Meller, *supra* note 266, at 565. The PCT was executed in Washington in 1970. See WIPO, TREATIES AND CONTRACTING PARTIES, THE PATENT COOPERATION TREATY, <http://www.wipo.int/pct/en/texts/articles/atoc.htm> (last visited Sept. 22, 2005). The PCT is currently administered by WIPO and enjoys the participation of 126 contracting parties. See WIPO, TREATIES AND CONTRACTING PARTIES, THE PATENT COOPERATION TREATY: CONTRACTING PARTIES, http://www.wipo.int/treaties/en/ShowResult.jsp?lang=en&treaty_id=6 (last visited Sept. 22, 2005).

304. See Meller, *supra* note 266, at 565.

305. See *id.* at 569-81.

306. See *id.* at 575-77.

307. See *id.* at 581-87.

308. See *id.* (describing the "attempt of the drafters of [the PCT] to cover in their consideration all patent theories by trying to pull an umbrella over the two ends of the patent philosophy spectrum as best illustrated by the U.S. Patent System on the one hand and the German on the other").

309. See Robert Depelsenaire, *France*, in EUROPEAN PATENT LAW AND PRACTICE, *supra* note 245, (referring to Loi du 2 janvier 1968, the French patent law); Birgitt A. Pagenberg,

pre-grant examinations as to novelty,³¹⁰ the new French Patent Law introduced the concept of inventive step as a condition of patentability.³¹¹ In fact, the requirements for patentability articulated in the new French law were precisely the substantive elements that had been elaborated in the 1962 Draft Convention, the Strasbourg Convention, and the PCT: novelty, inventive step, and industrial applicability.³¹² In addition, the new French Patent Law did something interesting; it explicitly prohibited the patentability of “programs of a calculating machine.”³¹³

In the fall of that same year, the French Government revived the effort to develop a European patent.³¹⁴ In the spring of 1969, shortly after the new French Patent Law went into effect, a Committee of Experts of the inner six EEC member states formed under the Chairmanship of Kurt Haertel, then President of the German Patent Office.³¹⁵ In order to prevent Europe’s institutional complexity, the divide between EEC and non-EEC countries, from harming the effort to develop a pan-European patent law, the Committee of Experts proposed a bifurcated strategy.³¹⁶ First, a European patent and the necessary attendant

Patentability of Computer Programs on the National and International Level, 5 INT’L REV. INDUS. PROP. & COPYRIGHT L. 1, 32 (1974); Weinstein, *supra* note 242, at 778, 781.

310. See Weinstein, *supra* note 242, at 781-82. Because of the limited resources of the French Patent Office at the time the new law became effective, examinations were initially performed by the *Institut International des Brevets* in The Hague. See *supra* note 280 and accompanying text.

311. See Depelsenaire, *supra* note 309, at 9, 10-11, 125-29; Weinstein, *supra* note 242, at 787-88.

312. See Depensenaire, *supra* note 309, at 11 (“Under the new law, you have three basic requirements: the invention must be new; it must have some industrial character; it must show inventive activity.”).

313. “[N]ot regarded as technical inventions are . . . programs and series of instructions for the performance of operations of a calculating machine.” Cour d’appel [CA] [Regional Court of Appeal] Paris, May 22, 1973, *reprinted and translated* in 5 INT’L REV. INDUS. PROP. & COPYRIGHT L. 216-19 (1974) (omission in original) (quoting art. 7 of the French Patent Law of 1968); see Pagenberg, *supra* note 309, at 32.

314. See Singer, *supra* note 293, at 20-21. “The French Government then took the initiative and awakened Sleeping Beauty.” Haertel, *supra* note 293, at 290.

315. See Singer, *supra* note 293, at 21. Mr. Haertel exercised an enormous degree of influence over the process of developing the European patent approach. See VAN EMPEL, *supra* note 267, at 16. In 1960, he proposed a European Patent Convention that would enable issuance of a European patent, which would coexist, without supplanting, national patents. See *id.* at 15-16; Iain C. Baillie, *Where Goes Europe? The European Patent*, 58 J. PAT. OFF. SOC’Y 153, 154 (1976). Furthermore, he served as Chairman of the working group that developed the 1962 Draft Convention. See VAN EMPEL, *supra* note 267, at 16. In addition to serving as Chairman of the EEC Committee of Experts, in 1969 he was unanimously elected to serve as Chairman of the Brussels Conference to develop the European patent. See Singer, *supra* note 293, at 21.

316. See *id.*

institutions would be created pursuant to a convention that would be open to all European states, EEC or non-EEC.³¹⁷ This patent would be granted on the basis of a uniform standard of patentability by a European Patent Office, but it would coexist with national patents of the member states and would be subject to interpretation and enforcement in accordance with the laws of member states.³¹⁸ Second, for EEC member states, a Community Patent would be created pursuant to a second convention.³¹⁹ This Community Patent would entirely supplant national patents, resulting in uniformity over all stages of the patent life.³²⁰ Thus, a compromise was achieved between the EEC and non-EEC states which, with the added impetus of French backing, enabled moving forward on the project to develop a European patent.

In May of 1969, EEC and non-EEC countries met in Brussels to participate in the Inter-Governmental Conference to Establish a European System for the Grant of Patents (1969 Conference).³²¹ The basis for the work of the 1969 Conference was a memorandum issued earlier that month.³²² This memorandum stated that a European patent would only be possible if the rules concerning patentability were unified according to "international regulation."³²³ Therefore it was determined that the convention to be developed "must of necessity include provisions of this nature."³²⁴ The basis for these provisions was to be the 1962 Draft Convention and the Strasbourg Convention.³²⁵ In 1970, patentability language was approved by the participants in a second Inter-Governmental Conference held in Luxembourg.³²⁶ These provisions were incorporated into a preliminary draft Convention Es-

317. *See id.*

318. *See id.*

319. *See id.*

320. *See id.*

321. *See id.* at 19. Seventeen countries participated in this Conference: Austria, Belgium, Denmark, the Federal Republic of Germany, France, Great Britain, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and Turkey. *See id.* In addition to Kurt Haertel, who served as Chairman of the Conference, the following served as Vice-Chairmen: Gordon V. Grant, Comptroller General of the English Patent Office; Françoise Savignon, Director of the French Patent Office; and Antonio Fernández-Mazambroz, Director of the Spanish Patent Office. *See id.* at 21-22. Organizations permitted to observe were BIRPI, the Council of Europe, the Commission of the European Communities (EEC), and the International Patent Institute, or *Institut International des Brevets*. *See id.* at 22.

322. *See id.* at 21-22.

323. MEMORANDUM ON THE SETTING UP OF A EUROPEAN SYSTEM FOR THE GRANT OF PATENTS, *supra* note 293, at 26-31.

324. *See id.*

325. *See id.*

326. *See id.* at 24.

establishing a European System for the Grant of Patents (1970 Draft Convention), which was approved by the Luxembourg Inter-Governmental Conference.³²⁷

The provisions relating to patentability appeared in article 9 of the 1970 Draft Convention.³²⁸ Article 9(1) recited the language of the Strasbourg Convention nearly verbatim: "European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step."³²⁹ Article 9(2), on the other hand, was influenced by the PCT and provided a list of items that were definitionally excluded from article 9(1).³³⁰ In the case of the PCT, the excluded list operated at a relatively pragmatic level to exempt international searching authorities from having to undertake a prior art search in the case of certain particularly difficult items.³³¹ However, when incorporated into the patentability provisions of the 1970 Draft Convention, the excluded list helped to delineate the scope of a patentable invention.³³² Although the excluded list of the 1970 Draft was relatively limited,³³³ by 1971 it had been expanded to include computer programs and the presentation of information.³³⁴ In 1972, the excluded list was defined more precisely and expanded further.³³⁵ In 1973, just prior to adoption of the final text in Munich, the German delegation proposed addition of a third article to provide an interpretive rule for the excluded list; only where a European patent application or European patent related to the excluded items *as such* would patentability be denied.³³⁶

And thus, built on the foundation of the Strasbourg Convention and the 1962 Draft Convention, and supplemented by the PCT, subject to no small amount of back-room bargaining, a standard for pat-

327. See First Preliminary Draft, *supra* note 293.

328. See *id.* at 87-88.

329. See *id.* at 87. The 1970 Draft Convention stated in the notes that article 9(1) corresponded to article 1 of the Strasbourg Convention. See *id.* at 88.

330. See Kolle, *supra* note 299, at 143.

331. See *id.*

332. See *id.*

333. See First Preliminary Draft, *supra* note 293, at 87-88. The items excluded were:

(a) scientific and mathematical theories as such; (b) the mere discovery of materials occurring in nature; (c) purely aesthetic creations; (d) commercial, financial or book-keeping methods, the rules of playing games and other systems, in so far as they are of a purely intellectual nature; (e) therapeutic or surgical methods for treatment of the human or animal body, and diagnostic methods.

See *id.*

334. See Kolle, *supra* note 299, at 143.

335. See *id.*

336. See *id.*

entability of European patents was defined.³³⁷ On October 5, 1973, the Convention on the Grant of European Patents (EPC)³³⁸ was signed in Munich.³³⁹ The provisions of the EPC relating to patentability are contained in articles 52 to 57. Article 52 corresponds to article 9 of the 1970 Draft Convention and provides as follows:

- (1) European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step.
- (2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1:
 - (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.
- (3) The provisions of paragraph 2 shall exclude patentability of the subject-matter or activities referred to in that provision only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.³⁴⁰

The EPC became effective in signatory member states in 1977.³⁴¹ It is currently in force among thirty member states, including all but two of the states that are members of the European Union.³⁴²

337. See generally Kurt Haertel, *The Munich Diplomatic Conference on European Patent Law*, 4 INT'L REV. INDUS. PROP. & COPYRIGHT L. 271 (1973).

338. Convention on the Grant of European Patents, Oct. 5, 1973, T.S. No. 20, 13 I.L.M. 270, available at <http://www.european-patent-office.org/legal/epc/el/contents.html> [hereinafter EPC].

339. See Haertel, *supra* note 337, at 277. Fourteen nations originally signed the EPC: Belgium, Denmark, France, Federal Republic of Germany, Great Britain, Greece (with reservations), Ireland, Italy, Lichtenstein, Luxembourg, Netherlands, Norway, Sweden, and Switzerland. See *id.* The EPC remained open for signature to additional nations who had participated in the Munich Conference until 1974 and for accession after that date. See *id.* at 277-78. At the time of signing, nine of these nations were EEC member states (the inner six plus Denmark, Ireland and Great Britain) and five were not. See BERMANN ET AL., *supra* note 295, at 422. Denmark, Ireland, and Great Britain joined the EEC in 1973. See EUROPEAN UNION, THE EUROPEAN UNION AT A GLANCE, http://europa.eu.int/abc/index_en.htm (last visited Sept. 22, 2005). In addition to all of his previous activities in relation to the project to develop a European patent, Mr. Haertel chaired the Main Committee that dealt with the finalization of the legal provisions of the EPC, as well as the Committee of the Whole that coordinated the work of the three Main Committees and transmitted the final document to the Plenary for voting. See Haertel, *supra* note 337, at 272-73.

340. EPC, *supra* note 338, art. 52 (emphasis added).

341. See BERMANN ET AL., *supra* note 295, at 422.

342. See EUROPEAN PATENT ORGANIZATION, LEGAL FOUNDATIONS, http://ac.european-patent-office.org/legal_foundations/index.en.php (last updated Jan. 19, 2005). The two exceptions are Latvia and Malta. See *id.* The European Union represents the further integration

The primary institution created by the EPC is the European Patent Organization, which is comprised of the European Patent Office (EPO) and an Administrative Council.³⁴³ The EPO is charged with carrying out the European Patent Organization's primary task, which is the granting of patents according to the terms of the EPC, under the Administrative Council's supervision.³⁴⁴ The EPO is divided into seven Divisions, one of which is the Boards of Appeal.³⁴⁵ Under the terms of the EPC, the Boards of Appeal are responsible for examining appeals from several divisions of the EPO, including the Examining Divisions and the Opposition Divisions.³⁴⁶

C. Enter the Computer, Its Programs, and Their Inventors: 1965-1975

Even before the EPC was signed, controversy began to rage over the inclusion of "programs for computers" as an item excluded from patentability under article 52.³⁴⁷ According to the General Rapporteur who prepared the final EPC draft for signature, the reason for exclusion was to eliminate a particularly controversial issue.³⁴⁸ Whether the intention was merely to prevent the issue from derailing the EPC or to settle the issue completely is unclear.³⁴⁹ What is relatively clear is that certain of the exclusions were intended to codify categories of items that were uniformly regarded as non-patentable, in order to bring some predictability to future decisions of the EPO,³⁵⁰ and that computer programs were not among these uniformly-regarded catego-

of the European communities created in 1957. See BERMANN ET AL., *supra* note 295, at 1-19. It was created by the Treaty on European Union, Feb. 7, 1992, 1992 O.J. (C 191) 1 [hereinafter TEU], signed at Maastricht. See *id.* at 16. In addition to the nine EEC member states as of 1973 who signed the EPC, Greece (1981), Spain and Portugal (1986), Austria, Finland and Sweden (1995) have become members of the EEC/European Union. See EUROPEAN UNION, THE EUROPEAN UNION AT A GLANCE, http://europa.eu.int/abc/index_en.htm (last visited Sept. 22, 2005). In 2004, ten additional states joined the European Union. See *id.*

343. See EPC, *supra* note 338, arts. 4(1)-4(2).

344. See *id.* art. 4(3).

345. See *id.* art. 15(f).

346. See *id.* art. 21(1).

347. See Beier, *supra* note 244, at 434.

348. See Kolle, *supra* note 299, at 150-51 (citing Mr. van Bentham, President of the Netherlands Patent Office and General Rapporteur for the Munich Diplomatic Conference); Haertel, *supra* note 337, at 273.

349. See Kolle, *supra* note 299, at 150-51; Pagenberg, *supra* note 309, at 42.

350. See Kolle, *supra* note 299, at 144. According to Kolle, these included the exclusion of discoveries, scientific theories, aesthetic creations, purely mental acts, and business activities. See *id.*

ries.³⁵¹ The participants refused to adopt a compromise solution, which would have been to place the exclusion of computer programs in the implementing regulations of the EPC, subject to amendment by the Administrative Council.³⁵² At least one commentator speculated that the statutory exclusion represented a “concession” to France, which had recently excluded “programs of a calculating machine” from patentability under its Patent Law of 1968.³⁵³ However, this may not be completely fair since, as early as 1971, France indicated its willingness to consider patent-like protection for computer programs.³⁵⁴

Unfortunately, the need to make a decision as to whether to include computer programs in the EPC’s list of excluded items arose at a time when member states had not yet taken a clear position on whether computer programs were patentable inventions. Even France, which appeared to have the clearest position on the issue, had not statutorily excluded computer programs from patentability, but rather programs of a calculating machine.³⁵⁵ It was not until May of 1973 that a decision of the *Cour d’Appel de Paris* determined that programs of a calculating machine included computer programs and that the legislature had intended to exclude such programs from patentability in the Patent Act of 1968.³⁵⁶ The court reasoned that because the Act made rejection for non-patentability dependent upon a determination that an invention was “manifestly” lacking in technical character,³⁵⁷ the legislature’s separate exclusion of computer programs from patentability meant that the legislature had determined such programs to manifestly lack the requisite technical character.³⁵⁸ The court inter-

351. *See id.* at 150. “In spite of the nearly unanimous refusal of a naked exclusion of computer programs by the interested associations and organizations during the several hearings, the Governmental Conference settled for final establishment of such a rule in the [EPC].” *Id.* (footnote omitted).

352. *See id.*

353. *See id.* at 151.

354. *See* Pagenberg, *supra* note 309, at 38-39. Pagenberg discusses France’s participation in an international meeting on computer programs held in Geneva in 1971. *See id.* Although France specifically pointed to the position taken in its Patent Act of 1968, it indicated a willingness to consider “legal protection by other means.” *See id.* at 39 n.134. The participants in this meeting recommended that, at minimum, any protection scheme adopted should prevent unauthorized use of computer programs. *See id.* at 39.

355. *See supra* note 313 and accompanying text.

356. *See* Cour d’appel [CA] [Regional Court of Appeal] Paris, May 22, 1973, *reprinted and translated in* 5 INT’L REV. INDUS. PROP. & COPYRIGHT L. 216-19 (1974).

357. Loi du 2 janvier 1968, art. 16(5), *as discussed in* Cour d’appel [CA] [Regional Court of Appeal] Paris, May 22, 1973, *reprinted and translated in* 5 INT’L REV. INDUS. PROP. & COPYRIGHT L. 216-19 (1974) at 218-19.

358. *See* Cour d’appel [CA] [Regional Court of Appeal] Paris, May 22, 1973, *reprinted*

preted the legislature's determination to extend to all computer-implemented inventions; even "programs or series of instructions" that controlled the "performance of industrial processes, thus producing technical results," were not patentable, according to the court's interpretation of the Act.³⁵⁹

In the same month that the French case was decided, the *Bundespatentgericht* (German Federal Patent Court) issued a decision that pertained to the patentability of computer programs.³⁶⁰ The invention claimed in this case was virtually identical to that deemed unpatentable by the American Supreme Court only one year previously in *Gottschalk v. Benson*, namely a method of converting decimal numerals into pure binary numerals.³⁶¹ Nevertheless, the German Federal Patent Court determined that it was unnecessary to make a determination as to the question of whether computer programs may be patentable in the abstract, since the case could be decided under *Bundesgerichtshof* (German Federal Supreme Court) precedent.³⁶² Having thus avoided this "highly complex fundamental question," the German Federal Patent Court held the invention to be patentable based on the German Federal Supreme Court's holding in the *Rote Taube* (Red Dove) case, which appeared to signal a move away from technicality as a requirement for patentability in the context of a biological invention.³⁶³ Following this precedent somewhat ambivalently, the German Federal Patent Court reasoned that in any case the invention possessed technical character because it constituted an application of technical means (parts of a data processor) to accomplish a technical purpose (conversion of decimal to binary numbers).³⁶⁴

in English in 5 INT'L REV. INDUS. PROP. & COPYRIGHT L. 216-19 (1974) at 218-19.

359. *See id.* at 218. "It is evident, therefore, that the legislature has clearly expressed its intent not to regard programs or series of instructions as inventions of a technical character, regardless of their purpose or result." *Id.*

360. *Bundespatentgericht* [BPatGE] [German Federal Patent Court] May 28, 1973, *reprinted and translated in 5 INT'L REV. INDUS. PROP. & COPYRIGHT L.* 211-16 (1974).

361. *See id.* at 211; *supra* notes 131-143 and accompanying text. In fact, an application filed in America was rejected based on the holding of *Benson*. *See Bundespatentgericht* [BPatGE] [German Federal Patent Court] May 28, 1973, *reprinted and translated in 5 INT'L REV. INDUS. PROP. & COPYRIGHT L.* 211, 213 (1974).

362. *See id.* at 213.

363. *See id.* at 213-14; *Bundesgerichtshof* [BGH] [Federal Supreme Court] Mar. 27, 1969, *reprinted and translated in 1 INT'L REV. INDUS. PROP. & COPYRIGHT L.* 136-42 (1970). The invention in this case concerned a method for breeding doves. *See id.* at 136. Reasoning that the "laws governing biological phenomena and forces" originate in physical phenomena to the same degree as laws and forces relating to inanimate matter, the court held that it was "immaterial" to the question of patentability whether the word technology could be applied to such biological laws. *See id.* at 138.

364. *See Bundespatentgericht* [BPatGE] [German Federal Patent Court] May 28, 1973,

Thus, the German and French courts came to diametrically opposed conclusions based on an application of the same criterion of technical character. In Austria and Switzerland, respective patent offices also applied this criterion, arriving at a conclusion that computer programs were not patentable.³⁶⁵ Only the English, stubbornly persisting in applying the manner of new manufactures formulation of the Statute of Monopolies, managed to avoid wrestling with the language of technicality, technical effect, and technical character in dealing with computer programs.³⁶⁶ However, the English faced their own difficulties in fitting computer programs within the language of manufacture; the best solution seemed to be to describe the invention in terms of a machine or an apparatus, which had already been determined to constitute a manufacture.³⁶⁷ Although this made a determination of patentability possible, it caused the English to struggle mightily with the form of claims.³⁶⁸

Therefore, while the precise nature of the challenge posed by computer programs may have differed depending on the side of the Channel from which it was viewed, the reality of the challenge could not be denied. Ironically, Germany and England, nations seeming most divided in history, tradition, and philosophy relating to patents, both appeared to be moving in the direction of allowing computer programs to be patented, albeit through the use of vastly differing linguistic formulations. Nevertheless, the issue of computer program

reprinted and translated in 5 INT'L REV. INDUS. PROP. & COPYRIGHT L. 211, 214 (1974).

365. See Osterreichisches Patentamt, Beschwerdeaebteilung [Austrian Patent Office, Appeals Division] Oct. 29, 1970, *reprinted and translated in 2 INT'L REV. INDUS. PROP. & COPYRIGHT L. 206-08 (1971).*

[A] computer program relates solely to the sphere of the intellect and thus lacks all technical character. The creative activity necessary to the formulation of a program as well as the underlying computational process (algorithm) belongs only to the realm of mathematics or intellectual endeavor and not to the technological arts.

Id.; Amt für Geistiges Eigentum [Swiss Office for the Protection of Intellectual Property] Sept. 3, 1968, *reprinted and translated in 1 INT'L REV. INDUS. PROP. & COPYRIGHT L. 148-49 (1970)* (holding that the creation of a computer program "is the result of a purely mental process," which is preliminary to the stage at which the natural forces set in motion by the program cause a technical effect, and that therefore a computer program is not a patentable invention).

366. See *In re Gevers*, (1970) R.P.C. 91 (Pat. App. Tr. 1969) (Eng.); *In re Badger Company*, (1970) R.P.C. 36 (Pat. App. Tr. 1968) (Eng.); *In re Slee and Harris*, (1966) R.P.C. 194 (Pat. Ct.) (Eng.). The computer programs at issue in these cases were punch cards. See *id.*

367. See *In re Gevers*, (1970) R.P.C. 91. Thus, the early British approach contains striking parallels to the early American approach, denying patentability to process claims as involving "intellectual information," but allowing claims to a *new* machine created by running software on that machine. See Soma et al., *supra* note 7, at 30-32.

368. See *In re Gevers*, (1970) R.P.C. 91; *In re Badger Company*, (1970) R.P.C. 36 (Pat. App. Tr. 1968); *In re Slee and Harris*, (1966) R.P.C. 194 (Pat. Ct.).

patentability was too new for any stable precedent to develop, and in 1973 the EPC intervened.

D. Merging Inventive Step and Technical Effect: 1975-1990

In 1975, the Convention for the European Patent for the Common Market (Community Patent Convention) was signed in Luxembourg.³⁶⁹ The intention of the Community Patent Convention, which constituted the second stage in the two-stage strategy for European patent integration developed by Kurt Haertel and his Committee of Experts in 1969,³⁷⁰ was to create a single patent for all EEC countries.³⁷¹ However, this Community Patent Convention required unanimous ratification among the EEC countries in order to become effective,³⁷² and so it was doubtful from the beginning that the Community Patent Convention would ever have an impact.

Despite the doubtful viability of the Community Patent Convention, the pace of integration between 1960 and 1975 had been striking. The impressiveness of these changes, combined with a recognition that the EPC was likely to become effective soon, led Germany and the United Kingdom to undertake, between 1976 and 1977, radical revision of their patent laws to conform them to the EPC's substantive provisions.³⁷³ As of 1981, both German and United Kingdom patent law contained provisions substantively identical to article 52 of the EPC.³⁷⁴ The change seemed more dramatic for Germany, at least as far as patentability was concerned, because the standards of technical advance and technical effect were not mentioned and the English inventive step was explicitly incorporated.³⁷⁵ Commentators concluded

369. Baillie, *supra* note 315, at 153, 169.

370. See *supra* notes 316-20 and accompanying text.

371. See Baillie, *supra* note 315, at 169, 183.

372. See *id.* at 155.

373. See Bradford C. Auerbach, *Biotechnology Patent Law Developments in Great Britain and the United States: Analysis of a Hypothetical Patent Claim for a Synthesized Virus*, 6 B.C. INT'L & COMP. L. REV. 563, 571-72 (1983); Frithjof E. Müller & Harold C. Wegner, *The 1976 German Patent Law*, 59 J. PAT. OFF. SOC'Y 89, 90 (1977).

374. Section 1(2) of the British 1977 Patents Act, as amended, is substantively identical to article 52(2) and article 52(3) of the EPC. See Patents Act, 1977, ch. 37, § 1(2) (Eng.), available at <http://www.jenkins-ip.com/patlaw/pa77.htm#s1>; EPC, *supra* note 338, art. 52(2)-(3). Similarly, the Federal Republic of Germany's Patent Act of 1981 contains language substantively identical to the EPC. See Patentgesetz [German Patent Act], Dec. 16, 1980, BGBl. 1981 I at 1, § 1(2)-(3), translation available at <http://www.ip-firm.de/patentact.pdf> (last visited Sept. 22, 2005); EPC, *supra* note 338, art. 52(2)-(3).

375. The German law as reformulated in 1976 delineated the standard of patentability in terms identical to those contained in the Strasbourg Convention, the 1962 Draft Convention, the PCT, and the EPC. "Patents shall be granted for any inventions which are susceptible of

that the standards relating to technical character had been eliminated from German law³⁷⁶ and, as a result, probably would have predicted that the language of technical effect and technical advance would gradually fade from the European patent law scene. Nothing would have been further from the truth.

Not surprisingly, the questions of whether, and to what extent, inventions making use of computers and their programs should be patentable continued after the EPC became effective and member states revised their laws accordingly. In 1984, the EPO established a working group to examine the problem further;³⁷⁷ the recommendation of this working group was to include technical character as one of the criteria for determining whether an invention came within the excluded list of article 52(2) of the EPC.³⁷⁸ In 1985, the EPO's Guidelines for Examination were revised to incorporate this recommendation.³⁷⁹ Finding it impossible to define technical character, the working group settled for providing examples and left it to the EPO Boards of Appeal to develop a definition.³⁸⁰

The EPO Boards of Appeal had an opportunity to apply the new standard in 1987, in *VICOM/Computer-Related Invention*,³⁸¹ which concerned digital processing of visual images in a computer.³⁸² The

industrial application, which are new and which involve an inventive step." See Müller & Wegner, *supra* note 373, at 94-95.

376. See *id.* at 94.

377. See Brad Sherman, *The Patentability of Computer-Related Inventions in the United Kingdom and the European Patent Office*, 13(3) EUR. INTEL. PROP. REV. 85, 88 n.32 (1991).

378. See *id.* at 88.

379. See *id.* at 88 n.32. EPO Guidelines for Examination, C-IV, § 2.2 (1985), stated as follows:

In considering whether the subject-matter of an application is an invention within the meaning of Article 52, paragraph 1, there are two general points the examiner must bear in mind. Firstly, any exclusion from patentability under Article 52, paragraph 2, applies only to the extent to which the application relates to the excluded subject-matter as such. Secondly, the examiner should disregard the form or kind of claim and concentrate on its content in order to identify the real contribution which the subject-matter claimed, considered as a whole, adds to the known art. *If this contribution is not of a technical character, there is no invention within the meaning of Article 52, paragraph 1. . . .* [I]f a computer program is claimed in the form of a physical record, e.g., on a conventional tape or disc, the contribution to the art is still no more than a computer program. In these instances the claim relates to excluded subject-matter as such [and] is therefore not allowable. *If, on the other hand, a computer program in combination with a computer causes the computer to operate in a different way from a technical point of view, the combination might be patentable.*

In re Merrill Lynch, [1989] R.P.C. 561, 564-65 (C.A. (Civ.)) (Eng.) (emphases added).

380. See Sherman, *supra* note 377, at 88 & n.35.

381. Case T 208/84, *VICOM/Computer-Related Invention*, [1987] E.P.O.R. 74, *construed in In re* Fujitsu Ltd., [1996] R.P.C. 511 (Pat.) (Eng.).

382. *Fujitsu Ltd.*, [1996] R.P.C. 511, 524-25 (discussing *VICOM*).

applicant claimed both a method of digitally processing such images as well as an apparatus that was essentially a computer "programmed to carry out" the claimed method.³⁸³ With respect to the method claim, the Board held that it was not excluded from patentability by articles 52(2) and (3) of the EPC as a "mathematical method."³⁸⁴ Finding a distinction between "abstract mathematical concepts," where numbers are processed to produce new numbers only, and technical processes where physical entities are manipulated to produce new physical entities, the Board held that the exclusion of article 52(2) only applied to the former.³⁸⁵ Thus, according to the Board, if an "abstract mathematical concept[]" is used in a technical application it becomes patent-eligible as an invention under article 52(1) of the EPC.³⁸⁶ Because the Board considered a digital image to be a physical thing, by virtue of the fact that electrical signals caused it to be displayed and visually perceived, the fact that mathematical operations were applied to such images in the applicant's invention meant that the invention concerned a technical application, rather than a mathematical method as such, and thus was patentable.³⁸⁷

Turning to the apparatus claim, the Board appeared to regard the fact that a technical process had been implemented in a device as the key to a determination of patentability, regardless of whether that device happened to be software or hardware.³⁸⁸ In other words, once the Board had determined the method claim to be patent-eligible as a technical application of a mathematical concept, the eligibility of the computer apparatus in which that method was implemented followed logically under the technical character standard for determining whether the invention was an excluded computer program.

Thus, the German concept of technical character had been revived. Indeed, for some it had never died. In a 1985 speech, Herr Gunter Gall, former Director of Legal Affairs for the EPO, character-

383. *Id.* at 524.

384. *See id.* at 524-25.

385. *Id.* at 525.

386. *Id.*

387. *See id.*

388. *See id.*

The Board is of the opinion that a claim directed to a technical process which process is carried out under the control of a program (be this implemented in hardware or in software), cannot be regarded as relating to a computer program as such within the meaning of Article 52(3) EPC, as it is the application of the program for determining the sequence of steps in the process for which in effect protection is sought. Consequently, such a claim is allowable under Article 52(2)(c) and (3) EPC.

Id.

ized the EPC's exclusion of computer programs in article 52 as arising out of national traditions of invention and the historical perception that, "like discoveries, scientific theories, mathematical methods and presentations of information, [computer programs] are not of a technical nature."³⁸⁹ Clearly the Continental approach of focusing on the nature of invention in determining patentability had not been eliminated, even with the enactment of legislation following the EPC approach that nominally separated the issue of inventive step from patentability, according to the British approach.

The interesting question after *VICOM* was what the British courts would do, since the language of technical character was completely foreign to them. This question was answered by the court of appeal in 1989, in *In re Merrill Lynch*.³⁹⁰ The invention claimed in *Merrill Lynch* was a "data processing system" to automate trading in securities.³⁹¹ In order to determine whether such an invention was patentable under section 1 of the Patents Act of 1977, which corresponded to article 52 of the EPC,³⁹² the principal examiner looked to the EPO's recently adopted Guidelines for Examination.³⁹³ Utilizing what was essentially a point of novelty approach,³⁹⁴ the examiner reasoned that because the physical and systemic components of the computer were "wholly conventional," the novelty and inventiveness could only be located in the computer's program, which was unpatentable as such under the Patents Act of 1977 and the EPC.³⁹⁵ Determining that the means comprising the invention, which were specified in the claim at issue, "relate to features which either would be present in a conventional business computer system or define essential functions for the performance of [a] business method," the examiner concluded that the claim did not recite anything that could be viewed as constituting a "new technical structure" or capable of producing a new technical effect in the sense intended by the Guidelines.³⁹⁶ Thus, the examiner rejected the invention as unpatentable.³⁹⁷ The examiner's

389. HART ET AL., *supra* note 5, at 9-10.

390. *In re Merrill Lynch*, [1989] R.P.C. 561 (C.A. (Civ.)) (Eng.).

391. *Id.* at 562.

392. *See sources cited supra* note 374.

393. *See Merrill Lynch*, [1989] R.P.C. at 564.

394. *See supra* notes 128-29, 173, 183 and accompanying text.

395. *See Merrill Lynch*, [1989] R.P.C. at 564.

396. *Id.*

397. *See id.*

conclusions, as well as his reasoning, were upheld upon appeal to the Patents Court,³⁹⁸ the applicant then appealed to the court of appeal.

In the meantime, the court of appeal had decided *In re Genentech*,³⁹⁹ which concerned interpretation of section 1 of the Patents Act of 1977, albeit not in the context of a computer-related invention.⁴⁰⁰ In deciding *Genentech*, however, several judges reviewed the determinations in *Merrill Lynch* and concluded that the point of novelty approach was incorrect.⁴⁰¹ Thus, the court of appeal in *Merrill Lynch* was forced to reformulate the test for determining whether an invention is patentable under section 1 of the Patents Act of 1977.⁴⁰² In doing so, the court took judicial notice of *VICOM* as instructed by section 91(1) of the Patents Act of 1977.⁴⁰³ Following the reasoning in *VICOM*, the court concluded that patentability must be determined with reference to the technical contribution or technical advance made by the invention, relative to prior art.⁴⁰⁴ According to the court, such technical contribution or technical advance, rather than the form of the claim (for example, whether a process versus an apparatus is claimed), should determine patentability.⁴⁰⁵ In addition, however, the court reasoned that patentability must depend upon the end result of the invention that is claimed, regardless of technical advance.⁴⁰⁶ Where that result is an excluded category, the court found that there can be no patentable invention.⁴⁰⁷ Reasoning that the end result of *Merrill Lynch*'s invention was nothing more than a method of doing business, the court concluded that despite any technical advance that might be achieved by the computer program, the invention was unpatentable.⁴⁰⁸

Thus, the German concepts of technical advance and technical effect came to be incorporated into the British analysis of patentability at the same time that the British requirement of an independent inquiry into inventive step was incorporated into German law. For the United Kingdom, this meant that the difficulty of defining a "manner of new manufacture" had been replaced with a new difficulty, that of

398. *See id.* at 565.

399. *In re Genentech Inc.*, [1989] R.P.C. 147 (C.A. (Civ.)) (Eng.).

400. *Id.* at 157-58.

401. *See id.* at 207, 239-40, 270.

402. *See Merrill Lynch*, [1989] R.P.C. at 565-67.

403. *Id.* at 567.

404. *Id.* at 569.

405. *See id.*

406. *See id.*

407. *Id.*

408. *Id.*

defining technical character.⁴⁰⁹ Moreover, this meant that several hundred years of precedent relating to the interpretation of manufactures would have to be discarded, with guidance instead to be obtained by taking judicial notice of decisions of the EPO Boards of Appeal.⁴¹⁰ On the other hand, the German courts would be able to enjoy the benefit of years of precedent relating to the interpretation of technical character. In the end, ironically, at least in the field of computer-related inventions, the change may have been greater for the United Kingdom than for Germany.

E. The Evolving Jurisprudence: 1990-2000

The EPO Technical Board of Appeal decisions following *VICOM* sought to further delineate the circumstances in which a computer program involves a technical application sufficient to defeat exclusion under article 52 of the EPC. In *IBM/Document Abstracting and Retrieving*,⁴¹¹ the Board held that a computer program cannot be determined to involve a technical application merely by virtue of the fact that a software program causes changes to the hardware through electrical currents.⁴¹² Thus, the Board avoided the American approach of asserting that computer software is patentable by virtue of the fact that the computer becomes a new machine when software is implemented on it.⁴¹³

Furthermore, the Board was clear from a relatively early stage that the requisite technical application could be found outside of traditional physical and industrial contexts, avoiding troublesome distinctions between computer hardware and computer software as well as the focus on a physical transformation in an industrial process as the key to pat-

409. See *In re Gale*, [1991] R.P.C. 305, 328 (C.A. (Civ.)) (Eng.) (Buckley, L.J.) (“I confess to having difficulty in identifying clearly the boundary line between what is and what is not a technical problem [for purposes of defining patentability].”).

410. See *id.* at 323.

[I]t is of the utmost importance that the interpretation given to section 1 of the [Patents Act of 1977] by the courts of the United Kingdom, and the interpretation given to Article 52 of the [EPC], should be the same. . . . When interpreting the [British Patents Act of 1977] an English court should have due regard to decisions of the [EPO] Board of Appeal and take them into account, although the English court is not bound by them.

Id.

411. Case T 22/85, *IBM/Document Abstracting and Retrieving*, [1990] E.P.O.R. 98.

412. Case T 1173/97, *IBM/Computer Programs*, [2000] E.P.O.R. 219, at 228 (discussing “*Document Abstracting and Retrieving/IBM*”).

413. See *supra* notes 115, 146 and accompanying text.

entability. Thus, in *SOHEI/General-Purpose Management System*,⁴¹⁴ the Board determined that method and apparatus claims directed to a computer system for financial and inventory management involved technical considerations and thus were patent-eligible under article 52 of the EPC.⁴¹⁵ Noting prior cases, the Board stated that claims to a mix of hardware and software “may or may not be patentable.”⁴¹⁶ The key to patentability, according to the Board, lay in whether a contribution to the computer art could be identified, either by virtue of a technical problem to be solved or by virtue of a technical effect achieved by the solution.⁴¹⁷ Moreover, exclusion from patentability under article 52 of the EPC might be avoided where “technical considerations are to be made concerning the particulars of [an invention’s] implementation.”⁴¹⁸ Following this logic, the Board abstracted from the fact that the claims related to management (doing business) for purposes of evaluating whether the claimed invention involved the requisite technical considerations, finding such technical considerations in the fact that the claimed system allowed several data points to be input simultaneously in a single common form, called a transfer slip, and subsequently processed independently.⁴¹⁹ Significantly, therefore, the requisite technical considerations were identified in software, rather than in hardware, and in the context of a financial services application, rather than an industrial process.

In 1998, the Board issued a decision in *IBM/Computer Programs*.⁴²⁰ This decision is significant because it elaborated clear guidelines for the interpretation of article 52 of the EPC with respect to computer programs, and because the Board took explicit notice of international developments as indicators of “trends” in the patentability of computer programs.⁴²¹ In this case, the applicant claimed “[a] method for resource recovery in a computer” running a particular application as well as an apparatus (the computer system) for implementing the method.⁴²² In addition, however, the applicant claimed a

414. Case T 769/92, *Sohei/Gen.-Purpose Mgmt. System*, [1996] E.P.O.R. 253.

415. *Id.* at 263-64.

416. *Id.* at 259.

417. *See id.*

418. *Id.* According to the Board, “[t]he very need for such technical considerations implies the occurrence of an, at least implicit, technical problem to be solved (Rule 27 EPC) and, at least implicit, technical features (Rule 29 EPC) solving that technical problem.” *Id.*

419. *See id.* at 260-62.

420. Case T 1173/97, *IBM/Computer Programs*, [2000] E.P.O.R. 219.

421. *See id.*

422. *Id.* at 221.

“computer program product” in two forms: one stored on a “computer usable medium” and the other “directly loadable into the internal memory of a digital computer”; the latter comprised “software code portions for performing the steps of” the claimed process.⁴²³ In other words, the applicant was claiming the software program directly, in addition to the process to be implemented by means of the software and a computer system as implementer of the process.

The examining division of the EPO indicated that it viewed the process and apparatus claims as acceptable, but, following then-current Guidelines for Examination, determined that the claims to the software product were excluded by article 52 of the EPC.⁴²⁴ In the proceedings at the level of the examining division, the applicant pointed not only to technical considerations, but also to economic circumstances and “international developments.”⁴²⁵ With respect to the latter, the applicant urged the examining division to consider developments in the USPTO and the Japanese Patent Office,⁴²⁶ as well as article 27 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS),⁴²⁷ which provides that “patents shall be available for any inventions, whether products or processes, *in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.*”⁴²⁸ The examining division responded that its only obligation was to follow the law established by the EPC, including the Guidelines for Examination established by the EPO.⁴²⁹

Although the Board ended its consideration of these international developments by concluding that “the only source of substantive patent law for examining European patent applications at this moment is

423. *Id.*

424. *Id.* at 221-22.

425. *Id.* at 222. With respect to the technical character of the invention, the applicant claimed, and the examining division appeared to agree, that it was to be found in a specific command sequence, namely in software programming. *See id.* at 223. Therefore, the applicant argued, it is arbitrary to determine claims to be ineligible merely based on the fact that their form is different, to determine that the system and process are eligible, while the product itself is ineligible. *Id.*

426. *Id.* at 222.

427. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, 33 I.L.M. 1125 (1994) [hereinafter TRIPS]. *See IBM/Computer Programs*, T 1173/97 at 222.

428. TRIPS, *supra* note 427, art. 27(1) (emphasis added). TRIPS explicitly notes that “the terms ‘inventive step’ and ‘capable of industrial application’ may be deemed by a Member to be synonymous with the terms ‘non-obvious’ and ‘useful’ respectively.” *Id.* n.5.

429. *IBM/Computer Programs*, T 1173/97 at 222.

the European Patent Convention,”⁴³⁰ the Board concluded that it was “appropriate” to take such international developments into consideration as indicators of “trends” and as contributions to the “*highly desirable (world-wide) harmonisation of patent law.*”⁴³¹ Turning to the application of article 52 of the EPC, as well as its prior cases,⁴³² the Board confirmed that the exclusion for computer programs as such means that computer programs are only excluded from patentability where they lack a technical character.⁴³³ Moreover, the Board confirmed that the required technical character cannot be derived from the physical modifications to computer hardware caused by electrical currents resulting from running a software program,⁴³⁴ but rather must be found either in “further effects” generated by the execution of the program (software) in hardware or in the fact that the programming (software) itself solves a particular technical problem.⁴³⁵ Stated positively, these two alternatives for finding requisite technical character mean that

a patent may be granted not only in the case of an invention where a piece of software manages, by means of a computer, an industrial process or the working of a piece of machinery, but in every case where a program for a computer is the only means, or one of the necessary means, of obtaining a technical effect within the meaning specified above, where, for instance, a technical effect of that kind is achieved by the internal functioning of a computer itself under the influence of said program.⁴³⁶

In the case where patentability is based on the program/software itself solving a particular technical problem, the Board held that a determination in this regard must be made by examining the program directly, without reference to any specific characteristics of the com-

430. *Id.* at 225. With respect to TRIPS, the Board noted that the European Patent Organization is not a member of the World Trade Organization and was not a signatory to TRIPS. *Id.* at 224. Moreover, based on its examination of the Vienna Convention on the Law of Treaties, May 23, 1969, 8 I.L.M. 679, the Board concluded that there was no justification under the law of treaties to apply TRIPS to the EPC. *IBM/Computer Programs*, T 1173/97 at 224. In particular, the Board emphasized that the signatory member states to the EPC do not fully correspond to the signatory member states to TRIPS. *Id.* With respect to the revised guidelines of the USPTO and the Japan Patent Office, permitting the patenting of computer program products, the Board stated that it had “taken due notice of these developments,” but emphasized that the legal situation in Japan and America is different because neither country has a legal provision analogous to article 52 of the EPC. *Id.* at 225.

431. *See id.* at 224-25 (emphasis added).

432. *See id.* at 226-29.

433. *See id.* at 226-27.

434. *Id.* at 227.

435. *Id.*

436. *Id.*

puter system as a whole.⁴³⁷ In other words, the Board seemed to say that the patentability of computer software, claimed in its own right, cannot be determined based on the inclusion of hardware elements, but must instead be determined by examining whether the software represents a particular solution to a technical problem in the art of computer programming. If a software program represents a solution to a technical problem, it possesses the requisite technical character to merit patent eligibility under article 52, according to the Board.⁴³⁸

Turning to the question of whether "computer program product[s]" may be claimed directly, the Board found as a preliminary matter that the essence of such a claim lies in the program itself, not in the hardware or the particular medium in which the program is stored.⁴³⁹ Acknowledging that such a program only shows its effects "in physical reality when the program is being run" and, thus, that the program only possesses, at most, the *potential* to produce a technical effect; the Board nevertheless found "no good reason for distinguishing between a direct technical effect on the one hand and the potential to produce a technical effect, which may be considered as an indirect technical effect, on the other hand."⁴⁴⁰ Therefore, as long as a computer program, when executed, could be viewed as having the requisite technical effect, the program itself possesses the potential to produce the technical effect and is not excluded from patentability under article 52 of the EPC.⁴⁴¹

Thus, the EPO Boards of Appeal have clearly established that computer programs may be patentable, regardless of the form in which they are claimed, as long as they possess a technical character beyond the normal physical effects of software running in the hardware components of a computer. The most recent EPO Guidelines for Examination reflect this position.⁴⁴² At the same time, however, the Boards of Appeal have continued to assert that non-technical (for ex-

437. See *id.* at 227-28.

438. See *id.* at 227.

439. *Id.* at 229.

440. *Id.* at 229-30.

441. See *id.* at 230. The Board noted that

it would seem illogical to grant a patent for a method but not for the apparatus adapted for carrying out the same method. By analogy, the present Board finds it illogical to grant a patent for both a method and the apparatus adapted for carrying out the same method, but not for the computer program product, which comprises all the features enabling the implementation of the method and which, when loaded in a computer, is indeed able to carry out that method.

Id. at 230-31.

442. See EPO Guidelines for Examination, C-IV, § 2.3.6 (2003), available at http://www.european-patent-office.org/legal/gui_lines/e/c_iv_2_3_6.htm.

ample, business) applications of computer programs,⁴⁴³ as well as the purely “mental act[s]” of computer programmers,⁴⁴⁴ are not patentable under article 52 of the EPC.

In the beginning, similar to the USPTO and the Patent Court of the United Kingdom, the EPO adopted a point of novelty-like approach, referred to as a contribution approach, in order to distinguish excluded non-technical categories of invention from patentable computer programs containing a requisite technical character.⁴⁴⁵ Under this approach, an examiner was instructed to “disregard the form or kind of claim and concentrate on its content in order to identify the real contribution which the subject-matter claimed, considered as a whole, adds to the known art.”⁴⁴⁶ If this contribution was not found to be “of a technical character,” the claim was to be excluded from patentability as failing to recite an invention within the meaning of article 52.⁴⁴⁷

The Boards of Appeal have consistently rejected the contribution approach as incorrectly blending an investigation of inventive step with that of patentability.⁴⁴⁸ However, in trying to maintain the separation of these two levels of analysis, the Boards of Appeal have tended to introduce a degree of discrimination against method (process) claims in favor of apparatus claims.⁴⁴⁹ This is a testimonial to the fundamental difficulty of fully separating the question of invention from inventive step, *particularly* where the standard for invention (technical character) was originally developed in relation to the analogous question of the degree of invention (inventive height).⁴⁵⁰

443. See Case T 0931/95, *R. v. PBS Partnership/Controlling Pension Benefits Systems*, [2002] E.P.O.R. 52, at 528-29.

Methods only involving economic concepts and practices of doing business are not inventions within the meaning of Article 52(1) EPC. A feature of a method which concerns the use of technical means for a purely non-technical purpose and/or for processing purely non-technical information does not necessarily confer a technical character to such a method.

Id.

444. See *IBM/Computer Programs*, T 1173/97 at 232 (discussing System for Generating Software Source Code/ATT, T 204/93 (unpublished)).

445. See *PBS Partnership*, T 0931/95 at 530-31; *supra* notes 129, 173 and 183 and accompanying text.

446. *PBS Partnership*, T 0931/95 at 531 (quoting then-current EPO Guidelines for Examination, C-IV, § 2.2).

447. *Id.*

448. See *id.* at 531-32; *IBM/Computer Programs*, T 1173/97 at 229.

449. See *PBS Partnership*, T 0931/95 at 528-29, 532-33 (finding method claims to be patent-ineligible and apparatus claims to be eligible, although lacking an inventive step).

450. See *supra* notes 259-60 and accompanying text.

Aside from the EPO Boards of Appeal, most of the cases relating to computer-implemented inventions have been decided by courts in the United Kingdom and Germany.⁴⁵¹ While it is dangerous to characterize the rapidly evolving jurisprudence in courts and patent offices of these two nations, it is arguable that the United Kingdom is slightly more conservative than Germany and the EPO, at least where business methods are concerned.⁴⁵² However, the courts and patent offices of the United Kingdom and Germany have consistently taken judicial notice of the decisions by the EPO Boards of Appeal and generally adopt a similar approach to the interpretation of article 52 of the EPC as implemented in domestic law.⁴⁵³ In both of these nations, the question of patentability of computer-related inventions ultimately turns on whether a technical contribution can be identified.⁴⁵⁴

F. The Ill-Fated European Directive: 2000-Present

Despite a striking European consensus that a technical contribution is key to determining patentability under the EPC and respective

451. See *Commission Proposal for a Directive of the European Parliament and of the Council on the Patentability of Computer-Implemented Inventions*, at 1, 9, COM (2002) 92 final (Feb. 2, 2002), available at http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2002/com2002_0092en01.pdf [hereinafter *Proposed Directive*].

452. Compare *In re Merrill Lynch*, [1989] R.P.C. 561 (C.A. (Civ.)) (Eng.) (holding that, regardless of any technical advance in computer art, the result of an invention was a method of doing business and therefore the invention was not patent-eligible) with *Automatic Sales Control*, Bundespatentgericht [BPATG] [Federal Patent Court] Jun. 15, 1999 (F.R.G.), discussed in HART ET AL., *supra* note 5, at 27 (holding that the technical character of a digital data processing system made the claims patent-eligible, although they were found to be obvious and thus a patent was denied).

453. See Bundesgerichtshof [BGH] [Federal Court of Justice] Oct. 17, 2001, 149 Entscheidungen des Bundesgerichtshofes in Zivilsachen [BGHZ] 68 (F.R.G.), translated in R. v. Re IBM's Patent Application, [2003] EUR. NAT'L PAT. REP. 2, 28 (BGH 2001) (referring to EPO case law interpreting article 52 of the EPC as part of the literature relevant to an interpretation of the German Patent Law); *In re Gale*, [1991] R.P.C. 305, 323 (C.A. (Civ.)) (Eng.).

454. See Bundesgerichtshof [BGH] [Federal Court of Justice] Oct. 17, 2001, 149 Entscheidungen des Bundesgerichtshofes in Zivilsachen [BGHZ] 68 (F.R.G.), translated in R. v. Re IBM's Patent Application, [2003] E.N.P.R. at 27-28 ("[T]he characterising instructions in the claimed teaching [of a patent application] must solve a specific technical problem. In these circumstances, the claimed teaching may also be patented if it is to be protected as a computer program or in any other form which uses a computer."); *In re Gale*, [1991] R.P.C. at 327.

Computer instructions may represent, for instance, a technical process. What is recorded in the instructions may be the means for carrying out a technical process with the aid of a computer. In such a case the process is not barred from patentability by reason of the use of a computer as the medium by which it is carried out.

Id. For United Kingdom jurisprudence, see *In re Fujitsu Ltd.*, [1996] R.P.C. 511 (Pat.) (Eng.).

domestic law, concern over possible divergences in EPC interpretation relating to “computer-implemented inventions” led the Commission of the European Communities (European Commission) to propose a Directive on the Patentability of Computer-Implemented Inventions (Proposed Directive) in 2002.⁴⁵⁵ The basic intention of the Proposed Directive was to harmonize the interpretation of article 52, as it relates to computer-implemented inventions, among European Union member states.⁴⁵⁶ The approach proposed by the European Commission was to explicitly require a computer-related invention to make a technical contribution in order to be patentable and to deny patentability to “pure business methods” and “social processes.”⁴⁵⁷ The essence of the Proposed Directive was a requirement that EC member states “ensure that it is a condition of involving an inventive step that a computer-implemented invention must make a technical contribution.”⁴⁵⁸

The legal basis for the Proposed Directive was article 95 of the Treaty Establishing the European Community (EC Treaty).⁴⁵⁹ Article 95 provides for a procedure whereby the European Commission may propose directives for the harmonization of member state laws in substantive areas deemed essential to the functioning of a common European “internal market.”⁴⁶⁰ Under this procedure, often referred to as a “co-decision” procedure, the Commission must submit a proposal to the European Parliament (Parliament) and the Council of the European Union; however, the European Parliament has the power to amend or veto.⁴⁶¹ Although this procedure has resulted in greater de-

455. See *Proposed Directive*, *supra* note 451, at 9.

456. See *id.* at 11.

457. *Id.*; see also *id.* at 14-15.

458. See *id.* at 14.

459. Treaty Establishing the European Community, Nov. 10, 1997, 1997 O.J. (C 340) 3 [hereinafter EC Treaty]. See *Proposed Directive*, *supra* note 451, at 12. Article 95 of the EC Treaty has been the primary basis for harmonizing European Union laws relating to intellectual property. See *id.* at 12-13; Case C-377/98, *Pays-Bas v. Parliament*, 2001 E.C.R. I-7079. The term “EC Treaty” designates the foundational EEC Treaty, as amended by the TEU and the 1987 Single European Act, O.J. (L 169) 1. See *A Citation Manual for European Community Materials*, 18 FORDHAM INT’L L.J. 694, 696 (1994); *supra* note 342. The EC Treaty was significantly amended, and many of its articles were renumbered, by the Treaty of Amsterdam Amending the Treaty on European Union, the Treaties Establishing the European Communities and Certain Related Acts, Oct. 2, 1997, 1997 O.J. (C 340) 1 [hereinafter Treaty of Amsterdam]. Article 95 was article 100a, prior to amendment of the EC Treaty by the Treaty of Amsterdam. See Roger J. Goebel, *The Treaty of Amsterdam in Historical Perspective*, 22 FORDHAM INT’L L.J. S7 (1999).

460. See EC Treaty, *supra* note 459, art. 100a (as in effect in 1997) (now art. 95), available at http://europa.eu.int/abc/obj/treaties/en/entr6d05.htm#Article_100a; BERMANN ET AL., *supra* note 295, at 428-31, 439-40.

461. See EC Treaty, *supra* note 459, art. 189b, available at <http://europa.eu.int/abc/obj/treaties/en/entoc.htm>; Koen Lenaerts, *Federalism: Essential Con-*

mocratic legitimacy of European Union legislation, it can be highly politicized and cumbersome, as evinced by the length of time taken to enact the Data Protection Directive (five years)⁴⁶² and the Biotech Directive (ten years).⁴⁶³ The Proposed Directive was no exception.

In September 2003, the Parliament proposed alternative language for the Proposed Directive.⁴⁶⁴ In accordance with the co-decision procedure, the European Council was faced with the choice either to accept Parliament's amendments and adopt the Directive or to make changes.⁴⁶⁵ In the case of the Proposed Directive, Parliament's amendments were quite significant and, as it turned out, unacceptable to the Council. As far as patentability was concerned, Parliament's proposal did not change the basic approach of looking to whether a computer-related invention results in a technical contribution in order to determine patentability.⁴⁶⁶ Moreover, Parliament's proposal continued the approach of blending invention with inventive step, as both are determined by the technical character of the claimed invention.⁴⁶⁷ However, Parliament's proposal attempted to directly connect technical character to invention and to define such technical character in a manner that tethered it to the physical world.⁴⁶⁸ In addition, Parliament's proposal provided direct instructions as to how to determine

cepts in Evolution—The Case of the European Union, 21 FORDHAM INT'L L.J. 746, 759-63 (1998).

462. See Patrick J. Murray, Comment, *The Adequacy Standard Under Directive 95/46/EC: Does U.S. Data Protection Meet This Standard?*, 21 FORDHAM INT'L L.J. 932, 955-58 (1998).

463. See Lydia Nenow, Comment, *To Patent or Not to Patent: The European Union's New Biotech Directive*, 23 HOUS. J. INT'L L. 569, 592 (2001).

464. See *European Parliament Legislative Resolution on the Commission Proposal for a Directive of the European Parliament and of the Council on the Patentability of Computer-Implemented Inventions*, COM (2003) 402 (Sept. 24, 2003) [hereinafter *Parliament Amendments*].

465. See Lenaerts, *supra* note 461, at 761.

466. See *Parliament Amendments*, *supra* note 464, at 15.

("In order to be patentable, a computer-implemented invention must be susceptible of industrial application and new and involve an inventive step. In order to involve an inventive step, a computer-implemented invention must make a technical contribution.")

467. See *id.*

468. See *id.* at 13-14. Changes from Commission's Proposed Directive are italicized: "technical contribution," also called "invention," means a contribution to the state of the art in a field of technology. *The technical character of the contribution is one of the four requirements for patentability. Additionally, to deserve a patent, the technical contribution has to be new, non-obvious, and susceptible of industrial application. The use of natural forces to control physical effects beyond the digital representation of information belongs to a field of technology. The processing, handling, and presentation of information do not belong to a field of technology, even where technical devices are employed for such purposes.*

Id. (emphasis added).

whether a computer-related invention contains a technical contribution.

In determining whether a given computer-implemented invention makes a technical contribution, the following test shall be used: whether it constitutes a new teaching on cause-effect relations in the use of controllable forces of nature and has an industrial application in the strict sense of the expression, in terms of both method and result.⁴⁶⁹

Additionally, Parliament's proposal sought to ensure that data processing would not be treated as a "field of technology," and that "innovations in the field of data processing [not be] considered to be inventions within the meaning of patent law."⁴⁷⁰ Furthermore, the proposal contained an explicit exclusion from patentability in the case of "computer programs which implement business, mathematical or other methods and do not produce any technical effects beyond the normal physical interactions between a program and the computer, network or other programmable apparatus in which it is run."⁴⁷¹ Finally, the proposal obligated EC member states to "ensure that computer-implemented solutions to technical problems are not considered to be patentable inventions merely because they improve efficiency in the use of resources within the data processing system."⁴⁷² Thus Parliament's proposed amendments sought to tightly constrain interpretation of the Directive.

On May 18, 2004, the European Council announced a "Political Agreement on a Common Position,"⁴⁷³ meaning that it had decided to move the co-decision procedure to stage two and to amend Parliament's proposal.⁴⁷⁴ On May 24, 2004, the text on which this political agreement had been based was circulated, and it became apparent that the Council intended to reject all of Parliament's amendments relating to patentability.⁴⁷⁵ On March 7, 2005, following protracted discussion

469. *See id.* at 15.

470. *See id.* "Field of technology" was defined as "an industrial application domain requiring the use of controllable forces of nature to achieve predictable results." *Id.* at 14. It was equated with "technical." *See id.* "Industry" was defined as "the automated production of material goods." *Id.*

471. *Id.* at 16.

472. *Id.*

473. *See* Press Release, Council of the European Union, Commission Welcomes Council Agreement on Directive on Computer-Implemented Inventions (May 18, 2004), <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/659&format=HTML&aged=0&language=EN&guiLanguage=en>.

474. *See* Lenaerts, *supra* note 461, at 761.

475. *See generally* Political Agreement on the Council's Common Position (EU) No. 9713/04, May 24, 2004, available at <http://register.consilium.eu.int/pdf/en/04>

within the Council, the adoption of the Common Position by qualified majority was announced.⁴⁷⁶ On March 9, 2005, the European Commission indicated its acceptance of the Common Position in a communication to Parliament.⁴⁷⁷ The Common Position generally reflected an approach to patentability that was consistent with the Commission's original proposal.⁴⁷⁸

As matters then stood, Parliament had the choice either to (1) remain silent and therefore accept the Common Position, in which case the Directive would be deemed adopted under the co-decision procedure; (2) reject by absolute majority, in which case the Directive would be defeated; or (3) to propose additional amendments.⁴⁷⁹ Commentators expected Parliament to take action by July, before the beginning of summer recess.⁴⁸⁰ In the meantime, interested groups at both ends of the software patent spectrum battled furiously in the press, on the web, and through available political venues.⁴⁸¹ In the end, however, these groups appeared to agree that the Directive could not be enacted in a satisfactory form, and it was defeated.⁴⁸²

The failure of the Directive exposes Europeans' fundamental disagreement as to the meaning of the technical character requirement and its implications for the patentability of computer programs and computer-implemented inventions. Clearly, the technical character requirement is no panacea. It has not prevented European courts from having to struggle through the analytical thickets of separating questions of novelty and inventiveness from questions of patentability.⁴⁸³ Nor has it saved such courts from having to extricate themselves from a reliance on physicality to define technology.⁴⁸⁴ Nevertheless, the technical character requirement has provided European courts with a

/st09/st09713.en04.pdf.

476. See Press Release, Council of the European Union, Adoption of Council's Common Position on a Directive on the Patentability of Computer-Implemented Inventions (Mar. 7, 2005), <http://europa.eu.int/rapid/pressReleasesAction.do?reference=PRES/05/57&format=HTML&aged=0&language=EN&guiLanguage=en>.

477. See *Communication from the Commission to the European Parliament*, COM (2005) 83 final (Mar. 9, 2005), http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2005/com2005_0083en01.pdf.

478. See *id.*

479. Lenaerts, *supra* note 461, at 761.

480. See Alan Cane, *Patently an EU Tangle*, FIN. TIMES (London), Apr. 20, 2005, at 6.

481. See *id.*

482. See *Intellectual Property: European Parliament Buries Software Patents Directive*, *supra* note 2.

483. See *supra* notes 390-402, 445-50, 458, 466-68 and accompanying text.

484. Compare *supra* notes 381-388 and accompanying text with notes 414-419 and accompanying text. See also *supra* notes 468-469.

patentability meta-jurisprudence that theoretically distinguishes between technology and the social and cultural arts. According to the argument presented in this Article, such a meta-jurisprudence is preferable to the current American patentability meta-jurisprudence because it undertakes the challenging but vitally important task of conceptually separating technology from the realm of human social and cultural interaction.

V. CONCLUSION

The European Directive on the Patentability of Computer-Implemented Inventions represents only the most recent and democratic of attempts to define the nature of patentable technology, as prompted by the chimerical mind-machine that is the modern, general-purpose computer. The degree of controversy surrounding the Directive, given its apparently modest original ambitions, provides a clear signal that questions concerning the nature of patentable technology are far from being settled. This should raise significant questions as to how the nature of patentable technology might, in the future, be legitimately determined in Europe and America, as well as in other nations.⁴⁸⁵

Faced with the challenge of defining patentable technology, the American Federal Circuit has defined it expansively, prompting questions as to whether any limits remain. Such an approach seems to be based more on expediency than on any real and sustained attempt to wrestle with the nature of patentable technology or the constitutional "useful arts." Utilizing Germanic concepts of technical character, on the other hand, European courts appear to be shaping a definition of patentable technology that is capable of providing limits without necessarily tying those limits to a physical transformation or analogous test, which may be open to the criticism that it is unduly dependent on outdated categories of technology. Only time can show whether these limits will survive or be sacrificed in the desire to remain competitive with America.

485. Max Weber defined "legitimacy" as a characteristic that people ascribe to a social order when, among other traditional possibilities, it is regarded as possessing "legality." See WEBER, *supra* note 29, at 31-37. According to Weber, where such legality does not derive from voluntary agreement of all participants in a social order, it can only depend on the degree to which persons imposing it are regarded as possessing authority to do so and behave in a manner that is formally correct. See *id.* at 37.

Differentiating between the social and cultural aspects of human endeavor, and the technology of which human beings make use and seek constantly to improve, has unquestionably become difficult in our computer-dominated era. However, such differentiation has never been easy. The ancient and medieval alchemists made no such distinctions, viewing physical transformation as only part of the spiritual transformation of a human being.⁴⁸⁶ It may be the case that values of openness and authorial transmission of knowledge (science), combined with clearer differentiation between the means and ends of human endeavor, were partially responsible for the period of rapid technological development that began in the sixteenth and seventeenth centuries.⁴⁸⁷ If so, it would be unfortunate to lightly discard such values and differentiations precisely at the moment when called upon to face the Chimæra.

486. See LONG, *supra* note 27, at 63-71, 144-48.

487. Cf. *id.* at 176-91, 243-50 (chronicling fifteenth and sixteenth century developments in writings concerning techniques of mining and metallurgy, many of which were critical of the alchemists for their secrecy and esotericism, and arguing that such writings evidence a validation stage in the development of technological knowledge, which enabled knowledge of techniques and technology to attain a more elevated status and thus to contribute to the "scientific revolution").

