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Richard S. Gruner

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**IN SEARCH OF THE UNDISCOVERED COUNTRY:
THE CHALLENGE OF DESCRIBING
PATENTABLE SUBJECT MATTER**

Richard S. Gruner[†]

Abstract

In defining patent law, lawmakers and courts face the unusual challenge of describing the future characteristics of useful devices and processes that are presently nonobvious but which are within the scope of the "useful arts" and the range of patentable subject matters. This article reassesses the Federal Circuit's patentable subject matter standards in anticipation of the Supreme Court's possible review of those standards. The article argues that patentable subject matter standards which are appropriately open ended should focus on three minimum features in determining whether a design of a new advance constitutes patentable subject matter – (1) the inventor's articulation of a precise definition of the advance such that the advance is transferable to and usable by multiple parties; (2) the production of immediately available and regularly obtained practical benefits through use of the advance; and (3) the lack of field-specific policy reasons to believe that, if patent controls are applied to the advance, the advantages of innovation incentives normally associated with patent rewards will be overwhelmed by countervailing public injuries from the patent controls. The recent extension of patentable subject matter to tax planning methods for reducing tax liabilities is then examined under these criteria to demonstrate application of the criteria and the sufficiency of these criteria in focusing complete evolutions of the net public benefits achieved by extending patent controls and incentives to new categories of practices and devices.

[†] Richard Gruner is a registered patent attorney and a former inside counsel for the IBM Corporation. He is presently a Professor of Law at the Whittier Law School. Professor Gruner is a member of the New York and California state bars and a graduate of the Columbia University School of Law (LL.M. 1982), the University of Southern California School of Law (J.D. 1978), and the California Institute of Technology (B.S. 1975). He is a coauthor, with Shubha Ghosh and Jay Kesan, of *INTELLECTUAL PROPERTY IN BUSINESS ORGANIZATIONS: CASES AND MATERIALS* (LexisNexis 2006).

I. INTRODUCTION

In Shakespeare's *Hamlet*, "the undiscovered country" refers to the unknown future, in particular the afterlife following death.¹ As part of *Hamlet*'s famous "To be or not to be . . ." soliloquy, he points out that concerns about the unknown features of the future cause people to be resistive of change and to hold onto unfavorable present circumstances because of fears of the alternatives.² More recently, "the undiscovered country" has been seen by some as a broader metaphor, suggesting both the potential and threat of movement into future circumstances that may vary greatly from our present reality.³

In patent law, we face the unusual challenge of describing the future – "the undiscovered country" – as part of legal standards defining the characteristics of the "useful arts" and types of patentable subject matters falling within the reward scheme of the patent system.⁴ Patent laws are aimed at encouraging the development of new technologies. Yet, we exclude from patenting new technological discoveries that are predictable in light of present knowledge and no more than obvious extensions of present understanding.⁵ Hence, what we are seeking through the patent system – and trying to describe in patentable subject matter standards – are unpredictable technologies that are not presently obvious. The difficulty in defining patentable subject matter standards lies in describing a future range of potentially patentable technologies of value to the public, but which we cannot understand nor even remotely appreciate in concrete terms now.

This article reassesses the Federal Circuit's present patentable subject matter standards in anticipation of the possible review of those standards by the Supreme Court.⁶ It argues that these standards as

1. WILLIAM SHAKESPEARE, *HAMLET* act 3, sc. 1.

2. *Id.*

3. Perhaps the best-known usage of the "undiscovered country" as a general metaphor for fear of the future occurred in one of the well known *Star Trek* movies. *Star Trek VI: The Undiscovered Country* (1991) emphasized the fear of a future in which formerly warring parties (humans and Klingons) contemplate peace but can not initially bring themselves to trust each other to form peaceful relationships in light of their fear of the risks that trust will bring in their unknown future — that is, their "undiscovered country." IMDb, <http://imdb.com/title/tt0102975/plotsummary> (last visited Mar. 9, 2007).

4. See generally Richard S. Gruner, *Intangible Inventions: Patentable Subject Matter for an Information Age*, 35 *LOY. L.A. L. REV.* 355 (2002).

5. See 35 U.S.C. § 103 (2000).

6. In a recent case in which the Supreme Court initially granted a writ of certiorari and then withdrew the writ as improvidently granted, Justice Breyer, writing on behalf of himself and Justices Stevens and Souter, indicated a willingness to reassess the Federal Circuit's

presently constituted serve a valuable purpose in avoiding artificial and publicly detrimental restrictions on the rewards that patent laws are capable of providing to publicly beneficial innovation.

The article describes why patentable subject matter standards that are appropriately open ended should focus on three minimum features of useful advances in determining whether a design of a new advance constitutes patentable subject matter:

1. The advance involves an item or procedure that is described in sufficient detail that it can be presently evaluated and implemented by users;
2. The advance has immediately available utility to users of a sort that does not depend on the involvement of persons with particular expertise or the exercise of unusual types of personal discretion; and
3. There are no special characteristics of the advance that would make the recognition of patent rights concerning that type of advance against public policy on the ground that the net effects of such rights would be detrimental to the public.

The article goes on to evaluate one specific and recently controversial extension of patentable subject matter – the extension of patents to tax planning methods for reducing tax liabilities – under these three criteria. This evaluation will illustrate how a thorough public debate on the propriety of patents in a new field should be constructed. This example is presented both to indicate how the three criteria described above should be applied and to demonstrate the sufficiency of these criteria in focusing complete evolutions of the net public benefits achieved by extending patent controls and incentives to new categories of practices and devices.

standards for patentable subject matter. See *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2928 (2006) (Breyer, J., dissenting) (citing *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999)) (arguing that the withdrawal of the writ of certiorari was improvidently granted). In describing how he would have analyzed the case in question had the court given it full consideration, Justice Breyer indicated that:

[T]he Federal Circuit’s decision in *State Street Bank* . . . does say that a process is patentable if it produces a “useful, concrete, and tangible result.” But this Court has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary.

Id. (citation omitted). Given Justice Breyer’s comments on behalf of three members of the Court, it seems likely that the Supreme Court may take a case in which the patentable subject matter standards adopted and applied by the Federal Circuit are reviewed and perhaps revised.

II. JUDICIAL UNCERTAINTY REGARDING PATENTABLE SUBJECT MATTER

At present there are many ambiguities regarding the standards for patentable subject matter. This section discusses the sources of these ambiguities and the means the Federal Circuit uses to resolve those ambiguities without overly restricting the scope of patentable subject matter.

A. The Challenge of Defining the Unknown

In order to meet the challenge of defining the boundaries of patentable subject matters without knowing what sorts of useful advances may fall within those boundaries, federal courts have sought to develop a set of patentable subject matter standards that are free of technological details and limitations and that are instead framed in terms of very general features of patentable advances. The aims of these open ended, minimally detailed standards are to ensure that descriptions of advances in issued patents communicate valuable designs to the public and thereby ensure that patents are limited to valuable additions to the public's practical knowledge.

Disputes that still rage over the minimum physical features of patentable inventions – sometimes framed in terms of whether a patentable invention must incorporate a physical transformation of some item – miss the point of keeping our patent system general and ensuring that this system encourages the broadest possible range of innovations of benefit to the public. Limitations on patentable inventions which demand physical components seem particularly inappropriate in an era when many of our most revolutionary advances of greatest importance to society – such as new computer software innovations or communications technology advances – entail information processing discoveries with few if any physically transformative features. To place these fields and advances outside the patent system seems particularly short sided in our present times and inconsistent with the forward-looking, technologically unbounded nature of Congress' views on the patent system and past judicial interpretations of the “useful arts” potentially enhanced through patentable subject matter.

Rather than focusing on particular physical limitations on patentable inventions or restrictions of patent incentives to engineering fields that have been important to the public in the past, the greatest possible impact of the patent system can be achieved by requiring only that parties receiving patents deliver a practical design

of widespread replicability to the public in exchange for obtaining a patent. A patent system bounded by this notion should be limited only by patentable subject matter tests that emphasize the features that a useful discovery must have in order to be adequately communicated to the public and to deliver a valuable addition to the public's practical and useful knowledge. In short, the outer boundaries of patentable subject matter and the patent system should be framed in terms of the types of useful results that a technological advance must bring to the public, and the completeness with which the means for achieving the results are described, with essentially no restrictions on the means used for attaining a practical result.

This type of means-inclusive patentable subject matter standard ensures the broadest possible incentives for encouraging the production of diverse types of useful advances of presently unimaginable character. So long as the ends are useful and the means are sufficiently described, the substance of the means for achieving a useful result should be unimportant. Indeed, the Court of Appeals for the Federal Circuit has adopted patentable subject matter standards that embrace this notion.⁷

Several justices on the Supreme Court recently indicated that they have doubts about the Federal Circuit's approach to patentable subject matter, thereby signaling that the Supreme Court may soon be willing to review this bedrock standard of patent law.⁸ Given the significant growth in numbers of patents at the non-traditional margins of the patent system in such areas as software, information processing, and business method advances, a change in patentable subject matter standards that injected a substantial physical content requirement or some other highly restrictive standard into tests for patentable subject matter would work a significant change in present patenting practices. It would also threaten to exclude patent incentives and rewards from areas of innovation – such as software designs and communications technologies – where innovators in this country are world leaders and where many important advances of commercial and public value seem likely to occur in the next few years.

This article reassesses the Federal Circuit's present patentable subject matter standards in anticipation of the new attention that these standards may soon receive from the Supreme Court. It argues that

7. See *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999) (citing *In re Alappat*, 33 F.3d 1526, 1544 (Fed. Cir. 1994) (en banc)).

8. See *supra* note 6 and accompanying text.

the Federal Circuit's standards are, if interpreted properly, essentially correct statements of properly open-ended patentable subject matter criteria. However, it also argues that the Federal Circuit's tests should be supplemented by several additional public policy considerations described here in order to ensure that patents are not extended into settings where their incentives do not produce net public benefits.

This section examines the sources of the present ambiguities regarding patentable subject matter standards and the means used by the Federal Circuit court to resolve those ambiguities while not overly restricting patentable subject matter scope.

B. Sources of Present Ambiguity in Patentable Subject Matter Standards

Much of the current uncertainty in the law of patentable subject matter stems from the failure of the Supreme Court to articulate clear principles for separating patentable applications from unpatentable abstract ideas. The Court has, for the most part, dealt with what are essentially easy cases, in which the inventions at issue have involved manipulations of physical device or environmental features.⁹ The Court's analyses have identified these designs involving physical manipulations as practical applications that are clearly patentable if other patent law requirements are met.

In addition to dealing with cases in which physical manipulations have been present, the Court has stated the clearly correct but largely unhelpful rule that "an idea of itself is not patentable, but a new device by which it may be made practically useful is."¹⁰ What the Court's analyses have generally lacked is a clear discussion of what minimum features must be present in order for an implementation of an idea to be considered a practical application rather than just an unpatentable abstract idea. However, the Court has provided no coherent guidance as to whether practical advances involving no physical manipulations of physical items will also qualify as patentable subject matters.

In contrast to the Supreme Court, the Court of Appeals for the Federal Circuit has described a clear standard for patentable subject matter that constitutes the prevailing standard absent a change by the

9. See, e.g., *Diamond v. Diehr*, 450 U.S. 175, 177-93 (1981) (evaluating the patentability of a process for operating a computer-controlled rubber mold in which the sole new design elements were innovative information processing features).

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

Supreme Court.¹¹ The Federal Circuit's analyses have gone directly to the issue of the minimum features of a patentable invention, ruling that such an invention does not require a physical manipulation, but is instead present if a specific machine or process produces a useful, concrete, and tangible result.¹² By tangible result, the Federal Circuit has indicated that it means a result having importance in connection with a tangible feature of socially important activities.¹³ Thus, an invention that kept track of money was deemed to have a tangible result even though the actual result produced by the invention was no more tangible than an accounting entry in a computer data storage system.¹⁴

The criticism often raised concerning the Federal Circuit's tests is that they include too much subject matter, extending patent protections to broad new ranges of inventions in areas like computer software, information processing advances, and business methods where patents have not been significant forces until recently.¹⁵ However, as is explained more fully in later portions of this article, the main problem with the Federal Circuit's standard is not its scope, but rather the failure of the court to explain the rationales supporting this standard in a manner that will allow the standard to be interpreted and extended in actual cases.¹⁶ Once seen in light of the basic goals of the patent system, the patentable subject matter test of the Federal Circuit seems well grounded and a useful means to carry the patent system forward to socially desirable impacts regarding new technologies. In short, the Federal Circuit's test for patentable subject matter, upon better understanding, generally serves the goals of the patent system well and should be upheld in the face of doubts about

11. See *State St. Bank & Trust Co.*, 149 F.3d at 1372-73 (Fed. Cir. 1998), cert. denied, 525 U.S. 1093 (1999); *Alappat*, 33 F.3d at 1544.

12. *State St. Bank & Trust Co.*, 149 F.3d at 1373; *Alappat*, 33 F.3d at 1544.

13. See generally *State St. Bank & Trust Co.*, 149 F.3d at 1373.

14. *Id.*

15. See Pamela Samuelson, *Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025 (1990); John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139 (1999); Rochelle Cooper Dreyfuss, *Are Business Method Patents Bad for Business?*, 16 SANTA CLARA COMP. & HIGH TECH. L.J. 263 (2000); Leo J. Raskind, *The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 61 (1999).

16. See *infra* Section II.E.

that standard recently expressed by Justice Breyer, writing on behalf of himself and Justices Stevens and Souter.¹⁷

C. *Gottschalk v. Benson*¹⁸ – *The Root of Confusion*

The one exception to the Supreme Court's lack of attention to the patentability of innovations containing no manipulation of physical invention features is the Court's analysis in *Gottschalk v. Benson*.¹⁹ In that case, the Court considered the patentability of a method for converting information from one computer-readable format to another computer-readable format.²⁰ The Court interpreted the claims of the patent at issue as covering all implementations of the method described in the patent "not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use."²¹ In short, there was no limitation of the claimed invention to a particular implementation involving physical manipulations in a specific device or in a surrounding environment.²² Rather, at least some versions of the claimed invention involved non-physical data processing in accordance with the claimed method.²³ Hence, the Court was required to consider whether developers of innovative computer programming methods or information processing advances that used non-physical means to achieve useful results could obtain patents for these types of advances in the absence of additional physical device features or processes that implemented the advances.²⁴

Unfortunately, the Court's response was worse than silence. In an opinion authored by Justice Douglas, the Court unanimously ruled that the invention did not constitute patentable subject matter.²⁵ However, the Court's rationale was essentially incoherent, citing several different types of considerations in different portions of its opinion, but failing to link those considerations clearly to the

17. See *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921 (2006) (Breyer, J., dissenting) (describing the dismissal of the writ of certiorari as improvidently granted).

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

19. *Id.* at 71-72.

20. The patent purporting to cover this method described the conversion process as "a method for converting binary-coded decimal (BCD) numerals into pure binary numerals." *Id.* at 64.

21. *Id.*

22. *Id.*

23. *Id.* at 67.

24. *Id.* at 68.

25. *Id.* at 73.

invention at hand and giving little guidance on how similar considerations would apply to other inventions in the future.²⁶

One concern of the Court was that the advance at stake was no more than an unapplied “idea.”²⁷ The Court noted that just as “one may not patent an idea,” one could not patent the “formula for converting [binary coded decimal (BCD)] numerals to pure binary numerals”²⁸ This observation suggests that the Court was concerned with the lack of practical details regarding the implementation of the claimed invention and that a more concretely described and implemented computer-processing sequence might have passed muster. This objection to the patentability of the invention at issue in *Benson* is not new; rather it is a plea for more developed and clearly described engineering details in patent applications and a reminder that unapplied, abstract design ideas are available as an unconstrained, unpatentable base for design elaborations by all inventors.²⁹

However, other parts of the Court’s analyses suggest that the real problem that the Court had with the invention at stake in *Benson* was that it concerned computer programming, pure and simple without any further physical device details.³⁰ At least some commentators felt that this signaled the unwillingness of the Court to extend patents into the realm of computer software and, by extension, to withhold patent controls from other types of intangible processes such as data processing sequences supporting innovative business methods.³¹ The Court’s later decision in *Diamond v. Diehr*, discussed below, indicated that this was not a correct reading of *Benson*.³² In *Diamond*, the Court disclaimed any desire to exclude all software advances from patent protections.³³ Instead the Court indicated that its main concern in *Benson* was not that all software advances were unpatentable but rather that some software advances might be unpatentable because they lacked a practical linkage to surrounding devices and

26. See generally *id.*

27. *Id.* at 71.

28. *Id.*

29. See ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 137-38 (3d ed. 2002).

30. *Benson*, 409 U.S. at 64, 71-72.

31. See Robert Greene Sterne & Lawrence B. Bugaisky, *The Expansion of Statutory Subject Matter Under the 1952 Patent Act*, AKRON L. REV. 217, 221 (2004).

32. *Diamond v. Diehr*, 450 U.S. 175, 187 (1981) (discussing *Gottschalk v. Benson*, 409 U.S. 63, 71 (1972)).

33. *Id.*

environments. The Court went on to make clear in *Diamond* that software causing a physical item or environment in a useful way would establish enough of a practical linkage to bring a software-based process within the scope of patentable subject matter.³⁴

Yet another portion of the Court's analysis in *Benson* appeared to indicate that the advance at issue there was unpatentable because of its sweeping importance as a design concept in the computer field.³⁵ The Court noted that:

The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below [finding the patent covering the advance to be enforceable] is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.³⁶

The observation that the method at issue in this case would probably not have applications outside the computer programming area is probably correct – if for no other reason than that manipulation of information in a similar manner in a human brain would be so tedious and prone to error that no one would undertake the method. But why this fact makes the method unpatentable is a mystery.

Indeed, there are many fundamental design breakthroughs that are only useful in a particular field such that an applicable patent will control all practical uses of the design principle involved. Consider the early patents for xerographic processes which gave the patent holder the control over certain processes for transferring optical images to corresponding patterns of charges on a drum and then used these patterns to recreate the original image in a copy on a piece of paper.³⁷ This sequence of steps was unlikely to be useful in other contexts and was fundamentally important in its field, such that all designers of copying equipment would either need to license these patents or wait for them to expire. Yet the dominance of this field by

34. *See id.* at 188.

35. *Benson*, 409 U.S. at 68.

36. *Id.* at 71-72.

37. The earliest xerography patent, issued to industry pioneer Chester F. Carlson in 1942, covered the process of reproducing words or images through the use of an electrostatically charged material (such as copier toner particles) which is applied to a photoconductive insulating material in a pattern that matches the image to be reproduced and then transferred to a second surface (such as the front of a sheet of paper) to create a duplicate of the original image. *See* U.S. Patent No. 2,297,691 (filed Apr. 4, 1939) (issued Oct. 6, 1942). This patent and others granted to Carlson on devices for carrying out xerographic processes and improvements to those processes covered many of the basic building blocks of the xerographic field. *See* Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601, 606 n.23 (2005).

the relevant patents and the lack of any additional uses of the xerographic design principles if the patents were granted was not an issue in this setting.

In fact, advances such as xerographic processes which enable and establish a new category of useful products or processes are precisely the types of advances we most want to encourage and strongly protect with patents since entire new categories of advances depend on breakthrough discoveries like these that make them possible. The notion that downstream impediments to further engineering or product production are reasons not to grant a patent on a category-creating breakthrough is precisely backwards. Provided that other tests for patenting are met, breakthrough discoveries – that is, pioneering discoveries that become category controlling discoveries upon the issuance of patent rights – are ones that deserve the clearest and strongest patent protections to encourage inventors to pursue and investors to back these advances that make possible a group of downstream advances and associated societal benefits.

D. The Supreme Court Continues to Provide Limited Guidance

Following its somewhat cryptic discussion in *Benson*, the Supreme Court revisited the topic of patentable subject matter in computer-based advances in two subsequent cases, but failed in either to clarify the sorts of features that are needed to distinguish non-patentable ideas or abstract ideas from patentable inventions.³⁸ In the first of these cases, *Parker v. Flook*,³⁹ the Court considered a method for computing an “alarm limit” regarding a number of process variables associated with the catalytic chemical conversion of hydrocarbons.⁴⁰ Once a variable under scrutiny reached a value that exceeded its “alarm limit,” the claimed method called for the triggering of an alarm signaling “an abnormal condition indicating either inefficiency or perhaps danger.”⁴¹ The claimed method differed from prior alarm sounding processes only in the mathematical

38. The failure of the Supreme Court to use these post-*Benson* cases to clarify patentability standards led to a long period of confusion about those standards and several attempts by the Federal Circuit court to specify what the Supreme Court had not – the necessary characteristics of a patentable subject matter. See Richard S. Gruner, *Software Patents: The Evolution of the Useful Arts*, in *INTELLECTUAL PROPERTY AND INFORMATION WEALTH: ISSUES AND PRACTICES IN THE DIGITAL AGE* 377, 378-81 (Peter K. Yu ed., 2007) (describing the struggles of the Federal Circuit court to develop patentable subject matter standards for computer software advances in the wake of the *Benson* case).

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

40. *Id.* at 586.

41. *Id.* at 585.

algorithm used to calculate an alarm limit for a particular variable.⁴² The Court held that this invention did not constitute patentable subject matter because it involved only a formula for computing an alarm limit without associated details on how to “select the appropriate margin of safety, the weighing factor, or any of the other variables”⁴³ and did not “contain any disclosure relating to the chemical processes at work, the monitoring of process variables, or the means of setting off an alarm or adjusting an alarm system.”⁴⁴

In short, the Court suggested in *Parker* that the mathematical algorithm at issue might be used to produce a practical, patentable invention with the addition of linkages into an operative physical environment, but the invention submitted for patenting in that case lacked these further implementation details. Thus, the Court’s emphasis in *Parker* was on the absence of physical instantiation of the method of calculation specified in the patent at issue, not on the need for a mathematical calculation that leads to a physical manipulation or step in every case where a patent is sought. The Court provided no guidance on the minimum linkage to physical features or surroundings that would transform an abstract idea (or a calculation in accordance with an abstract idea such as the relationship represented by a mathematical formula) into a patentable invention.⁴⁵

While the invention in that case did not involve a natural phenomenon, the Court’s discussion of the exclusion from patentable subject matter of inventions that no more than restate a principle or phenomenon of nature suggests a bit about the Court’s thinking concerning the minimum physical features needed in a patentable invention.⁴⁶ The Court noted that the exclusion from patentable subject matter of advances based on natural phenomena and the additional exclusion of advances involving no more than abstract

42. *Id.* at 585-86.

43. *Id.* at 586.

44. *Id.*

45. The closest the Court’s discussions got to this ultimate issue of patentable subject matter concern was the Court’s firm indication that a recording of data or other similar communicative “post-solution activity” following the determination of a solution to a mathematical problem would not transform an abstract calculation into a patentable invention. Hence, the Court felt that post-solution steps signaling the results of a calculation did not add meaningful physical features or practical instantiation to the advance at issue in *Parker* of the sort that was needed to make that advance a patentable invention. Rather, the Court emphasized that recording steps or other “post-solution activity” such as the activation of an alarm should be ignored and the patentability of an invention assessed from its remaining features. *Id.* at 590, 594.

46. *Id.* at 589.

ideas are based on two different concerns.⁴⁷ Advances restating a principle or phenomenon of nature are unpatentable, not because they lack the physical features needed to make them “processes” within the meaning of the Patent Act, but rather because the naturally occurring features of these advances preexist the advances and, hence, are not “discoveries” of the sorts needed to qualify for patent protections.⁴⁸ The missing feature is a discovery of a human-created design for a practical item or procedure, not the lack of a physical manipulation or interpretation of a specific physical environment.⁴⁹ By contrast, an idea is unpatentable because it is not useful in the right way absent the addition of either a way to use the idea to achieve a physical manipulation or a way to use the idea to interpret a physical situation in a useful way.⁵⁰

Both an unpatentable abstract idea and an unpatentable principle of nature can be used to construct a patentable invention if something more – in the words of the Court in *Parker* an additional “inventive concept” – is added that distinguishes the idea or phenomenon from the invention sought to be patented.⁵¹ Unfortunately, even as it saw this type of incremental relationship to a physical manipulation or context as an important consideration in separating natural phenomena from patentable inventions, the Court in *Parker* made no substantial attempt to describe the sorts of physical features that would be sufficient to produce a patentable invention.

Finally, in *Diamond v. Diehr*,⁵² the Court addressed two key features of intangible innovations and related patentable subject matter criteria. First, it firmly rejected the view that a computer software advance could not form the basis for a patentable invention.⁵³ Where software or associated computer-based systems are used to control a device that would qualify as patentable subject matter in its own right, the resulting computer-enhanced innovation is also patentable subject matter.⁵⁴ Applying this rule, the Court had no trouble in concluding that “a process for molding raw, uncured synthetic rubber into cured precision products” involved patentable

47. *Id.* at 590-93.

48. *Id.* at 593.

49. *Id.* at 593 n.15.

50. *Id.* at 590.

51. *Id.* at 594.

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

53. *Id.* at 187.

54. *Id.*

subject matter.⁵⁵ The process at issue in *Diehr* used a computer to interpret temperature data and to trigger the opening of a rubber mold at the optimum point to produce high quality molded items.⁵⁶ The Court saw this process as no more than an improved means of operating a rubber mold.⁵⁷ Since a purely mechanical process for rubber molding would be patentable subject matter, it followed directly that a computer-controlled process for rubber molding was equally patentable.⁵⁸

The difficulty with the Court's analysis in *Diehr* was that it only addressed the "easy" case of an invention with clear physical features beyond the intangible information processing steps that were the novel aspects of the design. The invention at issue in *Diehr* involved not one but two physical manipulations – the manipulation of a rubber mold and the manipulation of the items being molded.⁵⁹ Either one of these types of physical manipulation would probably have been sufficient to establish that the calculations involved in *Diehr* were part of an advance involving physical manipulations of practical importance and, hence, patentable subject matter. In short, while *Diehr* stands for the relatively uncontroversial rule that a physical manipulation of a functionally significant aspect of a process is *sufficient* to transform an abstract idea or calculation into a patentable advance, the Court's analysis in this case does not address the harder question regarding the minimum physical features or relationships to physical surrounds that are *necessary* to place an advance within the range of patentable subject matter. The answer to this ultimate question – or even how to approach it – remains surprisingly unresolved in the Supreme Court's rulings on patent law. This gap in Supreme Court guidance, along with new forms of advances such as information processing designs and business management methods which have focused primarily on intangible manipulations of practically important information, have presented lower federal courts with numerous difficulties in the years since the Supreme Court's *Benson* ruling emphasized that practical details are essential parts of patentable inventions, but gave no useful indication of what sorts of physical features in addition to an abstract idea are needed to produce patentable subject matter.

55. *Id.* at 177.

56. *Id.* at 177, 187.

57. *Id.* at 191.

58. *Id.* at 192.

59. *Id.* at 187.

E. Federal Circuit Solutions

Given the Supreme Court's lack of guidance regarding the scope of patentable subject matter in intangible advances, the task fell to the Court of Appeals for the Federal Circuit to articulate patentable subject matter standards that both stayed within the murky boundaries defined by the Court's ruling in *Benson* and provided meaningful guidance to lower federal courts and potential patentees about practical tests for identifying patentable inventions. Because they often involved information processing advances that were implemented with few physical elements other than the physical recording of data, cases involving computer software and computer systems forced the Federal Circuit and its predecessor, the Court of Customs and Patent Appeals (CCPA), to attempt to develop more detailed patentable subject matter standards that could be applied to the particular patent applications involving innovative computer software and computer systems.

The first of these attempts, dubbed the *Freeman-Walter* test after the cases in which it was developed,⁶⁰ was a failure, producing confusion and varying results in lower courts and little predictability among patentees and potential infringers about the enforceability of computer-related patents.⁶¹ The Federal Circuit's second attempt to articulate a generally applicable patentable subject matter standard – announced in *In re Alappat*⁶² – was more successful in setting out a clear standard, but some of the features and goals of this test were not clearly articulated by the Federal Circuit court. What was clear from *Alappat* was that the Federal Circuit court's patentable subject matter standard was broadly encompassing, leading to surges in patents obtained for advances in areas like computer software, information processing systems, financial systems and business methods which, a few years before, would have been presumed by many experts to be outside the patent system.⁶³

1. The Failed *Freeman-Walter* Test: An Unhelpful Detour

In light of the limited guidance provided by the Supreme Court's *Benson* opinion about the patentability of inventions involving new methods of computer processing, the Court of Customs and Patent Appeals (CCPA) attempted in the late 1970's to define a concrete

60. See *In re Alappat*, 33 F.3d 1526, 1543 n.21 (Fed. Cir. 1994).

61. *Id.* at 1543-44.

62. *Id.* at 1544.

63. See *id.* at 1582.

standard for identifying patentable subject matter in computer-based advances.⁶⁴ The result was the *Freeman-Walter* test.⁶⁵ The test evaluated whether a particular patent claim addressed statutory subject matter or the type of unpatentable subject matter identified in *Benson*.⁶⁶ The CCPA described the test as follows:

First, the claim is analyzed to determine whether a mathematical algorithm is directly or indirectly recited. Next, if a mathematical algorithm is found, the claim as a whole is further analyzed to determine whether the algorithm is "applied in any manner to physical elements or process steps," and, if it is, it "passes muster under § 101."⁶⁷

In essence, the first part of the test did no more than determine whether a claim was potentially problematic under *Benson* because the claim included an algorithm (which might be no more than an abstract idea). The second part of the test was the heart of the standard, forcing a court to look at the uses of the algorithm that would be constrained if a patent were granted. A court was to determine if those constrained uses were appropriately limited because the patent applicant only claimed control over the use of the algorithm in some specific physical setting (that is a context of physical elements) or to produce a specific sequence of physical actions (that is to produce physical process steps). Overall, this second portion of the test was aimed at assessing the preemptive scope of the patent under consideration.⁶⁸ If the patent would control all potential uses of the algorithm at issue, then the patent would preempt all use of the algorithm and be improper.⁶⁹ However, if the use of the algorithm in accordance with the patent under consideration was limited to a specific physical context or set of process steps, the use of the algorithm in other contexts or steps would not be constrained by the patent and the patent was proper.⁷⁰

64. See generally *In re Freeman*, 573 F.2d 1237 (C.C.P.A. 1978), amended by *In re Walter*, 618 F.2d 758 (C.C.P.A. 1980).

65. *Id.*

66. *Id.*

67. *In re Pardo*, 684 F.2d 912, 915 (C.C.P.A. 1982) (quoting *Walter*, 618 F.2d at 767).

68. *Walter*, 618 F.2d at 767.

69. *Id.* at 767-68.

70. See *Freeman*, 573 F.2d at 1246. See also *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998) (describing the application of the *Freeman-Walter* test); *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1058 (Fed. Cir. 1992) (same).

Unfortunately, the *Freeman-Walter* standard retained many of the ambiguities of the *Benson* standard. In particular, the *Freeman-Walter* test lacked clarity regarding the types of information processing algorithms that would bring a computer-based advance within this special standard. The standard also left in doubt the types of physical elements or steps that would be sufficient limitations on the use of an algorithm to cause an invention based on the algorithm to be seen as not preempting all use of the algorithm and, therefore, to be within the range of patentable subject matter as defined in *Benson*.

Since this “cure” for the problems of *Benson* proved no better than the disease – given that the *Freeman-Walter* test simply substituted one set of ambiguous standards for another – the Federal Circuit Court of Appeals (the successor to the CCPA) abandoned the *Freeman-Walter* test in 1994.⁷¹ However, by then numerous federal courts had applied the *Freeman-Walter* test for a number of years, leading to a series of inconsistent and often overly negative results regarding the patentability of advances involving software implementations of novel information processing algorithms.⁷²

2. The Open Ended *In re Alappat*⁷³ Standard

In *In re Alappat*⁷⁴ the Federal Circuit court used a new test for patentable subject matter, a test that its analysis suggested would be generally applicable for identifying patentable subject matter in computer-based inventions and other types of advances. The *Alappat* case involved a computer system for controlling visual outputs on a cathode ray tube screen.⁷⁵ A computer system carefully evaluated electronic signals and determined how to best display the signals on the screen.⁷⁶ The only new components in the computer system were the information processing sequences defined by the applicable computer program.⁷⁷ The Federal Circuit court found this invention to entail patentable subject matter because the system was “a specific machine [that produces] a useful, concrete, and tangible result.”⁷⁸

71. See *State St. Bank & Trust Co.*, 149 F.3d at 1374 (noting that “[a]fter *Diehr* and *Chakrabarty*, the *Freeman-Walter-Abele* test has little, if any, applicability to determining the presence of statutory subject matter.”).

72. See Gruner, *supra* note 4, at 390-91.

73. *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) (en banc).

74. See generally *id.* at 1543-44.

75. *Id.* at 1537-38.

76. *Id.* at 1538.

77. *Id.*

78. *Id.* at 1544.

While the Federal Circuit only used the quoted set of four criteria – (1) specific machine, (2) useful result, (3) concrete result, and (4) tangible result – in passing, the usage made it clear that the court felt that the presence of all four of these features materially distinguished an advance from the sorts of abstract ideas that were excluded from patenting.⁷⁹

a. Aims of the Standard

Perhaps hidden in this analysis was the assumption that the Supreme Court's main concern in cases like *Benson* was that the patent system should not extend to and place restrictions on the use of abstract ideas. Hence, in the Federal Circuit's view, the key to defining the scope of patentable subject matter was to find a test for what is *not* an abstract idea, thereby solving the problem raised in *Benson* (as the Federal Circuit perceived *Benson*) while not placing any additional subject matter constraints on patentable subject matter.⁸⁰ Because of this the *Alappat* standard can be seen as a negative test – that is, a test for whether a new advance is not an “abstract idea.” If an original, useful advance is distinguishable from an abstract idea based on the presence of all four features mentioned in the *Alappat* case, then it is a practical application of a new design idea and the type of advance the patent system was intended to encourage in the eyes of the Federal Circuit.

b. Potential Criticisms

The approach taken by the Federal Circuit in *Alappat* can be criticized from at least three perspectives. First, the four criteria that the court focused on in *Alappat* may be argued to be too undemanding. Perhaps there are more features that should generally be required before a new advance with practical implications is treated as sufficiently important to future societal activities to justify applying to the advance the often costly transactional and conduct limiting features of the patent system.

Second, perhaps the Federal Circuit court's objective of broadly inclusive patent system scope, limited only by the need to exclude abstract ideas, was fundamentally misdirected and further limiting criteria should be injected into patentable subject matter standards to ensure that the patent system is limited to more specific realms of activities and useful designs. For example, these further limitations

79. See generally *id.* at 1544-45.

80. See *id.* at 1545.

might restrict patentable subject matter to inventions that make a physical change in some object. Or the further limitations might restrict patentable subject matter to processes and devices used in industrial contexts. While I have argued elsewhere in this article that such limitations might risk withholding valuable patent incentives from various types of highly useful and currently important intangible advances (such as new designs for communications technologies), such limitations of patentable subject matter to physical inventions or industrial contexts would have the merit of more predictable boundaries for the patent system and greater exclusion of the patent system from non-traditional areas of patenting such as advances in business methods or software designs.

Third, the four part standard developed in *Alappat* might be criticized because it ignores special public policy considerations that may militate against applying patent incentives and controls in particular areas of useful activities. For example, special concerns about not wanting to restrict doctor-patient interactions might justify the special exclusion of medical procedures from patentable subject matter. Recognition that these sorts of concerns about the downstream consequences of patent protections may sometimes justify field-specific exclusions of some otherwise patentable subject matters might be an improvement over the field-neutral approach of the *Alappat* standard. While it would probably be impossible to articulate all of the fields that might qualify for special treatment under this approach, it might still have been helpful if the Federal Circuit had described some of the factors that might justify a field-specific exclusion of certain types of processes or items from patentable subject matter.

Even though the *Alappat* standard may be criticized from these three perspectives, it is probably the best possible choice of a court-developed standard despite these potential criticisms. In general, as the Supreme Court noted in *Diamond v. Chakrabarty*,⁸¹ Congress has indicated that the patent system should be open ended and highly inclusive regarding types of technologies and other advances that can constitute patentable subject matter.⁸² In essence, the legislative history of the Patent Act suggests that the Congress intended that most if not all new types of practical advances created by individuals as helpful tools should be considered patentable subject matter absent a strong case for exclusion on public policy grounds that make patents

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

82. *Id.* at 309.

particularly undesirable for narrow sorts of advances.⁸³ This type of broad view of the increasing sweep of patentable subject matter is necessary to establish the full range of desirable incentives for the creation of practical advances that Congress intended to establish through the patent system. While the overextension of the patent system to abstract ideas is an ongoing concern, the four criteria specified in *Alappat*, if carefully and consistently applied, provide a means to exclude from patenting (or exclude from patent enforcement) any restrictions on abstract ideas that are unapplied to useful implementations.

As to whether the criteria specified in *Alappat* demand a sufficient level of social advantage and utility in order to justify patent restrictions on advances meeting the *Alappat* test, this is not so much a question of the sufficiency of the *Alappat* standard as it is an indication that how this standard is applied – particularly the demand for a “useful result” – may be highly important and justify further attention in subsequent cases.

With respect to whether further criteria specifying a need for a physical effect or an industrial application in a patentable invention should be added to the *Alappat* criteria, these types of additional, more restrictive criteria would probably be unwise for several reasons. The first is that, in our increasingly information processing based world, these sorts of artificial limits on what we consider to be patentable technology may leave highly useful, socially valuable advances outside the patent system and forego a degree of societal benefits that stronger patent incentives and greater ranges of resulting inventions might have achieved. The second is that policing the boundaries of “physical transformation” or “industrial application” criteria for patentable subject matter will involve its own definitional and fact finding challenges. The meaning of what constitutes a sufficient physical transformation or industrial application may be very hard to define. Once these criteria are defined, there may be some opportunity for patent drafters to work around the latest boundary definitions for patentable subject matter by including relatively unimportant physical features (meeting a “physical transformation” test) or industrial uses (meeting an “industrial application” test) for various types of advances sought to be patented. The “cure” of adding further narrowing criteria like these to the

83. As noted by the Supreme Court in *Chakrabarty*, in passing the 1952 Patent Act, “Congress intended statutory subject matter to ‘include anything under the sun that is made by man.’” *Id.* (quoting S. REP. NO. 1979, 82d CONG., 2d Sess., at 5 (1952)).

Alappat standard for patentable subject matter may not produce much change in the range of advances actually being patented.

Finally, while there may be field-specific cases for excluding certain types of subject matters from patentable subject matter, courts would seem to have little ability to make the factual findings needed to identify these fields and to craft appropriate exceptions to patentable subject matter tests. Rather, the assessment of the need for and proper scope of these “special cases” against patent protection would appear to be best left to the greater fact finding powers of Congress. Indeed, in the specific area of medical procedures, Congress has responded to concerns about the possible impact of patents on doctor-patient relationships with special standards diminishing the threat of patent infringement liability for doctors who undertake patented medical procedures.⁸⁴

3. Clarifying and Applying the *Alappat* Standard

The Federal Circuit has clarified and applied the *Alappat* standard in cases involving business methods; data collection and recording methods; and data processing methods that interpret physical inputs. These decisions are discussed below.

a. Business Methods: State Street

In *State Street Bank & Trust Co. v. Signature Finance Group, Inc.*,⁸⁵ the Federal Circuit reviewed the patentability of a data processing system used to implement a particular financial investment structure and business method.⁸⁶ The invention in this case involved a business method calling for the central investment of funds from multiple financial institutions, with frequent status reports made to the contributing institutions (a so called “hub and spoke” system of investment and reporting).⁸⁷ The court described the data processing system in the case as one that offered “the advantageous combination

84. See 35 U.S.C. § 287(c) (2000). Under this special provision regarding medical procedures, a patent holder generally cannot obtain either damages or injunctive relief against a licensed medical practitioner or related health care facility with respect to the performance of a medical activity that entails infringement of a medical procedures patent. However, this limited liability rule applies only to a medical procedure on the human body (or on an organ or cadaver, or a nonhuman animal used in medical research or instruction directly relating to the treatment of humans), which does not involve the use of a patented device.

85. *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999).

86. *Id.* at 1370.

87. *Id.*

of economies of scale in administering investments coupled with the tax advantages of a partnership.”⁸⁸ Hence, various financial advantages – including desirable tax consequences of the business structure involved – were recognized by the court as forms of utility associated with the patented method at issue in *State Street*.⁸⁹

This method of investment and financial reporting was found to be a patentable process because the information being processed had practical consequences in managing funds and increasing profits.⁹⁰ The Federal Circuit specifically noted that, given their importance in producing useful results in the form of potential financial gains, business methods should be treated no differently than other practical advances.⁹¹ Thus, if they meet the *Alappat* test, innovative business methods can qualify as patentable subject matter like other useful advances.⁹²

b. Data Collection and Recording Methods: AT&T

The Federal Circuit reaffirmed its support for the potential patentability of business methods in *AT&T Corp. v. Excel Communications, Inc.*⁹³ The innovation at issue in that case involved a new electronic record keeping method for recording information on long distance calls.⁹⁴ This method was found to be patentable subject matter because it had practical significance in carrying out specialized phone usage billing systems in which the identities of callers and their long distance carriers affected the charges for various long distance calls.⁹⁵

In *AT&T*, the Federal Circuit described the range of patentable subject matter related to information handling and management methodologies:

In *State Street*, this court, following the Supreme Court’s guidance in *Diehr*, concluded that “[u]npatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not ‘useful.’ . . . [T]o be patentable an algorithm must be applied in a

88. *Id.*

89. *Id.* at 1373, 1375.

90. *Id.* at 1373.

91. *See id.* at 1375.

92. *Id.*

93. *AT&T Corp. v. Excel Comm’ns, Inc.*, 172 F.3d 1352, 1353 (Fed. Cir. 1999), *cert. denied*, 528 U.S. 946 (1999).

94. *Id.*

95. *Id.* at 1358.

‘useful’ way.” In [*State Street*], the claimed data processing system for implementing a financial management structure satisfied the § 101 inquiry because it constituted a “practical application of a mathematical algorithm, . . . [by] produc[ing] ‘a useful, concrete and tangible result.’”

The *State Street* formulation, that a mathematical algorithm may be an integral part of patentable subject matter such as a machine or process if the claimed invention as a whole is applied in a “useful” manner, follows the approach taken by this court en banc in *In re Alappat*. In *Alappat*, we set out our understanding of the Supreme Court’s limitations on the patentability of mathematical subject matter and concluded that:

[The Court] never intended to create an overly broad, fourth category of [mathematical] subject matter excluded from § 101. Rather, at the core of the Court’s analysis . . . lies an attempt by the Court to explain a rather straightforward concept, namely, that certain types of mathematical subject matter, *standing alone*, represent nothing more than *abstract ideas until reduced to some type of practical application*, and thus that subject matter is not, in and of itself, entitled to patent protection.

Thus, the *Alappat* inquiry simply requires an examination of the contested claims to see if the claimed subject matter as a whole is a disembodied mathematical concept representing nothing more than a “law of nature” or an “abstract idea,” or if the mathematical concept has been reduced to some practical application rendering it “useful.” In *Alappat*, we held that more than an abstract idea was claimed because the claimed invention as a whole was directed toward forming a specific machine that produced the useful, concrete, and tangible result of a smooth waveform display.⁹⁶

In short, the Federal Circuit views the patentable subject matter inquiry as an assessment of whether an advance is a “useful” item or process – as indicated by whether it satisfies the *Alappat* standard – or is merely an unapplied abstract idea (meaning that it is not an invention because it is not of itself a practically useful advance) or a law of nature (meaning that there is no substance to the advance beyond the pre-existing operation of a natural process which was not invented by the person seeking a patent).

96. *Id.* at 1357 (emphasis in original) (citations omitted).

c. *Data Processing Interpretations of Physical Inputs: Arrhythmia (as interpreted in AT&T)*

While it predates the *Alappat* case, the Federal Circuit's decision in *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*⁹⁷ reflects reasoning that is consistent with its current views on the scope of patentable subject matter.⁹⁸ In *Arrhythmia*, the Federal Circuit considered whether patentable subject matter was present in a computer-implemented method for interpreting heartbeat monitor data to detect possible heart problems.⁹⁹ The court held that this invention constituted patentable subject matter because the results it produced were not abstract data but rather information "related to the patient's heart activity."¹⁰⁰ Patentable subject matter was present here because heartbeat monitor signals were "transformed" to produce a practically useful result in identifying heart abnormalities.¹⁰¹

In *AT&T*, the Federal Circuit summarized its earlier holding in *Arrhythmia* as follows:

The *Arrhythmia* court reasoned that the method claims qualified as statutory subject matter by noting that the steps transformed physical, electrical signals from one form into another form – a number representing a signal related to the patient's heart activity, a non-abstract output. The finding that the claimed process "transformed" data from one "form" to another simply confirmed that *Arrhythmia*'s method claims satisfied [35 U.S.C. § 101] because the mathematical algorithm included within the process was applied to produce a number which had specific meaning – a useful, concrete, tangible result – not a mathematical abstraction.¹⁰²

Thus, a process that "transforms" data from one state into another state is patentable subject matter if the transformed data is useful for either interpreting or measuring some feature of physical surroundings (such as the heart characteristics monitored in *Arrhythmia*) or manipulating some physical device (such as the computer-controlled rubber mold at issue in *Diehr*).¹⁰³

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

98. In *AT&T* – decided after the *Alappat* standard was in force – the Federal Circuit court reexamined and reaffirmed the appropriateness of its earlier reasoning in *Arrhythmia*. See *AT&T*, 172 F.3d at 1359.

99. See *Arrhythmia*, 958 F.2d at 1059.

100. *Id.*

101. *Id.*

102. *AT&T*, 172 F.3d at 1359 (citation omitted).

103. See, e.g., *Arrhythmia*, 958 F.2d at 1059.

F. Justice Breyer Stirs Things Up (With a Little Help from Justice Kennedy)

In an opinion dissenting from the Supreme Court's withdrawal of the writ of certiorari as improvidently granted in *Laboratory Corporation of America Holdings v. Metabolite Laboratories, Inc.*,¹⁰⁴ Justice Breyer, writing on behalf of himself and Justices Stevens and Souter, indicated strong doubts about the Federal Circuit's patentable subject matter standard.¹⁰⁵ As part of his discussion of how he would have analyzed the merits of the *Metabolite* case had the Court given it a full review, Justice Breyer questioned whether the invention at issue in this case involved patentable subject matter.¹⁰⁶ He described the invention as follows:

This case involves a patent that claims a process for helping to diagnose deficiencies of two vitamins, folate and cobalamin. The process consists of using any test (whether patented or unpatented) to measure the level in a body fluid of an amino acid called homocysteine and then noticing whether its level is elevated above the norm; if so, a vitamin deficiency is likely.¹⁰⁷

In questioning whether this process constituted patentable subject matter, Justice Breyer indicated that he felt that the *Alappat* standard would support a finding of patentable subject matter, but questioned whether that standard was proper.¹⁰⁸ In particular, he noted that:

[The Federal Circuit's decision in *State Street Bank*] does say that a process is patentable if it produces a "useful, concrete, and tangible result." But this Court has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary.¹⁰⁹

Hence, although he did not go further with this analysis, Justice Breyer implied that he felt that the *Alappat* standard (as restated in *State Street*) was inadequate in that it conflicted with the Supreme Court's own standards for patentable subject matter.¹¹⁰

104. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921 (2006).

105. *See id.* at 2928 (Breyer, J., dissenting).

106. *Id.* at 2925.

107. *Id.* at 2921.

108. *See generally id.* at 2928.

109. *Id.* (quoting *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999)) (citation omitted).

110. *Id.*

Although he did not directly question the *Alappat* standard, Justice Kennedy has also expressed doubts about some of the patents upheld under that standard.¹¹¹ His doubts were articulated in *eBay Inc. v. MercExchange, L.L.C.*, a case turning primarily on standards for injunctive relief in patent infringement cases.¹¹² Justice Kennedy, writing in a concurring opinion on behalf of himself and Justices Stevens, Souter, and Breyer, indicated that the negative consequences of the enforcement of business method patents may affect the propriety of issuing injunctive relief in a patent infringement case.¹¹³ These consequences could be particularly severe in Justice Kennedy's view because of the "potential vagueness and suspect validity of some of these [business method] patents"¹¹⁴ Thus, while his main topic was not patentable subject matter, Justice Kennedy's comments suggest that he believes business method patents sometimes have "suspect validity," perhaps because the *Alappat* standard under which they have been issued and enforced has allowed patents in this area to extend beyond the proper scope of patentable subject matter.

Given the comments of Justices Kennedy and Breyer (with the support of two additional members of the Court), it seems likely that the Supreme Court may reconsider the patentable subject matter standards applied by the Federal Circuit in the near future. This article is aimed at summarizing some of the considerations that the Supreme Court should take into account in reviewing the *Alappat* standard and in assessing whether any improvement to that standard is possible.

III. WHAT'S AT STAKE: SOME IMPORTANT EXAMPLES OF PATENTABLE SUBJECT MATTER UNDER THE *ALAPPAT* STANDARD

By extending patentable subject matter beyond the areas of physical inventions and industrial advances, the *Alappat* standard has probably had its most important impacts in encouraging intangible information processing advances (that would be unpatentable under a standard requiring physical elements in a patentable invention) and business method advances (which would be unpatentable under a standard requiring an industrial context).

This section briefly describes several recent patents that might be seen as encompassing non-patentable subject matter should the Court

111. See *eBay Inc. v. MercExchange, L.L.C.*, 126 S. Ct. 1837 (2006).

112. *Id.*

113. *Id.* at 1842.

114. *Id.*

move to a subject matter standard that demands either physical elements or an industrial context in a patentable invention. These patents illustrate by example several of the types of socially important advances that are encouraged through application of the widely inclusive *Alappat* standard for patentable subject matter. The following are not all of the types of advances promoted by the wide ranging patent incentives supported by the *Alappat* standard, but give some idea of the types of advances that might fall outside the patent system if further restrictions requiring physical system features or industrial applications were added to patentable subject matter standards.

A. Cell Phone Communications Technology

Patents on methods for compressing and managing information in communication systems cover a large number of important but intangible information processing advances. Qualcomm Inc., in particular, has amassed a large number of patents on information management and transmission protocols for use in cell phone systems.¹¹⁵ Qualcomm relies on large numbers of communications patents to protect its innovative efforts independent of any manufacturing and marketing of particular products.¹¹⁶ This has allowed the company to concentrate on research efforts while jettisoning manufacturing and marketing efforts.¹¹⁷ The result is a company that is focused on developing certain technologies without the need for maintaining manufacturing and marketing resources.¹¹⁸

The follow are a few representative examples of information processing patents held by Qualcomm.

1. Method for Managing a Communications Data Link¹¹⁹

Title: Signaling Data Link for a GSM-CDMA Air Interface

Summary: In a [Global System for Mobile (GSM)] mobile wireless telecommunications system, a method for conveying signaling between a mobile station and a base station via a [Code-Division Multiple Access (CDMA)] air interface includes generating a signaling message based on

115. See generally Simon Romero, *Qualcomm's Shrinking Act Could Pay Off Big; Company Prospers by Shedding Divisions and Focusing Fiercely on Patents*, N.Y. TIMES, Oct. 23, 2000, at C1.

116. *Id.*

117. *Id.*

118. *Id.*

119. U.S. Patent No. 6,813,256 (filed Sept. 30, 1999).

a GSM interface standard. Data link services are provided to process the message for transmission over the CDMA air interface, and the processed message is then transmitted over the CDMA air interface.

2. Method for Message Conversion between Formats for Wireless Communications Systems¹²⁰

Title: Short Message Conversion between Different Formats for Wireless Communication Systems

Summary: Techniques for converting short messages between different formats (e.g., from GSM [Short Message Service (SMS)] to CDMA SMS) such that pertinent control information is retained without changing the fundamental structure of these message formats.

3. Communication Load Monitoring and Management Method¹²¹

Title: Load Monitoring and Management in a CDMA Wireless Communication System

Summary: A system and method for monitoring and managing the loading conditions in a CDMA wireless communication system. The system comprises a load-monitoring device such as a CDMA mobile station connected to a data logging and processing device such as a diagnostic monitor. The monitoring device is placed within the service area of a base station. The monitoring device periodically initiates a call, is assigned to a traffic channel normally, and logs a power control parameter such as mobile station transmit power or the number of closed-loop power control commands received per unit time. From this information, the load-monitoring device can infer the real-time traffic loading conditions of the base station. If the loading of the system exceeds a predetermined threshold, an alarm may be sent to the system management center in order to take some action to limit additional loading on the base station.

B. Seismic Data Evaluation

Seismic data analysis methods aimed at interpreting seismic data to produce better understanding of underground structures and

120. U.S. Patent No. 7,072,359 (filed July 9, 2002).

121. U.S. Patent No. 5,859,838 (filed July 30, 1996).

resource locations (such as oil supplies) have been the subject of a stream of patents. Many of these methods involve specialized forms of information processing that aid geologists in interpreting physical settings, but that include no physical elements in the methods themselves. The following are a few representative patents on seismic data analysis methods that might be viewed as involving non-patentable subject matter under a standard that limits patents to inventions with physical elements.

1. Method of Analyzing Relationships within Seismic Data¹²²

Title: Method of Processing Seismic Data

Summary: A method of processing seismic data, for example surface seismic data such as multi-component OBC (Ocean Bottom Cable) seismic data, comprised of using vertical seismic profile (VSP) seismic data to determine a model of the relationship between depth within the earth and the velocity of seismic energy. In one embodiment, a model of the relationship between depth and velocity of seismic energy for P-waves is calibrated using VSP seismic data. Then, a model of the relationship between depth and velocity of seismic energy for S-waves is calibrated using VSP seismic data. Initially, the models are calibrated for the vertical velocity of P-waves and S-waves, using zero-offset or low-offset VSP data. The models may then undergo further calibration steps, such as calibration for VTI anisotropy and anelastic attenuation. Once calibration is complete, the models are used to process surface seismic data.

2. Method of Selecting Seismic Data for Subsequent Processing¹²³

Title: Method of Processing Seismic Data

Summary: A method of processing seismic data using a seismic energy propagation model of the subsurface is disclosed. The method assigns seismic source, seismic receiver, and reflection point locations to the propagation model; identifies a plurality of alternative raypaths consistent with the propagation model that originate at said seismic source location, reflect at said reflection point location, and terminate at said seismic receiver location;

122. U.S. Patent No. 6,917,564 (filed July 26, 2001).

123. U.S. Patent No. 6,950,790 (filed Aug. 12, 1998).

selects a raypath from the plurality of alternative raypaths having a shortest ray length, and utilizes the selected raypath in subsequent seismic processing.

3. Seismic Data Processing to Enhance Display of Faults and Channels¹²⁴

Title: Seismic Data Processing Method to Enhance Fault and Channel Display

Summary: A method of processing data of seismic traces for geophysical interpretation of the earth's subsurface includes the steps of determining a modified Hilbert transform of an input trace of data values [through a particular type of mathematical calculation that translates the original data values into additional "transformed" values] to detect rapid and slow changes in the input trace with reduced sensitivity to noise and providing results of modified Hilbert transform to enable identification of any detected rapid or slow changes.

C. Internet Search (Google)

Internet data search methodologies have formed the basis for a number of commercial enterprises in recent years.¹²⁵ None has been more successful than Google, which holds a broad portfolio of patents on innovative data search methodologies. The following are a few representative examples of Google's patents on intangible data gathering and analysis methods in this field.

1. Data Searching and Selection Based on Characterization of Initial Sources¹²⁶

Title: Information Extraction from a Database

Summary: Techniques for extracting information from a database are provided. A database such as the Web is searched for occurrences of tuples of information. The occurrences of the tuples of information that were found in the database are analyzed to identify a pattern in which the

124. U.S. Patent No. 6,963,804 (filed Nov. 19, 2002).

125. Marketing of goods and services through companies operating Internet search engines has proven very lucrative. A survey by the Search Engine Marketing Professionals Organization estimated that North American advertisers spent \$9.4 billion on search engine marketing in 2006, up 63 percent over the \$5.75 billion spent on similar advertising in 2005. Kevin Newcomb, *Search Marketing Shows Strength in 2006*, SEARCHENGINEWATCH.COM, Feb. 8, 2007, <http://searchenginewatch.com/showPage.html?page=3624915>.

126. U.S. Patent No. 6,678,681 (filed Mar. 9, 2000).

tuples of information were stored. Additional tuples of information can then be extracted from the database utilizing the pattern. This process can be repeated with the additional tuples of information, if desired.

2. Document Ranking in Search Results¹²⁷

Title: Adaptive Computation of Ranking

Summary: A system and method is disclosed in which a ranking function for a set of document rank values is iteratively solved with respect to a set of linked documents until a first stability condition is satisfied. After such condition is satisfied, some of the ranks will have converged. The ranking function is modified to take into account these converged ranks so as to reduce the ranking function's computation cost. The modified ranking function is then solved until a second stability condition is satisfied. After such condition is satisfied more of the ranks will have converged. The ranking function is again modified and process continues until complete.

3. Document Relevancy Determinations in Search Results¹²⁸

Title: Ranking Search Results by Reranking the Results Based on Local Inter-Connectivity

Summary: A search engine for searching a corpus improves the relevancy of the results by refining a standard relevancy score based on the interconnectivity of the initially returned set of documents. The search engine obtains an initial set of relevant documents by matching a user's search terms to an index of a corpus. A re-ranking component in the search engine then refines the initially returned document rankings so that documents that are frequently cited in the initial set of relevant documents are preferred over documents that are less frequently cited within the initial set.

D. Business Methods

The advent and widespread adoption of computer systems in business contexts has led to the increasing use of such systems and related information processing in creative ways to implement novel business methods. With the confirmation of the patentability of novel business methods in the *State Street* case, application for business

127. U.S. Patent No. 7,028,029 (filed Aug. 23, 2004).

128. U.S. Patent No. 6,526,440 (filed Jan. 30, 2001).

method patents have been among the fastest growing types within the United States Patent and Trademark Office.¹²⁹ Some typical examples of business method patents – which might be disallowed as involving unpatentable subject matter were new standards adopted emphasizing a need for an industrial application in a patented invention – include the following:

1. Method for Operating a Loyalty Marketing Program¹³⁰

Title: Customer Identification and Marketing Analysis Systems

Summary: A method and system for administering a loyalty marketing program (i.e., frequent buyer program) by using a government-issued identification card, such as a driver's license, as the frequent buyer redemption card. The data encoded onto the card may include a driver's license number, as the person's name and birth date. This information is used to tap into third party databases to gather further identification or demographic information about consumers. Incentives can be awarded in an efficient, personalized, and timely manner. Cost-effective and customer friendly administration of frequent-buyer incentive programs for marketing of goods and services is achieved.

2. System for Providing Electronic Commerce Information¹³¹

Title: Electronic Commerce System and Method for Providing Commercial Information in Electronic Commerce System

Summary: Log information concerning an electronic transaction performed between a transaction device and a business connection server through a network is compared with information concerning a predetermined business connection down-loaded from the server, and the log information is recorded in an IC card accepted by the transaction device when the log information is related to the information concerning a predetermined business

129. See *Hearing on Issues Relating to the Patenting of Tax Advice Before the Subcomm. on Select Revenue Measures of the H. Comm. on Ways and Means*, 109th Cong. 109-77 (2006) [hereinafter *Hearing*] (statement of James A. Toupin, Gen. Counsel, United States Patent and Trademark Office), available at

<http://waysandmeans.house.gov/hearings.asp?formmode=printfriendly&id=5271>.

130. U.S. Patent No. 6,070,147 (filed July 2, 1996).

131. U.S. Patent No. 6,070,148 (filed Mar. 24, 1998).

connection. Predetermined commodity information is provided to a user in accordance with a request by the user of the IC card when the log information stored in the IC card satisfies a predetermined condition.

3. Method for Accessing Online Sales Representative¹³²

Title: Virtual Sales Personnel

Summary: A method for enabling users over a network or over the WWW to interact with an interactive sales representative system for providing sales guidance. The system offers the user products, services, or ideas (the "products") according to parameters collected from the user. The system guides the customer to retrieve the desired products. If the system does not have a product matched to the customer requirements, preferably it will operate a mechanism for suggesting alternatives that are the closest to the customer requirements. The system will execute various sales tools and techniques to help and assist the customer and to convince the customer to purchase a product. By guiding the customer to the target product, the system will shorten the search cycle for the customer as well as find better-matched products. The system will provide market advisory, suggest, recommend, discuss (in written form and optionally voice form), comment, and advise the customer regarding the products. The system might advise the customer in any other aspects as well (such as providing personal feedback). The system adds graphics, animation, 3D, movie clips, voice and other effects to make the session enjoyable for the customer. The system is capable of executing various tools and techniques to improve its sales capabilities and bring better sales results.

IV. WHAT DO WE WANT? – SPECIFICATIONS FOR DESIGNING PATENTABLE SUBJECT MATTER STANDARDS FROM SCRATCH

In designing new patentable subject matter standards, the consequences of including and excluding advances from patentable subject matter must be considered. In addition, any new standards should fill gaps in innovation incentives and minimize the short-term costs related to changes in the standard.

132. U.S. Patent No. 6,070,149 (filed July 2, 1998).

A. Importance of Patentable Subject Matter Standards

Patentable subject matter standards are particularly important because they serve a threshold or “gatekeeper” role in the patent system. This function of patentable subject matter tests is highly important in defining the desirable features of these tests. Hence, some attention is given here to the impacts of patentable subject matter standards in defining the outer boundaries of the patent system.

1. Consequences of Exclusion of Advances from Patentable Subject Matter

The consequences of including or excluding particular types of advances from patentable subject matter standards are not symmetrical. The consequences of finding that a particular type of advance falls outside of patentable subject matter are particularly severe. These sorts of advances are never subject to patent rewards and incentives no matter how new and advantageous to society the advances might be. The gatekeeper function of patentable subject matter standards ensures that the gate is closed for these advances and no other features will bring the positive incentives of the patent system into play.

The severity of this result suggests that there is a significant benefit to tying the scope of patentable subject matter (and the range of patent incentives) to the full scope of socially beneficial advances. As the features of these sorts of advances shift from period to period (as they have with the advent of various types of information processing advances), courts should not hesitate to let the benefits of the patent system move to these new modes of practical design enhancements by recognizing highly open ended patentable subject matter standards.

Where transferable utility of benefit to substantial numbers of persons in the public is present in a particular type of advance, society will generally gain through access to more instances of such advances and it is desirable for the patent system to encourage new and nonobvious types of advances with these characteristics. Hence, transferable utility should be the touchstone of patentable subject matter tests, without any further limitations to particular technology areas or application contexts.

2. Consequences of Inclusion of Advances Within Patentable Subject Matter

The risks of taking an overly inclusive view of patentable subject matter are ameliorated somewhat by the fact that treating an advance as incorporating patentable subject matter does not ensure that the advance qualifies for a patent. Indeed, the test for patentable subject matter is only the first hurdle that an invention must successfully cross in order to qualify for a patent (and to ensure the enforceability of a patent if the USPTO has mistakenly issued a patent that did not meet all of the requirements of the patent laws). Assuming that an advance is seen as incorporating patentable subject matter, it will still not qualify for a patent if the same advance has already been publicly disclosed by another party,¹³³ if the advance, although not already disclosed and available to the public, is just an obvious variation of a previously disclosed design or practice,¹³⁴ if the advance has not been described in a patent application with sufficient details to enable a specialist in the same field with average skills to replicate the advance,¹³⁵ or if a timely patent application was not submitted concerning the application.¹³⁶

These additional tests controlling the issuance and enforceability of patents will screen out many attempts to gain rights over advances even if patentable subject matter is construed broadly to include new types of innovation such as data processing procedures and business methods. For example, in *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*,¹³⁷ the Federal Circuit felt that the “one click” online purchasing method at issue in that case probably constituted patentable subject matter, but held that a preliminary injunction was not appropriate in the case because of strong doubts about the enforceability of Amazon.com’s patent in light of evidence that the method was just an obvious variation of methods already disclosed and applied in the same field.¹³⁸

In general, then, a finding that a particular type of advance is patentable subject matter only ensures that the advance is subjected to further scrutiny. Allowing a broad range of innovations to be treated as patentable subject matter merely means that patents may ultimately

133. See 35 U.S.C. § 102(a) (2000).

134. See 35 U.S.C. § 103 (2000).

135. See 35 U.S.C. § 112 (2000).

136. See 35 U.S.C. § 102(b) (2000).

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

138. See *id.* at 1365-66.

protect some of these innovations provided they meet the other demanding tests of the patent laws. Keeping the door open to patent incentives for some nonobvious innovations in this way does not mean that every type of minor advance in fields like business methods or information processing will be patentable or that patents will become commonplace in a particular field.

What a broadly inclusive patentable subject matter standard does do is shift the focus regarding the patenting of many types of advances from the categorical analysis of whether like advances should always be excluded from patenting and patent incentives (because this type of advance does not constitute patentable subject matter) to a more advance-specific analysis of whether a particular advance sought to be patented meets patent law tests. As I have previously described:

In essence, recent changes involving a broader acceptance of intangible inventions as potentially patentable subject matter ensure that these types of inventions are not categorically rejected for patenting, but are instead assessed in terms of the individual characteristics of particular inventions. As one observer noted with respect to business method patents, recent case holdings “do[] not necessarily lower the standard for obtaining patents on business methods. The . . . holding[s] merely shift[] the patent inquiry away from the 35 U.S.C. § 101 subject matter analysis to the novelty, utility, nonobviousness, and specification inquiries. This shift implies only that business method claims will be analyzed individually rather than collectively.”¹³⁹

B. Designing a Patentable Subject Matter Standard from the Ground Up – Defining Patent Rights to Fill Gaps in Innovation Incentives

In general, a patentable invention should transfer new types of useful items or processes to users. The object of the patent system is to encourage innovators to develop new and nonobvious designs for items or processes that can be described and transferred to users. Where these sorts of transfers can be handled through direct transactions between individuals, contracts and contract-based incentives should be sufficient to encourage innovators to take optimal steps to produce and transfer innovations desired by the users

139. Gruner, *supra* note 4, at 366 (quoting Jared Earl Grusd, *Internet Business Methods: What Role Does and Should Patent Law Play?*, 4 VA. J.L. & TECH. 9, ¶ 8 (1999), http://www.vjolt.net/vol14/v4i2a9_grusd.html).

who are the opposite parties to innovation contracts. Hence, the potential transaction costs and risks of overly broad enforcement associated with patents are not necessary where only a few users are interested in a particular advance and can seek that advance through contract mechanisms.

Patents are needed where these sorts of contractual mechanisms tend to fail. This will occur where there are numerous potential users for a particular type of advance such that these users are unlikely to find each other and to band together to form contracting groups that can seek to promote the innovations they desire. Contract failures will also occur where the potential innovators who are capable of producing a particular type of advance can not be easily identified in advance by potential users of the advance such that there are no means for users to seek out the relevant innovators and to form innovation-encouraging contracts with them. These two types of failures of contractual mechanisms for encouraging innovation suggest that patent incentives are most needed where the following are present:

1. An innovation fills a need of users;¹⁴⁰
2. More than a few potential users share the need addressed by the innovation;¹⁴¹
3. The innovation meets the need through regular modes of operation that produce consistent results;¹⁴² and
4. The innovation and the results it achieves can be described clearly and distinctly, permitting effective transfers of the innovation to multiple users and accurate evaluations of the innovation by users.¹⁴³

If patents are extended to innovations meeting these criteria – by using these criteria as a test of patentable subject matter – the full potential of patent incentives to serve as valuable substitutes for contract-based incentives for nonobvious innovations can be realized without applying patents to settings where they can not have this impact.

The Federal Circuit's present *Alappat* standard for patentable subject matter, if properly interpreted, applies tests similar to the

140. See *id.* at 451-52.

141. *Id.*

142. *Id.*

143. *Id.*

above standard. For example, the criteria imposed by the *Alappat* standard will match the above criteria for patentable subject matter in the case of a “specific process” that produces a “useful, concrete, and tangible result” if the four elements of the *Alappat* standard are interpreted as follows:

1. A “specific process” is a process that is clearly defined so that it can be understood, replicated, and evaluated by potential users;¹⁴⁴
2. A “useful result” is present if the process has at least some utility;¹⁴⁵
3. A “concrete result” involves utility that is available to users without further development of the process;¹⁴⁶ and
4. A “tangible result” entails a result of a process that is useful in physical surroundings (by either manipulating or interpreting those surroundings).¹⁴⁷

Hence, the *Alappat* standard, understood in this way, offers promise as a patentable subject matter test that serves to extend the scope of the patent system and related innovation incentives to the types of nonobvious advances that may not be encouraged through contractual means. By enforcing patents over the full range of these subject matters, courts can help to form and solidify relationships between innovators and users of their innovations in which the innovators serve as agents of the users and are provided rewards through the enforcement of patent rights that are proportionate to the value of the innovations that they provide to users.¹⁴⁸

144. *Cf. In re Alappat*, 33 F.3d 1526, 1544 (Fed. Cir. 1994) (noting that a “combination of interrelated elements” defined a “specific machine” that produced a particular, practically useful result, thereby distinguishing the machine from an unpatentable abstract idea or concept).

145. *See, e.g., AT&T Corp. v. Excel Commc'ns, Inc.*, 172 F.3d 1352, 1358 (Fed. Cir. 1999) (finding “useful results” for purposes of patentable subject matter tests in accounting benefits of telephone usage record keeping system), *cert. denied*, 528 U.S. 946 (1999).

146. *See id.* (finding “concrete results” for purposes of patentable subject matter tests in results regularly achieved by patented record keeping system). *See also Tate v. Scanlan Int'l, Inc.*, 403 N.W.2d 666, 672 (Minn. Ct. App. 1987) (observing that, in the context of idea submission law, a design idea is “concrete” and a potential basis for a proprietary interest if the idea is “sufficiently developed to be ready for immediate use without additional embellishment.”).

147. *See AT&T*, 172 F.3d at 1358; *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999).

148. *See Gruner, supra* note 4, at 448-53.

C. *Minimizing Short-Term Costs of Changes in Patentable Subject Matter Standards*

If a patentable subject matter standard with the above breadth is applied, one risk is that too many patents may issue concerning innovations that are commonplace and that would appear even without the influence of patent incentives. Patents concerning these sorts of advances are detrimental because they place restrictions and costs on the subsequent use of the patented inventions, but do not produce any incremental increases in numbers of innovations over the levels that would prevail in the absence of patent incentives.

An excessive number of patents may issue and be enforced concerning obvious innovations for a number of reasons. The most common may be mistakes by patent examiners or enforcing courts about the nonobviousness of patented innovations. If an examiner or court underestimates the state of design knowledge in a particular field, then a wide range of innovations may be seen as significant departures from prior knowledge and therefore characterized as nonobvious advances when a full understanding of the relevant design knowledge would have shown that the advances were merely obvious variations of prior knowledge and therefore not patentable.

This type of mistake regarding patent issuance and enforcement decisions is most common in fields where innovations have not initially been seen as patentable (leading to gaps in patent records regarding lines of innovation) and then advances in that field have been found to constitute patentable subject matter (leading to patent applications for innovations that have been assessed against a relatively blank slate of prior art).¹⁴⁹ This pattern of weak prior art records leading to excessive ranges of patent issuance and enforcement has been seen in a number of fields including software and business method advances as these fields progressed through periods of assumed unpatentability and then surges of patenting activity.¹⁵⁰

149. See generally Richard S. Gruner, *Better Living Through Software: Promoting Information Processing Advances Through Patent Incentives*, 74 ST. JOHN'S L. REV. 977, 1064 (2000).

150. See Radhika Tandon, *Moving Forward: Patentability of Software and Business Method Patents*, 6 INTELL. PROP. L. BULL. 1 (2001) (observing that, before changes in the law in the 1990s clarified the patentability of innovative software and business methods, innovators in both these areas tended to rely on trade secret protections for their advances, thereby producing few publicly available prior art records on these advances); Christopher S. Cantzler, *State Street: Leading the Way to Consistency for Patentability of Computer Software*, 71 U. COLO. L. REV. 423, 456 (2000) (noting the weakness of prior art available to examiners

While these types of problems are sometimes temporarily significant during a period in which the patent system is reacting to a change in patenting practices in a particular area of innovation, these sorts of problems should probably not influence decisions about the proper scope of patentable subject matter. The fact that a type of innovative subject matter – previously thought to be unpatentable, but now treated as within the scope of patentable subject matter in the way that business methods and, earlier, software have changed in perceived patentability – is problematic for the patent system in the short term, should not deter courts from extending the patent system to this subject matter if there are benefits of such inclusion in the long term. While short term problems stemming from weaknesses in accumulated prior art records and associated over-patenting and over-extensive patent enforcement are real, the adverse impact of these short-term problems will often be overshadowed by the accumulated advantages of patent-induced innovations in the long run. Many years of benefits from patent-induced innovations are worth a few years of inconvenience due to excessive patent enforcement in a transition period when prior art records are being bolstered and patents are being properly limited to only nonobvious advances in the relevant field.

This is not to suggest that short-term problems related to the ever-broadening subject matter standards of the patent system are insubstantial. In a transition period when a new range of advances in a field are brought within the patent system due to new interpretations (or clarifications) of relevant standards, there may be considerable disruption in the relevant field due to both the over-breadth of patenting flowing from misperceptions about what is a nonobvious advance in the field and interference with design processes as previous expectations about the free sharing of advances are no longer applicable to patented advances. With time, the narrowing to proper levels of assessments of what is a nonobvious advance meriting a patent should severely limit the number of patents issued and the number of subsequent advances that are not freely available to developers because the advances are covered by a patent. However, in the short term, the problems stemming from over-patenting are likely to be disruptive.

regarding software advances); Thomas P. Burke, *Software Patent Protection: Debugging the Current System*, 69 NOTRE DAME L. REV. 1115, 1163 (1994) (“The legacy of the historical hostility to software patents is that prior art cannot easily be found.”).

Without limiting patentable subject matter in ways that will restrict the advantages of extending the patent system to a broad range of advances, the proper response to short term problems regarding potential over-patenting in various fields not previously affected by patenting is the addition of various fact finding steps to the patent issuance process that will, as rapidly as possible, overcome the prior art informational deficiencies that produce these sorts of short term surges in over-patenting. In short, a short-term problem with over-patenting deserves a short-term solution.

The methods that can overcome gaps in prior art records and bring patenting levels in line with proper notions of the scope of prior art and the nature of nonobvious extensions to the prior art deserving patents have been addressed previously in connection with advances in fields like software designs and business method advances that have gone through significant transitions from assumed unpatentability to recognized patentability. These methods – which will generally only be needed in a transition period when prior art records (and means to interpret them) within a field are suspected to be incomplete – include the following:¹⁵¹

1. Identify field-specific prior art sources for use in patent examination processes and enforcement disputes concerning patenting in a field of new patenting activity;
2. Develop means to expand the knowledge of patent examiners regarding designs and design methods in the relevant field, allowing them to better locate and interpret prior art records and to understand the nature of commonplace, obvious advances in the field;
3. Encourage concerned parties (i.e., competitors of patent applicants or designers in the relevant field) to submit prior references to support the examination or reexamination of patents in a field experiencing a surge of patenting; and
4. Develop an information distribution system aimed at informing designers and users of devices and processes in a field affected by a rapid increase in patenting about recently patented inventions, thereby avoiding surprise when a

151. See, e.g., Bradford L. Smith & Susan O. Mann, *Innovation and Intellectual Property Protection in the Software Industry: An Emerging Role for Patents?*, 71 U. CHI. L. REV. 241, 258-63 (2004); Jeffrey R. Kuester & Lawrence E. Thompson, *Risks Associated with Restricting Business Method and E-Commerce Patents*, 17 GA. ST. U. L. REV. 657, 681-82 (2001).

designer or user inadvertently adopts an infringing device or process.

These sorts of measures should help to reduce levels of erroneous patent issuance and enforcement while not completely excluding patent incentives from new areas of application. The alternative of simply restricting patentable subject matter standards in ways that would exclude particular fields (like business methods or software designs) from patent incentives will risk the loss of numerous advances that such incentives might produce over the long term, but which will not be reached through the everyday processes encouraging innovations in these fields.

D. Field-Specific Policy Arguments in Favor of Exclusions from Patentable Subject Matter

Even if, as has been argued here, there is a substantial case for maintaining highly open ended and inclusive patentable subject matter standards, there may be policy reasons in particular fields regarding the nature of innovation or the consequences of restricting the availability of some advances that militate against patent protections ever being allowed for certain types of advances in those fields. In essence, these policy arguments against patent protection for specific types of advances would need to support the conclusion that the net consequences of extending patent rewards to the advances are negative, taking into account the likelihood that certain nonobvious advances will be encouraged by the availability of patents, but also that the enforcement of patents regarding those advances will have adverse consequences.

Clearly, the nature of these field-specific arguments will vary from setting to setting. However, the following are a few of the field-specific reasons that might justify a withholding of patents from a particular domain by excluding that domain from definitions of patentable subject matter:

1. Ongoing difficulties in separating obvious from nonobvious advances (perhaps because there are no settled lines of engineering advance in a field and, hence, no means of identifying advances that are ordinary and unpatentable);¹⁵²

152. In general, the exclusion of obvious inventions from patent protections serves to protect the expectations of practitioners in a field and others that advances developed through routine engineering processes in a field will be freely available for use by all parties and as a basis for further designs. See Giles S. Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 402-07 (1960). However, where different persons in the same field apply widely different

2. Patterns of dual secret and public development of advances such that what is new in public is not new in secret and patents issuing on what appear to be a nonobvious advances in light of public records of prior art are in fact restricting long used advances in a highly disruptive manner;¹⁵³
3. Predominance of cumulative development of designs in a field through the aggregation of many small advances such that the existence of numerous patents on such small advances in so called “patent thickets” slows development in the field. This may occur if combinations of many small component features are needed to produce further advances and the transaction costs of arranging for patent rights to use the multiple components materially restrict subsequent rounds of innovation;¹⁵⁴ or

methods routinely, the types of innovations that should be seen as unpatentable in that field to protect the expectations of practitioners about free availability of new designs will also be unclear. This source of confusion may lead to patents on types of innovations that a substantial fraction of practitioners in the field would have expected to be available for subsequent use and elaboration in later designs. Rather than reaching this type of potentially disruptive result in the field in question, it may be desirable to exclude advances in that field from patent protection, at least until a stable and widespread set of routine innovation methods evolves in the field to both create more commonality of engineering expectations and provide more guidance on how to separate obvious advances from unusual ones warranting patent protection. This approach to defining patentable subject matter would withhold patents from a given range of innovations until engineering knowledge in the relevant field is ready to support predictable application of other patent standards such as criteria for separating obvious advances from nonobvious ones. See Richard S. Gruner, *Everything Old is New Again: Obviousness Limitations on Patenting Computer Updates of Old Designs*, 9 B.U. J. SCI. & TECH. L. 209, 217 (2003) (pointing out that the separation of nonobvious and potentially patentable advances from obvious and unpatentable innovations turns on the scope of routine advances in a particular field).

153. See, e.g., Mark A. Lemley & David W. O'Brien, *Encouraging Software Reuse*, 49 STAN. L. REV. 255, 301 (1997) (observing that the examination of software patents may be impaired because “much of the prior art which does exist, particularly source code manufactured by competing developers, is still maintained as a trade secret. There may be no way for the PTO to find and cite this material to oppose a patent claim.”); David R. Syrowik & Roland J. Cole, *The Software Patent Institute and the Challenge of Software-Related Patents*, 73 MICH. B.J. 544, 544 (1994) (noting that the long standing practice of software innovators of protecting many of their advances as trade secrets has caused many software design techniques which had been in use for some time to remain outside the public record of prior art and, hence, unavailable in evaluations of patent applications by patent examiners).

154. Patent thickets arise where the accumulation of overlapping patents that cover the same products choke out an industry. Transactional costs associated with licensing rights under the full set of governing patents may cause a number of desirable products in an industry governed by patent thickets not to be made. See Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1626-28 (2003). One possible solution to this problem might be to exclude a particular industry or subfield where innovations seem to lead to patent thickets from the range of patentable subject matter, thereby recognizing that whatever

4. Anticipated disruptive consequences of additions of patent rights to a previously unaffected field suggesting, for example, that patent rights will adversely affect duties and relationships between parties in the field (such as the impact that might follow from patents limiting the medical treatment that a doctor can give a patient) or otherwise undercut a regulatory program in the field (such as the impact that might follow from patents on tax law compliance methods that limit how taxpayers comply with tax laws).¹⁵⁵

Cases against patenting in terms of these and other similar arguments will depend heavily on the characteristics of innovation development and use in various fields. There are no doubt other reasons why patent rights may be ill advised in various fields. However, in order to state a compelling case against the extension of patent rights to encourage the development of nonobvious advances in a particular field, field-specific policy reasons for restricting the scope of patentable subject matter by excluding advances in that field from the range of patentable subject matter should present a strong case as to why, assuming that patents are successful in encouraging some degree of new and nonobvious advances in the field, the negative implications of patent enforcement are so clear that the adverse consequences of patent rights in the field are likely to overwhelm any benefits that an increment of nonobvious innovations might present, therefore justifying the complete exclusion of all advances in that field from potential patent rights and incentives.

E. A Summary of the Proposed Standard

To summarize the discussion in this section, an appropriately open-ended patentable subject matter standard, taking into account both the costs and benefits of extending patents to new subject matters, but being as unrestrictive as possible about the sorts of new subject matters that may be covered by patents, would recognize

incentives for innovation that might be gained by patent protections in that industry or subfield are overwhelmed in importance by the transactional problems created by patent rights.

155. Dennis I. Belcher & Dana G. Fitzsimons, Jr., *Tax Planners — Beware of Patented Estate Planning Techniques!*, 20-DEC PROB. & PROP. 24, 27 (2006) (observing that “patenting of tax reduction techniques will have a chilling effect on estate planning advice”); *Hearing*, *supra* note 129 (statement of Dennis I. Belcher, Partner, McGuire Woods LLP) (describing ways that enforcement of patents on tax planning techniques may affect how attorneys render legal advice to clients and how taxpayers comply with tax laws).

patentable subject matter in an advance that has the following characteristics:

1. The advance entails a useful design for an item or procedure that is described in sufficient detail to be presently evaluated and implemented by users;
2. Use of the advance entails immediately transferable utility of a sort that does not depend on the involvement of persons with particular expertise or the exercise of unusual or undefined personal discretion; and
3. There are no special characteristics of innovation or innovation use in the field of the advance that specially justify the withholding of patent rights because the adverse consequences of such rights would overwhelm the benefits to the public from any additional publicly disclosed innovations the rights are likely to encourage.

V. AN EXAMPLE OF THE PROPOSED STANDARD AS APPLIED: TAX PLANNING METHODS AS PATENTABLE SUBJECT MATTER

Patents covering tax-planning methods – that is, sequences of steps of asset and income management that are aimed at achieving advantageous tax results for taxpayers – have been issued in increasing numbers in recent years.¹⁵⁶ The developers of these methods have claimed that their tax planning steps are significantly new and useful methods for achieving practical results and have accordingly obtained patents covering the methods.¹⁵⁷ If valid, these patents will preclude other parties from using the patented methods without the patent holders' permission.

Tax planning methods present a form of new subject matter that can illustrate the application of the proposed test for patentable subject matter. This section sketches how the proposed standard would apply to determine if tax-planning methods are patentable subject matter.

156. See *Hearing, supra* note 129 (statement of James A. Toupin, Gen. Counsel, United States Patent and Trademark Office). See generally Richard S. Gruner, *When Worlds Collide: Tax Planning Method Patents Meet Tax Practice to Make Attorneys the Latest Patent Infringers* (forthcoming 2007).

157. See generally Wendy Davis, *Patenting Tax Strategies*, TR. & EST., Mar. 2004, at 42; Deborah L. Jacobs, *Patent Pending*, BLOOMBERG WEALTH MANAGER, May 2005, at 40.

A. Characteristics of Patented Tax Planning Methods

As of mid-2006, the United States Patent and Trademark Office (USPTO) had issued numerous patents on tax planning methods.¹⁵⁸ In a study conducted in July of 2006, the USPTO found forty-one issued patents related to tax strategies and an additional sixty-one published applications, not yet examined, related to tax strategies.¹⁵⁹ However, these counts of patents and published applications may not have been complete and the actual counts may be substantially higher. A quick check of patents on methods purporting to produce desirable tax results revealed a number of patents that were apparently not considered by the USPTO in reaching its counts.¹⁶⁰

The following are a few typical examples of patented methods for reducing tax liabilities and achieving other advantages in tax law compliance.

1. Income Taxes

Title: Method and Apparatus for Tax Efficient Investment Management¹⁶¹

Summary: A method and apparatus for automatically managing investment portfolios is disclosed which substantially tracks a selected index and automatically harvests tax losses.

Title: Method and Apparatus for Tax-Efficient Investment Using Both Long and Short Positions¹⁶²

Summary: Methods for managing an investment portfolio so that loss positions are aggressively harvested while still short term and gains are held for the long term.

158. See, e.g., U.S. Patent No. 6,567,790 (filed Dec. 1, 1999).

159. See *Hearing, supra* note 129 (statement of James A. Toupin, Gen. Counsel, United States Patent and Trademark Office).

160. The USPTO's counts of numbers of patents and published patent applications related to tax planning methods reflects the number of patents and applications that the USPTO has classified in subject matter subcategory 36T of Class 705 within the USPTO's subject matter system. See *id.* This is a special subcategory created by the USPTO for patents related to tax strategies. However, a quick review of patents purporting to implement tax shelters or otherwise achieve favorable tax results revealed a number of patents that were not included in subclass 705/36T in addition to those included in the above count. See, e.g., U.S. Patent No. 5,966,693 (filed May 7, 1996) (patent covering a procedure to reduce tax liabilities which is not classified in subcategory 36T of Class 705). These additional patents not yet classified in the relatively new subclass devoted to tax strategies may simply reflect the USPTO's ongoing efforts to reclassify patents into this new subcategory, efforts which have not yet reached and reclassified all of the relevant patents.

161. U.S. Patent No. 7,031,937 (filed Jan. 18, 2002).

162. U.S. Patent No. 6,832,209 (filed Oct. 6, 1999).

2. Estate and Transfer Taxes

Title: Method and Apparatus for Modeling and Executing Deferred Award Instrument Plan¹⁶³

Summary: This invention is directed to the administration of various deferred compensation programs that can effectively reduce an individual's income or estate tax.

3. Use Taxes

Title: Use Tax Optimization Process and System¹⁶⁴

Summary: A computer system and method for a lessor to determine correct use tax on moveable equipment, which may be subject to tax by more than one tax authority.

4. Reducing Administrative Burdens of Tax Law Compliance

Title: Method and Apparatus for Automatic Tax Verification¹⁶⁵

Summary: A method for tracking tax payment information includes fixing a unique machine-readable identifier to each of a number of taxable items, storing each of the unique machine-readable identifiers in a computer readable memory, and storing tax payment information in the computer readable memory for each of the items.

Title: System for Performing Tax Computations¹⁶⁶

Summary: A computer implemented application architecture and software component for providing tax computations for the administration of insurance and annuity products in a reusable software component.

B. Status of Tax Planning Methods Under the Proposed Standard

The first two of the criteria in the proposed test for patentable subject matter – requiring that a patentable advance be specified in detail and provide presently available utility to users – appear to be satisfied by tax planning methods. First, patented tax planning procedures produce – or at least increase the likelihood of producing – useful results for taxpayers in the form of reduced tax liabilities and increased retained monies. Provided that all the steps needed to carry out a procedure are described by the designers of the procedure and

163. U.S. Patent No. 6,609,111 (filed Oct. 18, 2000).

164. U.S. Patent No. 6,298,333 (filed Feb. 8, 2000).

165. U.S. Patent No. 6,360,208 (filed Feb. 4, 1999).

166. U.S. Patent No. 6,064,983 (filed Mar. 21, 1997).

disclosed in a patent application, then the operation and results of the procedure can be replicated and evaluated by users of the procedure and a meaningful transfer of the utility associated with the procedure can occur through disclosures associated with a patent. Second, a tax planning procedure in which the necessary steps are fully described and do not depend on undisclosed expertise or criteria for the exercise of personal discretion should be capable of regularly producing associated benefits to users. Thus, patent disclosures regarding tax-planning methods seem capable of transferring to multiple users the means to regularly produce useful results. Absent special field-specific reasons to withhold patents from these procedures, the normal goals of the patent system of producing and disseminating useful procedures and items would probably be furthered by treating tax planning procedures as patentable subject matter and thereby extending the incentives of the patent system to the development of tax planning methods.

However, there may be substantial field-specific reasons to withhold patents from tax planning methods even if such patents would encourage developers to produce and disclose larger numbers of nonobvious tax planning methods. A number of field-specific objections to tax method patents have been raised by tax specialists and others. For example, Dennis I. Belcher, an experienced tax counsel writing on behalf of the American College of Trust and Estate Counsel, has raised concerns about tax planning patents on the following grounds:

1. Patents on tax planning methods may be against public policy because such patents allow individual patent holders to “capture” and control particular tax law compliance methods and thereby prevent taxpayers from exercising their rights to choose how to comply with tax laws and to minimize their taxes within the limits of the law;¹⁶⁷
2. Patents on tax planning techniques may improperly increase a taxpayer’s costs in complying with tax laws – and reshape the taxpayer’s tax-related incentives influencing his or her choices of conduct – because the taxpayer must pay licensing fees for use of a patented tax planning method;¹⁶⁸ and

167. *Hearings, supra* note 129 (statement of Dennis I. Belcher, Partner, McGuire Woods LLP).

168. *See id.*

3. Because a patent on a tax planning technique can add credibility to the technique, patents on objectionable or aggressive tax planning techniques may increase the adoption of such techniques and reduce compliance with tax laws.¹⁶⁹

Whether or not these objections identify sufficiently frequent and negative consequences of tax method patents will depend on factual inquiries about the adverse consequences of these patents that are beyond the scope of this article.¹⁷⁰ The point for the purposes of this article is that the proposed standard for patentable subject matter will force courts to consider these domain-specific arguments against the issuance of tax planning method patents but will only exclude tax planning methods from the range of patentable subject matter if the adverse consequence of patents concerning advances in tax planning methods are not only clear but highly substantial. Where this is the case, the aggregate harm from those adverse consequences is likely to overshadow the societal gains produced by any new and nonobvious innovations in tax planning methods that patents on such methods may encourage developers to create.

VI. CONCLUSION

Patent incentives have a broadly applicable potential to encourage the creation of new and nonobvious advances in designs for practical devices, materials, and procedures in diverse fields. So long as our notions of what makes a new advance unusual and nonobvious are adjusted from field to field to ensure that patents are not issued for commonplace modifications to existing designs for practical items and procedures, patents are not likely to impact day to day improvements in practical activities. However, patents can produce incentives for some parties with exceptional skills to go outside the modes of everyday advancement in a field to create exceptional and highly important departures from prior designs.¹⁷¹ These sorts of incentives can produce valuable pressures favoring

169. *See id.*

170. For a more complete review of the issues surrounding tax planning method patents, see Joint Committee on Taxation, Background and Issues Related to the Patenting of Tax Advice (July 12, 2006), <http://www.house.gov/jct/x-31-06.pdf>.

171. Patents can also encourage persons with commonplace skills who are lucky enough to stumble onto a new and nonobvious insight into how to modify earlier designs in a field to make public disclosures of designs based on this insight, thereby ensuring that the insight is brought to public benefit rather than being lost.

increases in the diversity of designs in various fields of practical endeavor.

Patentable subject matter standards that are highly open ended help to ensure that these valuable forces favoring increased diversity in practical designs apply to as many fields as possible. Diversity of approaches in design developments is probably a positive feature of most if not all fields, particularly where the development of diverse designs for practical implements and procedures is subsequently coupled with market forces that determine which of various designs for useful items and procedures are widely adopted and form the basis for subsequent design efforts.

To ensure that patent incentives are a positive force for the rapid diversification of designs for practical items and procedures, open ended patentable subject matter standards like the Federal Circuit court's *Alappat* standard should not be pared down through the addition of restrictions such as limitations of patentable subject matter to inventions with physical elements or industrial application contexts. Rather, the *Alappat* standard should be retained as it reflects an appropriately broad embracing of the promise of patent incentives as a generally applicable means to positively influence most if not all fields of practical design.

If this generally applicable means for encouraging the diversification of practical designs is to be withheld from narrow classes of advances in some fields, this exclusion from patent rewards and controls should only occur following a careful consideration of the special characteristics of innovation or innovation use in those fields that present a strong case against ever allowing patenting of the advances in question. Because an exclusion from patentable subject matter for advances in a field will ensure that all advances of that type will be immune from patent incentives, this type of exclusion should only be accepted where the policy arguments against patents present a compelling case. In particular, field-specific exclusions of certain types of practical advances from patentable subject matter should only be recognized where the accumulated costs of patents concerning these advances seems likely to substantially overshadow any accumulated benefits from the new and nonobvious advances that patents might encourage. By treating these sorts of exclusions from patentable subject matter as rare exceptions to broadly inclusive patentable subject matter standards to be accepted only where the policy case against patent incentives is particularly clear, the promise of patent rewards to inventors will continue to serve as a lure to inventive activities in the great bulk of practical endeavors and the

benefits of the patent system will continue to be felt in the widest possible circumstances.

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