Paper No. 78

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CARL A. LUNDGREN

Appeal No. 2003-2088
Application 08/093,516

HEARD: April 20, 2004

Before FLEMING, Chief Administrative Patent Judge, HARKCOM, Vice Chief Administrative Patent Judge, and HAIRSTON, JERRY SMITH, and BARRETT, Administrative Patent Judges.

PER CURIAM.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the rejection of claims 1, 2, 6, 7, 19-22, 32, and 35-40, all the claims pending in the application.

Claim 1 is representative of the subject matter on appeal and reads as follows:

1. A method of compensating a manager who exercises administrative control over operations of a privately owned primary firm for the purpose of reducing the degree to which prices exceed marginal costs in an industry, reducing incentives for industry collusion between the primary firm and a set of

comparison firms in said industry, or reducing incentives for coordinated special interest industry lobbying, said set of comparison firms including at least one firm, said primary firm having the manager who exercises administrative control over said primary firm's operations during a sampling period, wherein privately owned means not wholly government owned, the method comprising the steps of:

a) choosing an absolute performance standard from a set of absolute performance standards;

b) measuring an absolute performance of said primary firm with respect to said chosen absolute performance standard for said sampling period;

c) measuring an absolute performance of each firm of said set of comparison firms with respect to said chosen absolute performance standard for said sampling period, said measurement of performance for each firm of said set of comparison firms forming a set of comparison firm absolute performance measures;

d) determining a performance comparison base based on said set of comparison firm absolute performance measures by calculating a weighted average of said set of comparison firm absolute performance measures;

e) comparing said measurement of absolute performance of said primary firm with said performance comparison base;

f) determining a relative performance measure for said primary firm based on said comparison of said primary firm measurement of absolute performance and said performance comparison base;

g) determining the managerial compensation amount derived from said relative performance measure according to a monotonic managerial compensation amount transformation; and

h) transferring compensation to said manager, said transferred compensation having a value related to said managerial compensation amount.

This is the second time this case has been appealed to the Board. In Appeal No. 96-0519, a merits panel reversed the examiner's rejection premised upon 35 U.S.C. § 101 (non-statutory

subject matter) of the claims then pending. The panel stated "[w]e find that the claim language recites subject matter that is a practical application of shifting of physical assets to the manager. We note the remaining claims also recite the above practical application. Therefore, we find statutory subject matter." Paper No. 49, page 7.

Dissatisfied with the outcome of the previous appeal, the Examining Corps filed a "Request for Reconsideration and Rehearing" (Paper No. 50, December 15, 1999) that lists two issues for reconsideration as follows:

> 1. Whether the invention as a whole is in the technological arts.
>
> 2. Assuming that the invention is in the technological arts, whether the claim transferring compensation to a manager is a practical application.

Id., page 2.

Appellant filed a response to the Request for Reconsideration and Rehearing (Paper No. 51, January 13, 2000).

In an opinion (Paper No. 52) mailed March 13, 2001, an expanded panel of the Board remanded the application to the examiner for two reasons. First, the record did not reflect that the examiner had considered and evaluated appellant's response to the Request for Reconsideration and Rehearing, and second, the Office of the Deputy Commissioner for Patent Examination Policy had requested that the application be remanded to the jurisdiction of the patent examiner so that issues regarding

"technological arts" and "practical application" could be further considered.

Following further prosecution before the examiner in which the examiner maintained a rejection under 35 U.S.C. § 101 (non-statutory subject matter), appellant filed a second appeal to this Board (Paper No. 64, December 12, 2002), followed by his Appeal Brief (Paper No. 69, March 13, 2003). The examiner filed an Answer on May 1, 2003 (Paper No. 70), that was followed by a Reply Brief (Paper No. 72, June 20, 2003). Oral argument was held by an expanded panel on April 20, 2004, and the case was taken under advisement.

DISCUSSION

We reverse the examiner's rejection under 35 U.S.C. § 101 (non-statutory subject matter). In reviewing the Examiner's Answer, we find the examiner refers the reader to Paper No. 60 for a statement of the rejection under § 101. We have reviewed Paper No. 60 and find that a rejection under this section of the statute is set forth on pages 4-8 thereof. The examiner states "both the invention and the practical application to which it is directed to be outside the technological arts, namely an economic theory expressed as a mathematical algorithm without the disclosure or suggestion of computer, automated means, apparatus of any kind, the invention as claimed is found non-statutory." Paper No. 60, page 7.

In reviewing the examiner's "Response to Argument" set forth at pages 3-8 of the Examiner's Answer of May 1, 2003, we first note that the examiner states that "the part of the 35 U.S.C. § 101 rejection that asserted that claims 1, 2, 6, 7, 19-22, 32, and 35-40 fail to produce a useful, concrete, and tangible result is withdrawn."[1] By withdrawing this rejection, it can be concluded that the examiner has found that the process claims on appeal produce a useful, concrete, and tangible result.

Since the Federal Circuit has held that a process claim that applies a mathematical algorithm to "produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle, on its face comfortably falls within the scope of § 101," AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999), one would think there would be no more issues to be resolved under 35 U.S.C. § 101. However, the examiner is of the opinion that there is a separate test for determining whether claims are directed to statutory subject matter, i.e., a "technological arts" test.

Thus, the only issue for review in this appeal is, to use the examiner's terminology, "whether or not claims 1, 2, 6, 7,

[1] The examiner had instituted two separate rejections under Section 101 in Paper No. 60. The first was on the basis that the claims were "nothing more than an abstract idea which is not associated or connected to any technological art," id., pages 4-7, and second was that the claims did not "achieve a practical result," id., pages 7-8.

19-22, 32, and 35-40 are limited to the technological arts, as required by 35 U.S.C. § 101." Examiner's Answer, page 3.

35 U.S.C. § 101 provides:

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

As seen, claim 1 on appeal is directed to a process. Thus, one may wonder why there is any issue regarding whether claim 1 is directed to statutory subject matter. The issue arises because the Supreme Court has ". . . recognized limits to § 101 and every discovery is not embraced within the statutory terms. Excluded from such patent protection are laws of nature, physical phenomena and abstract ideas." Diamond v. Diehr, 450 U.S. 175, 185, 209 USPQ 1, 7 (1981). However, in this appeal, the examiner has not taken the position that claim 1 is directed to a law of nature, physical phenomena or an abstract idea, the judicially recognized exceptions to date to § 101. Rather, the examiner has found a separate "technological arts" test in the law and has determined that claim 1 does not meet this separate test.

The examiner finds the separate "technological arts" test in In re Musgrave, 431 F.2d 882, 167 USPQ 280 (CCPA 1970); In re Toma, 575 F.2d 872, 197 USPQ 852 (CCPA 1978); and Ex parte Bowman, 61 USPQ2d 1669 (Bd. Pat. App. & Int. 2001)(non-precedential). We have reviewed these three cases and do not

find that they support the examiner's separate "technological arts" test.

In Musgrave, the court reversed a rejection under 35 U.S.C. § 101 that the claims under review therein were non-statutory because it disagreed with the Board that "these claims . . . are directed to non-statutory processes merely because some or all of the steps therein can also be carried out in or with the aid of the human mind or because it may be necessary for one performing the processes to think." Musgrave 431 F.2d at 893, 167 USPQ 289. After so holding, the court went on to observe "[a]ll that is necessary, in our view, to make a sequence of operational steps a statutory 'process' within 35 U.S.C. § 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of 'useful arts.' Const. Art. 1, sec. 8."

We do not view the court's statement in Musgrave in regard to the technological arts to have created a separate "technological arts" test in determining whether a process is statutory subject matter. Indeed, the court stated as much in Toma. The court first noted that the examiner in that case had "cited [inter alia, Musgrave] for the proposition that all statutory subject matter must be in the 'technological' or 'useful' arts... ." Toma, 575 F.2d at 877, 197 USPQ at 857. The court then stated that cases such as Musgrave involved what was

called at that time a "mental steps" rejection and observed, "[t]he language which the examiner has quoted was written in answer to 'mental steps' rejections and was not intended to create a generalized definition of statutory subject matter. Moreover, it was not intended to form a basis for a new § 101 rejection as the examiner apparently suggests." Id. at 878, 197 USPQ at 857. We do not believe the court could have been any clearer in rejecting the theory the present examiner now advances in this case.

We have also considered Ex parte Bowman, cited by the examiner. Bowman is a non-precedential opinion and thus, not binding.

Finally, we note that the Supreme Court was aware of a "technological arts test," and did not adopt it when it reversed the Court of Customs and Patent Appeals in Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673 (1972). As explained in Diamond v. Diehr, 450 U.S. 175, 201, 209 USPQ 1, 14 (1981) (Stevens, J., dissenting) (footnotes omitted):

> In re Benson, [441 F.2d 682, 169 USPQ 548 (CCPA 1971)] of course was reversed by this Court in Gottschalk v. Benson, 409 U.S. 63, [175 USPQ 673] (1972). Justice Douglas' opinion for a unanimous Court made no reference to the lower court's rejection of the mental-steps doctrine or to the new technological-arts standard. Rather, the Court clearly held that new mathematical procedures that can be conducted in old computers, like mental processes and abstract intellectual concepts, see id., at 67, [175 USPQ at 674-675], are not patentable processes within the meaning of § 101. (Footnotes omitted.)

Our determination is that there is currently no judicially recognized separate "technological arts" test to determine patent eligible subject matter under § 101. We decline to propose to create one. Therefore, it is apparent that the examiner's rejection can not be sustained. Judge Barrett suggests that a new ground of rejection should be entered against the claims on appeal. We decline at this stage of the proceedings to enter a new ground of rejection based on Judge Barrett's rationale, because in our view his proposed rejection would involve development of the factual record and, thus, we take no position in regard to the proposed new ground of rejection. Accordingly, the decision of the examiner is reversed.

REVERSED

Michael R. Fleming	)	
Chief Administrative Patent Judge	)	
	)	
	)	
	)	BOARD OF PATENT
Gary V. Harkcom	)	APPEALS
Vice Chief Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
Kenneth W. Hairston	)	
Administrative Patent Judge	)	

JERRY SMITH, Administrative Patent Judge, dissenting.

I would affirm the examiner's rejection. One must understand at the outset that the examiner's rejection raises the question of whether there is a "technological arts" standard implicitly required within the constitutional mandate authorizing Congress to grant patents in order to promote the progress of the useful arts. For purposes of this dissent, the term "technological arts" should be construed to mean nothing more than a threshold nexus to some field of technology to fall within the constitutional mandate. Likewise, any reference to "science" should be interpreted to mean based on scientific principles, which renders a claimed invention as falling within the constitutional mandate.

The issue presented by the examiner is a new one. That is, one can scrutinize as many court decisions as one may like, but there is no decision out there which unequivocally holds that the claimed invention on appeal before us must be granted a patent. Likewise, there is no decision out there that unequivocally holds that the claimed invention on appeal must be denied a patent. Thus, in my view, the issue before us raised by the examiner is one of first impression.

The "technological arts" standard as used by the examiner is intended to represent a more modern term for the reference to "useful arts" in the Constitution. The Constitution authorized

the Congress to award patents to inventors in order to promote the progress of the useful arts. While I do not question the power of Congress to pass laws to carry out this mandate, whatever law passed by the Congress cannot be applied in such a manner as to enlarge the constitutional mandate. Thus, any laws passed by the Congress to grant patents should be applied in a manner that is consistent with the constitutional mandate. My view of this mandate is that an invention must in some manner be tied to a recognized science or technology in order to promote the progress of the useful arts. Although a machine, manufacture, or composition of matter will rarely fail to meet the constitutional mandate, processes represent an especially troublesome type of invention. This is because almost anything can be claimed as a series of steps that technically can be considered a process, but the term process is so broad that it can be used to claim inventions that cover nothing more than human conduct or thought processes that are totally unrelated to any science or technology. Thus, I am not questioning the authority of the Congress to pass 35 U.S.C. § 101, but only the scope being given to the statute by the majority.

The majority is of the view that every invention is patentable unless it is nothing more than an abstract idea, a law of nature or a natural phenomenon, each of which has been held to be unpatentable by court decisions. These categories of

nonstatutory subject matter did not come to us by Scripture, however, but instead, resulted from some enlightened individual raising the question of whether such subject matter should be patented. Inventions within these categories certainly can be claimed in a manner which technically comply with 35 U.S.C. § 101. The point is that there is no absolute law that says that every category of nonstatutory subject matter has been decided for all time.

I would affirm the rejection, therefore, not because it is directed to a method of doing business, but rather, because the process as claimed is not tied to any known science or technology. If the claim recited that the steps were performed by a computer, then I would agree that the claimed invention would at least have met the constitutional "technological arts" standard, although the claimed invention would still need to be analyzed under 35 U.S.C. § 101 for conventional compliance with that section of the statute. There is no science or technology associated with the claimed invention. It is interesting to note that the claimed invention could have been performed by the writers of the Constitution using only the knowledge available at that time. I find it ludicrous, however, to think that the writers of the Constitution would have found the idea of providing compensation to an executive, as claimed, to be something that would qualify for a patent.

As noted above, I believe the issue before us is one of first impression. I have not overlooked the holdings in any of the cases most related to this issue because there is no computer being claimed here so that the most related cases do not apply. In fact, all the "relevant" cases cited by the majority relate to inventions that either specifically recited machines or were clearly performed in an environment that was an accepted science or technology.

If the majority simply wants to take comfort in the idea that all categories of nonstatutory subject matter have been established, and no new categories will be considered, then I disagree. The majority's position that essentially anything that can be claimed as a process is entitled to a patent under 35 U.S.C. § 101 opens the floodgate for patents on essentially any activity which can be pursued by human beings without regard to whether those activities have anything to do with the traditional sciences or whether they enhance the technological arts in any manner.

Who should raise the question of whether inventions are properly within the constitutional mandate if not the agency charged with applying the statutes? The examiner's rejection is based on a fundamental position that the claimed invention does not fall within the constitutional mandate regarding inventions which may be patented. This is a very important constitutional

question. Such constitutional questions cannot be answered by the Congress or even by this Board. The appropriate forum for deciding this question is the federal judiciary. Unfortunately, the federal judiciary cannot get jurisdiction of this issue unless someone takes the issue to it. The majority has ensured that, at least in this case and probably the foreseeable future, the entity best capable of deciding the constitutionality question will not get a chance to consider it. If it should turn out somewhere down the road that the federal judiciary decides that the "technological arts" requirement raised by the examiner is mandated by the Constitution, then it will mean that the invention on appeal before us as well as countless others will have improperly received patents. I cannot be concerned that an affirmance of the examiner's rejection may imply that many other previously issued patents should not have been granted. It cannot possibly be good public policy to continue to issue invalid patents just to be consistent with the past.

I expect that there will be an initial reluctance to accept this position because it is new. I only hope that this decision will open a public discourse on the topic of whether every process that technically falls within the scope of 35 U.S.C. § 101 automatically recites statutory subject matter. If this decision does nothing more than raise questions about the limits of nonstatutory subject matter that require the Congress to step

in and clarify the limits of 35 U.S.C. § 101, then this dissent will have been worthwhile.

Although I would affirm the examiner's rejection as is, I also join Judge Barrett in making a new ground of rejection under 35 U.S.C. § 101. I join Judge Barrett in his exhaustive treatment of why the invention on appeal is unpatentable under 35 U.S.C. § 101.

	)	BOARD OF PATENT
	)	APPEALS
Jerry Smith	)	AND
Administrative Patent Judge	)	INTERFERENCES

BARRETT, Administrative Patent Judge, concurring-in-part and dissenting-in-part.

The majority reverses the examiner's rejection on the narrow ground that there is no separate "technological arts" test under 35 U.S.C. § 101. That is, the majority holds that "technological arts" is the wrong test for statutory subject matter under § 101, but it does not state what the proper test should be and does not expressly say that the claimed subject matter is statutory. I concur with the majority's holding that there is no separate and distinct "technological arts" test. "Technological arts" has been said to be a modern equivalent of the "useful arts" in the U.S. Constitution, which, in my opinion, is fully circumscribed by the four categories of subject matter in § 101. However, I would enter a new ground of rejection for lack of statutory subject matter under § 101 based on different reasoning.

I dissent as to the majority's statement that "[a]s seen, claim 1 on appeal is directed to a process," apparently because it sets forth a series of method steps. In my opinion, not every claim to a series of steps constitutes a "process" under § 101. I also dissent as to statements in the opinion that imply that the sole test for statutory subject matter is the "useful, concrete and tangible result" test because the majority fails to acknowledge that this test was set out in the context of machine claims and machine-implemented process claims, which are not present here. I also dissent from the implied conclusion that the claims recite a "useful, concrete and tangible result" just because the original Board decision in Appeal No. 96-0519 held that "the claim language recites subject matter that is a practical application of shifting physical assets to the manager" (Paper No. 49, page 7), which conclusion has not been vacated, and because the examiner withdrew the rejection based on the failure of the claims to produce a useful, concrete, and tangible result. The examiner may have withdrawn this ground for the rejection simply because he felt that there was no way to overcome the Board's original statement. I do not agree that the claims recite a "practical application, i.e., 'a useful, concrete and tangible result,'" if that is the test.

I consider it the Board's duty to decide cases and to provide guidance to the Examining Corps in cases involving difficult legal questions. Thus, I disagree with the majority's decision not to state the test for statutory subject matter and not to state whether they consider the subject matter to be statutory. This application was filed July 16, 1993, and is the last of a series of continuation applications going back to November 1988. If the outcome of this case is not to issue the

application, but to reopen prosecution on some other theory, then I do not think it is fair to the applicant, who has expended so much time, energy, and money in prosecution and waited so long for a decision, to not decide the case now. I consider this case important enough that I would enter a new ground of rejection under § 101 based on different reasoning so that the USPTO might receive some guidance from our reviewing court, the U.S. Court of Appeals for the Federal Circuit.

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THE INVENTION

The invention relates to a method of compensating a manager of a privately owned firm in an oligopolistic industry for the purpose of reducing incentives for industry collusion between the firm and other firms in the industry. Although the title of the application refers to a "Method and Apparatus," no apparatus is disclosed or claimed. An oligopoly is an industry structure with a relatively small number of competitors. In an oligopolistic industry structure, there is an incentive for collusion, either overt, covert, or tacit, by managers of the firms to restrict output and artificially raise the price of their products above the price which would result under conditions of perfect competition.

There are said to be two results of oligopolistic collusion: (1) there is a net decrease in the benefit to consumers who consume a good that is priced above the perfect competition price; and (2) there is a net increase in the profit received by the oligopolistic firms producing the goods. However, the net decrease in benefit to consumers is of greater magnitude than the net increase in profits to the firms. The difference between the net decrease in benefits and net increase in profits represents a welfare cost to society. Therefore, it is to the benefit of society to discourage oligopolistic behavior.

Through collusion, a group of managers in an oligopolistic industry can restrict output and raise profits so as to increase profits for all firms in the industry. The claimed invention is said to reduce the likelihood of oligopolistic collusion in an industry comprising two or more firms. The goal of reduced collusion is achieved by tying a manager's compensation to the relative standard of profitability of the firm as opposed to the absolute profitability of the firm.

Managerial compensation based on a relative performance measure (profitability) creates a "zero sum game" for managers of firms in the industry. That is, a manager may increase his or her compensation by increasing his or her firm's relative profitability, but an increase in relative profitability of one firm will necessarily cause a decrease in relative profitability of one or more of the other firms in the industry. In this model, if all managers of firms in the industry are compensated based on the relative profitability of their respective firms, there will be no incentive for collusion.

Claim 1 (seven times amended) is reproduced below.

1. A method of compensating a manager who exercises administrative control over operations of a privately owned primary firm for the purpose of reducing the degree to which prices exceed marginal costs in an industry, reducing incentives for industry collusion between the primary firm and a set of comparison firms in said industry, or reducing incentives for coordinated special interest industry lobbying, said set of comparison firms including at least one firm, said primary firm having the manager who exercises administrative control over said primary firm's operations during a sampling period, wherein [the] privately owned means [is] not wholly government owned, the method comprising the steps of:

a) choosing an absolute performance standard from a set of absolute performance standards;

b) measuring an absolute performance of said primary firm with respect to said chosen absolute performance standard for said sampling period;

c) measuring an absolute performance of each firm of said set of comparison firms with respect to said chosen absolute performance standard for said sampling period, said measurement of performance for each firm of said set of comparison firms forming a set of comparison firm absolute performance measures;

d) determining a performance comparison base based on said set of comparison firm absolute performance measures by calculating a weighted average of said set of comparison firm absolute performance measures;

e) comparing said measurement of absolute performance of said primary firm with said performance comparison base;

f) determining a relative performance measure for said primary firm based on said comparison of said primary firm measurement of absolute performance and said performance comparison base;

g) determining the managerial compensation amount derived from said relative performance measure according to a monotonic managerial compensation amount transaction; and

h) transferring compensation to said manager, said transferred compensation having a value related to said managerial compensation amount.

THE REJECTION

No references are applied in the rejection.

Claims 1, 2, 6, 7, 19-22, 32, and 35-40 stand rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter.

The examiner's reasons for the rejection finally stabilized in the examiner's answer. The examiner states that there is a "two prong" test for statutory subject matter: first, the invention must be within the "technological arts" according to In re Musgrave, 431 F.2d 882, 167 USPQ 280 (CCPA 1970), In re Toma, 575 F.2d 872, 197 USPQ 852 (CCPA 1978), and the Board's decision in Ex parte Bowman, 61 USPQ2d 1669 (Bd. Pat. App. & Int. 2001) (nonprecedential and not designated for publication); and second, the invention must recite a "useful, concrete and tangible result" under State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998). The examiner asserts that the Court in State Street did not mention the "technological arts" test because it had already determined the subject matter to be in the technological arts (examiner's answer, pp. 5-6). The examiner agrees that the claimed invention produces a "useful, concrete and tangible result" (answer, p. 3). The only reasoning maintained by the examiner is that the claimed subject matter is not within the "technological arts" because (answer, pp. 7-8):

> [A]ll recited steps could be performed manually by a human as admitted by the Appellant on page 3 of paper no. 51 (filed January 13, 2000) when he stated, "While the calculations recited in Applicant's claimed invention may be carried out on a computer, they also may be carried out by hand calculation, using a hand-held calculator, a slide rule or any combination of such devices." However, the Examiner points out that even as disclosed in the specification, Appellant's invention is limited to steps performed manually by a human; there is no explicit contemplation of the integration of the technological arts anywhere in Appellant's claims or disclosure, thereby reinforcing the fact that Appellant's invention fails to "[p]romote the progress of science and useful arts," as intended by the United States Constitution under Art. I, § 8, cl. 8 regarding patent protection.

THE ISSUE

The issue is whether the subject matter of claim 1 is directed to a statutory "process" under 35 U.S.C. § 101.

The steps of claim 1: relate to an economic or game theory plan; do not recite any specific way of implementing the acts; do not expressly or impliedly recite any transformation of physical subject matter, tangible or intangible, from one state into another; do not recite any electrical, chemical, or mechanical acts or results; indirectly recite transforming data by a mathematical algorithm; do not require performance by a machine, such as a computer, either as claimed or disclosed; could be performed entirely by human beings; and do not involve making or using a machine, manufacture, or composition of matter. I do not believe the outcome is controlled by the Federal Circuit decisions in State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998) and AT&T v. Excel Communications, Inc., 172 F.3d 1352, 50 USPQ2d 1447 (Fed. Cir. 1999) because those cases involved transformation of data by a machine, such as a computer. This appeal involves a "non-machine-implemented" process claim, i.e., the claim does not recite how the steps are implemented--the claim is broad enough to read on performing the steps without any machine or apparatus, although it also covers performing the steps with a machine.

The question of whether this type of non-machine implemented subject matter is patentable is a common and important one to the U.S. Patent and Trademark Office (USPTO), as the bounds of patentable subject matter are increasingly being tested. In recent years, the USPTO has been flooded with claims to "processes," many of which bear scant resemblance to classical processes of manipulating or transforming compositions of matter and of functions performed by machines. The USPTO has learned the lessons from development of the law of machine-implemented processes, particularly when implemented on a general purpose digital computer. "Business methods" have long been considered statutory subject matter when performed by a machine. Technology Center 3600, Workgroup 3620, in the USPTO is entirely dedicated to "Electronic Commerce (Business Methods)" in Class 705, "Data Processing: Financial, Business Practice, Management, or Cost/Price Determination"; see www.uspto.gov/web/menu/pbmethod. The State Street and AT&T cases, often called "revolutionary," involved patented machines or machine-implemented processes that examiners have for some time regarded as nonexceptional. Perhaps encouraged by certain general language in these cases, however, a wide range of ever more general claims to "processes" come before the Office. Many, like the claimed process in the present case,

are not limited to implementation via any particular technology or machine, nor do they result in any transformation or manipulation of physical subject matter. Are such "processes" patentable because they are "useful"? Other "process claims" involve what seem to be insubstantial or incidental manipulations of physical subject matter--e.g., the recording of a datum: are these patentable processes? Still other process claims involve human physical activity--methods of throwing a ball, or methods of causing a fumble. Are these process claims patentable? Must the examiners analyze such claims for compliance with the written description and enablement requirements, and search the prior art for evidence of novelty and nonobviousness?

I recognize that § 101 rejections are strongly disfavored by our reviewing court, the U.S. Court of Appeals for the Federal Circuit. Also, examiners find § 101 rejections difficult because it is hard to put reasons into words. It would be more administratively convenient for the USPTO to have a rule that all subject matter is statutory, so that it did not have to make § 101 rejections and could focus its efforts on examining claims for patentability over the prior art. However, that is not the law and, therefore, the USPTO must apply § 101 case law the best it can. I believe that the present claim involves the kind of subject matter that was never intended to be patentable.

LEGAL ANALYSIS OF STATUTORY SUBJECT MATTER

Statutory subject matter is a complicated issue and the caselaw over the last 35 years has not been consistent in part due to broad pronouncements that, while sensible in the context of the facts of each case, proved to be ambiguous when applied to more general process claims. Therefore, the cases and tests cannot be completely reconciled. Nevertheless, the following is my analysis of statutory subject matter. In particular, I emphasize the sections dealing with "Process," "Abstract ideas," and "Claims that read on statutory and nonstatutory subject matter are unpatentable."

"Useful arts" ("technological arts") of U.S. Constitution

The origin of the United States patent laws is in the British Statute of Monopolies of 1623, 21 Jac. 1, ch. 3, which limited grants of monopolies to any "manner of new manufactures." United States v. Line Material Co., 333 U.S. 287, 330-31 (1947) (Burton, J., dissenting). "The term 'manufactures' was broadly construed by the English courts as embracing 'not merely a vendible product of inventive skill, but also a method of applying physical forces to the production of physical effects'

(i.e., processes as well as products)." 1 Donald S. Chisum, Patents § 1.01 (2001) (quoting 1 Willam Robinson, The Law of Patents for Useful Inventions 106 (1890)).

The considerations for the U.S. Constitution are discussed by Karl B. Lutz, Patents and Science, 18 Geo. Wash. L. Rev. 50, 53-54 (1949):

> By the year 1787 it was being recognized even in Great Britain that the phrase "new manufactures" was an unduly limited object for a patent system, since it seemed to exclude new processes. Doubts were also being raised as to the advisability of continuing to grant patents to those who introduced new industries from abroad. Both of these questions were resolved in the United States Constitution by broadening the field from "new manufactures" to "useful arts," and by limiting the grants to "inventors" who made "discoveries" in such arts, thus excluding mere importers of foreign technology.

The U.S. Constitution was adopted by convention of States, September 17, 1787, and ratification was completed June 21, 1788. The Constitution authorizes Congress "To promote the Progress of ... useful Arts, by securing for limited Times to ... Inventors the exclusive Right to their ... Discoveries." U.S. Const., art. I, § 8, cl. 8. "This qualified authority ... is limited to the promotion of advances in the 'useful arts.'" Graham v. John Deere Co., 383 U.S. 1, 5, 148 USPQ 459, 462 (1966).

"[T]he present day equivalent of the term 'useful arts' employed by the Founding Fathers is 'technological arts.'" In re Bergy, 596 F.2d 952, 959, 201 USPQ 352, 359 (CCPA 1979), aff'd sub nom. Diamond v. Chakrabarty, 447 U.S. 303, 206 USPQ 193 (1980); In re Musgrave, 431 F.2d 882, 893, 167 USPQ 280, 289-90 (CCPA 1970) (A series of operational steps is a statutory process if it is "in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of 'useful arts.'"); In re Prater (Prater I) 415 F.2d 1378, 1389, 159 USPQ 583, 593 (CCPA 1968) ("a process disclosed as being a sequence or combination of steps, capable of performance without human intervention and directed to an industrial technology--a 'useful art' within the intendment of the Constitution ..."), modified on rehearing, 415 F.2d 1393, 162 USPQ 541 (1969) (Prater II); In re Waldbaum (Waldbaum I), 457 F.2d 997, 1003, 173 USPQ 430, 434 (CCPA 1972) ("The phrase 'technological arts,' as we have used it, is synonymous with the phrase 'useful arts' as it appears in Article I, Section 8 of the Constitution."); Lutz, 18 Geo. Wash. L. Rev. at 54 ("The term 'useful arts,' as

used in the Constitution and in the titles of the patent statutes [before the 1952 Patent Act] is best represented in modern language by the word 'technology.' This word is defined in Webster's New International Dictionary (2nd edition 1942) as: 'Any practical art utilizing scientific knowledge, as horticulture or medicine; applied science contrasted with pure science.' (3rd definition.)"). Another synonym is "industrial arts." See Robinson § 157 ("Every invention in the industial arts is either an operation [process] or an instrument [machine, manufacture, or composition of matter].").

"Technology" is defined as: "2a: applied science b: a technical method of achieving a practical purpose 3: the totality of means employed to provide objects necessary for human sustenance and comfort." Webster's New Collegiate Dictionary (G.&C. Merriam Co. 1977). "Science" is defined as:

> 1a: possession of knowledge as distinguished from ignorance or misunderstanding b: knowledge attained through study or practice 2a: a department of systematized knowledge as an object of study <the ~ of theology> b: something (as a sport or technique) that may be studied or learned like systematized knowledge c: one of the natural sciences 3a: knowledge covering general truths or the operation of general laws esp. as obtained and tested through scientific method b: such knowledge concerned with the physical world and its phenomena : NATURAL SCIENCE 4: a system or method based or purporting to be based on scientific principles.

Id. The definition of "science" that applies is "natural science," not knowledge in general. The Constitution gave Congress the power "To promote the Progress of Science and useful Arts." "The term 'useful arts,' as used in the Constitution ... is best represented in modern language by the word 'technology.'" Lutz, 18 Geo. Wash. L. Rev. at 54. As described by Lutz:

> The word "science," which comes from the Latin, scire, "to know" at the writing of the Constitution meant learning in general. Such a use is found in a letter by Thomas Jefferson in 1799, in which he referred to "government, religion, morality, and every other science."

Id. at 51-52. "Natural science" is defined as "any of the sciences (as physics, chemistry, or biology) that deal with matter, energy, and their interrelations and transformations or with objectively measurable phenomena." Webster's. "Applied" is defined as "put to practical use; esp: applying general principles to solve definite problems." Id. "Engineering" is

defined as "2: the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to man in structures, machines, products, systems, and processes." Id. In my opinion, the definition of "engineering" best describes what is meant by "technology" and the "useful arts."

To further get a grasp on what is meant by "technology" I note a basic concept of the physical world. As explained in Gillespie et al., Chemistry 2 (Allyn and Bacon, Inc. 1986):

> We can describe the universe, and all the changes occurring in it, in terms of two fundamental concepts: matter and energy. Matter is anything that occupies space and has mass. Water, air, rocks, and petroleum, for example, are matter, but heat and light are not; they are forms of energy. The many different kinds of matter are known as substances. . . .

When we refer to "structure" or "material" or "substance" we are talking about matter and things made up of matter. Energy is further defined at Chemistry 53:

> The capacity to do work is called energy. Gasoline, for example, possesses energy because when it is burned, it can do the work of moving a car. We measure energy by the work done, and thus energy, like work, is measured in joules.
>
> In practice, it is convenient to distinguish different forms of energy, such as heat energy, light energy, electric energy, and chemical energy. . . .

Energy has physical existence because it is capable of doing work and of being measured, but is incorporeal. I submit that a fundamental property of "technology" is that it deals with the physical world, matter and energy, which are transformed and made useful to man in products and processes.

The Constitution was enacted at the beginning of the Industrial Revolution, which was both a series of technological and social innovations originating in England. The invention of the cotton-spinning jenny by James Hargreaves is usually pointed out as the first, major technological innovation of the Industrial Revolution. Prior to that time cotton had to be stretched out or spun into threads by a slow process, one thread at a time, by a machine called a spinning wheel. "Patented in 1767, the spinning jenny was a series of simple machines rather than a single machine, and it spun sixteen threads of cotton simultaneously. These two qualities: multiple machines in a

single machine as well as a machine that was designed not just to speed up work, but to do the work of several laborers simultaneously, was the hallmark of all subsequent technological innovations." See www.wsu.edu:8080/~dee/ENLIGHT/INDUSTRY.HTM. The spinning jenny and the water frame invented by Richard Arkwright circa 1769 allowed ten times as much cotton yarn to be manufactured in 1790 than had been possible twenty years before. The invention of the coal-fired rotary steam engine by James Watt in 1782 allowed spinning factories to be located almost anywhere and powered the machines of the Industrial Revolution. In 1784, Henry Cort invented the puddling process for iron production, which allowed pig iron to be refined from coke (which is made from coal which is abundant in England) instead of charcoal (which is made from less available wood). See www.historyguide.org/intellect/lecture17a.html. Against this background, it is likely that the Drafters of the Constitution envisioned protecting tangible manufactured products and physical methods of making products, operating machines, and working with the manifestations of the physical world (matter and energy).

Statutory subject matter - 35 U.S.C. § 101

Congress has defined patentable subject matter in consistent terms for over 210 years. The first United States Patent Act in 1790 required that the applicant "have invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein." Act of April 10, 1790, ch. 7, § 1, 1 Stat. 109. The language was amended three years later to require that the applicant "have invented any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement [thereof]." Act of February 21, 1793, ch. 11, § 1, 1 Stat. 318. The order and form of the words "invent" and "discover" changed several times over subsequent acts, but the statutory classes remained unchanged until the Patent Act of 1952 changed "art" to "process" and defined "process" as "process, art or method." See 1 Patents § 1.01. A "process" had long been considered to be a "useful art." See Corning v. Burden, 56 U.S. 252, 267 (1854) ("A process, eo nomine, is not made the subject of a patent in our act of Congress. It is included under the general term 'useful art.'").

Section 101 of Title 35 U.S.C. sets forth the subject matter that can be patented:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent

> therefor, subject to the conditions and requirements of this title.

"[N]o patent is available for a discovery, however useful, novel, and nonobvious, unless it falls within one of the express categories of patentable subject matter of 35 U.S.C. § 101." Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 483, 181 USPQ 673, 679 (1974). The statutory categories of § 101 define eligible (patentable or statutory) subject matter, i.e., subject matter that can be patented. The last phrase, "subject to the conditions and requirements of this title," makes it clear that § 101 is limited to the subject matter that can be patented. See S. Rep. No. 1979, 82d Cong., 2d Sess. 5 (1952), reprinted in 1952 U.S. Code Cong. & Admin. News 2394, 2399 ("A person may have 'invented' a machine or manufacture, which may include anything under the sun made by man, but it is not necessarily patentable under section 101 unless the conditions of the title are fulfilled."). The terms "new and useful" refer to conditions for patentability of subject matter that is eligible to be patented. "It may be useful to think of eligibility as a precondition for patentability, and of utility as one of the three fundamental conditions for patentability, together with novelty ... and nonobviousness ...." Robert L. Harmon, Patents and the Federal Circuit 40 (4th ed. Bureau of National Affairs, Inc. 1998). Thus, as a matter of terminology, subject matter that does not fall within one of the statutory classes is said to be "nonstatutory" or "unpatentable" subject matter, with utility being a separate requirement for patentability.

The § 101 terms "invents" and "discovers" are discussed in A.W. Deller, 1 Deller's Walker on Patents § 14 (2d ed. Baker, Voorhis & Co., Inc. 1964):

> The words "discover" and "discovery," as used in the Constitution and patent laws of the United States, do not have their broadest signification. In their primary and ordinary sense, they are not synonymous with "invent" and "invention." Webster in his dictionary defines the word "discover" in the following language:--"Discover differs from invent. We discover what before existed. We invent what did not before exist." Section 100 of Title 35 USC states that the term "invention" means invention or discovery. Webster's definition of invention is as follows:--"Invention differs from discovery. Invention is applied to the contrivance and production of something that did not before exist. Discovery brings to light that which existed before, but which was not known." A "discovery" in this sense is not the subject of a patent; and as stated in

> In re Kemper, [14 F. Cas. 286, 287 (1841),] "it will be found, by a careful perusal of the Constitution and laws of the United States upon the subject of patents for useful arts, etc., that it (discovery) is not there used in this sense, but always as synonymous with invention." No discovery will entitle the discoverer to a patent which does not in effect amount to the contrivance or production of something which did not exist before; or, in other words, to an invention. [Footnotes omitted.]

Not every discovery is patentable. See Morton v. New York Eye Infirmary, 17 F. Cas. 879, 884 (S.D.N.Y. 1862):

> A discovery may be brilliant and useful, and not patentable. No matter through what long, solitary vigils, or by what importunate efforts, the secret may have been wrung from the bosom of Nature, or to what useful purpose it may be applied. Something more is necessary. The new force or principle brought to light must be embodied and set to work, and can be patented only in connection or combination with the means by which, or the medium through which, it operates.

Thus, the discovery of a law of nature, a principle of a physical science, or a natural phenomenon is not patentable because it existed before and is not an invention. It is only when the discovery or principle is utilized in an invention that is a "process, machine, manufacture, or composition of matter" under § 101 that it becomes eligible for protection. See Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 130 (1948) ("He who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end."); Mackay Radio & Tel. Co., Inc. v. Radio Corp. of America, 306 U.S. 86, 94 (1939) ("While a scientific truth, or the mathematical expression of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be."); 1 Deller's § 14 (describing the example that discoveries about laws of nature, such as electric current, conduction of materials, and magnetism were not patentable, but the application of these laws and principles in the telegraph by Morse was patentable).

Statutory classes of § 101 define the "useful arts"

"Congress intended statutory subject matter to 'include anything under the sun that is made by man.'" Diamond v. Diehr, 450 U.S. 175, 182, 209 USPQ 1, 6 (1981) (quoting from S. Rep. No. 1979, reprinted in 1952 U.S. Code Cong. & Admin. News at 2399 ("A person may have 'invented' a machine or manufacture, which may include anything under the sun made by man, but it is not necessarily patentable under section 101 unless the conditions of the title are fulfilled.")). (The Senate Report does not mention "composition of matter" or "process.") "[T]he use of the four terms [process, machine, manufacture, and composition of matter] represent an effort to indicate the general industrial boundary of the single field of patentable invention. [Emphasis ours.] The first three terms, machines, manufactures and composition of matter, refer to physical things, while the fourth, process, refers to acts. Hence the general field may be considered as consisting of new things and new acts." Bergy, 596 F.2d at 974 n.11, 201 USPQ at 372 n.11 (citing Glasscock and Stringham, Patent Law 22 (1943)). The four categories define the "useful arts" ("technological arts") as discussed in 1 Patents § 1.01:

> The general purpose of the statutory classes of subject matter is to limit patent protection to the field of applied technology, what the United States constitution calls "the useful arts." Theoretical or abstract discoveries are excluded as are discoveries, however practical and useful, in nontechnological arts, such as the liberal arts, the social sciences, theoretical mathematics, and business and management methodology. This focus on technology explains the preoccupation of patent law with means. A patent can issue only for a new means of achieving a useful end or result. Those who articulate new problems or recognize new needs frequently make valuable contributions to society but cannot look to the patent system for reward unless they go on to find a new and specific process, machine, manufacture, or composition of matter that solves the problem or meets the need. [Footnotes omitted.]

"Thus patent law rewards persons for inventing technologically useful applications, instead of for philosophizing unapplied research and theory." In re Alappat, 33 F.3d 1526, 1553, 31 USPQ2d 1545, 1565 (Fed. Cir. 1994) (en banc) (Archer, C.J., concurring in part and dissenting in part).

Historical definitions of statutory categories

It is useful to define the § 101 categories of "process, machine, manufacture, or composition of matter." "These terms may not be read in a strict literal sense entirely divorced from the context of the patent law." Id. (citing, inter alia, In re Schrader, 22 F.3d 290, 295-96 & n.11, 30 UPSQ2d 1455, 1459-60 & n.11 (Fed. Cir. 1994)).

Machine, manufacture, and composition of matter

The three product classes of machine, manufacture, and composition of matter have traditionally required physical structure or substance. "The term machine includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result." Corning v. Burden, 56 U.S. at 267; see also Burr v. Duryee, 68 U.S. 531, 570 (1863) ("A machine is a concrete thing, consisting of parts or of certain devices and combinations of devices."). In modern parlance, electrical circuits and devices, such as computers, are referred to as machines. "Manufactures" and "compositions of matter" are defined in Diamond v. Chakrabarty, 447 U.S. at 308, 206 USPQ at 196-97:

> [T]his Court has read the term "manufacture" in accordance with its dictionary definition to mean "the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery." American Fruit Growers, Inc. v. Brogdex Co., 283 U.S. 1, 11 (1931). Similarly, "composition of matter" has been construed consistent with common usage to include "all compositions of two or more substances and ... all composite articles, whether they be results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids." Shell Development Co. v. Watson, 149 F. Supp. 279, 280 (D.C. 1957) (citing 1 A. Deller, Walker on Patents § 14, p. 55 (1st ed. 1937). [Parallel citations omitted.]

The statutory categories of "machine, manufacture, or composition of matter" broadly cover every possible "thing" that can be made by man. Included are living things made by man. See Diamond v. Chakrabarty, 447 U.S. at 313, 206 USPQ at 199 (man-made micro-organism falls within § 101: Congress recognized that "the relevant distinction was not between living and inanimate things, but between products of nature, whether living or not, and human-made inventions."); J.E.M. Ag Supply, Inc. v.

Pioneer Hybrid Int'l, Inc., 534 U.S. 124, 145, 60 USPQ2d 1865, 1874 (2001) (newly developed plant breeds fall within § 101). Structure and materials made by man clearly fit the definition of "technology." While a machine and a manufacture can only be made by man, a composition of matter can be made by man or naturally occurring.

Process

The most difficult category to define is a "process." A "process" is broadly defined in the dictionary as "a series of actions or operations conducing to an end." Webster's. Any series of actions or operations is a process within the dictionary definition. However, not every method or process in the dictionary sense is a patentable "process" under §§ 100(b) and 101 within the "useful arts" ("technological arts"). See Gottschalk v. Benson, 409 U.S. at 64, 175 USPQ 674 ("The question is whether the method described and claimed is a 'process' within the meaning of the Patent Act."); Parker v. Flook, 437 U.S. 584, 588 n.9, 198 USPQ 193, 196 n.9 (1978) ("The statutory definition of 'process' is broad.... An argument can be made, however, that this Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a 'different state or thing.'"); id. at 589, 198 USPQ at 197 ("The holding [in Gottschalk v. Benson] that the discovery of that method could not be patented as a 'process' forecloses a purely literal reading of § 101."); Musgrave, 431 F.2d at 893, 167 USPQ at 289-90 (a series of operational steps must be in the technological arts to be a statutory process); In re Sarkar, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978) ("Though every set of steps, of whatever nature, may properly be labeled a 'process,' § 101 ('Whoever invents') limits the patent system to invented processes ... [and] inventions which Congress is constitutionally empowered to make are tangible embodiments of ideas in the useful, or technological, arts.... Thus, a series of steps is a 'process' within § 101 unless it falls within a judicially determined category of nonstatutory subject matter exceptions."); John Hogg Austin, The Patentable Invention, 18 J. Pat. Off. Soc'y 738, 748 (1936) ("The statutory classification, considered in its totality, limits 'art' [now 'process'] by interpretation to the industrial methods of the artisan according to the general character of the other three classes."); A.H. Walker, The Law of Patents § 3 (5th ed., Baker, Voorhis & Co. 1917) ("The word 'art' [now 'process'] also has a narrower meaning in the patent laws than it has in the dictionaries. In the latter its significance is 'the use of means to produce a result.' In the patent laws it covers only a certain limited meaning of the word process.").

Section 100(b) of Title 35 U.S.C. defines "process" to mean "process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material." The definition of "process" to mean "process, art or method" makes it clear that the terms are synonymous. See S. Rep. No. 1979, reprinted in 1952 U.S. Code Cong. & Admin. News at 2409-10. "When Congress approved the addition of the term 'process' to the categories of patentable subject matter in 1952, it incorporated the definition of 'process' that had evolved in the courts" (footnotes omitted); Schrader, 22 F.3d at 295, 30 UPSQ2d at 1459, which included this definition from Cochrane v. Deener, 94 U.S. 780, 788 (1877): "A process is . . . an act, or series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing." See Diamond v. Diehr, 450 U.S. at 185, 209 USPQ at 7 ("Analysis of the eligibility of a claim of patent protection for a 'process' did not change with the addition of that term to § 101. Recently, in Gottschalk v. Benson, ... we repeated the above definition recited in Cochrane v. Deener, adding: 'Transformation and reduction of an article "to a different state or thing" is the clue to the patentability of a process claim that does not include particular machines.'"). The transformation definition has frequently been misunderstood to require transformation of an object or article. See Schrader, 22 F.3d at 295 & 295 n.12, 30 UPSQ2d at 1459-60 & 1459 n.12 (noting imperfect statements requiring object or article in 1 William C. Robinson, The Law of Patents for Useful Inventions § 159 (1890) and Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673 (1972)). However, the "subject matter" transformed does not need to be a physical (tangible) object or article or substance, but can be physical, yet intangible, phenomena such as electrical signals or electromagnetic waves. See Schrader, 22 F.3d at 295 n.12, 30 USPQ2d at 1459 n.12 ("In the Telephone Cases, 126 U.S. 1 ... (1887), the Court upheld the validity of a claim directed to a method for transmitting speech by impressing acoustic vibrations representative of speech onto electrical signals. If there was a requirement that a physical object be transformed or reduced, the claim would not have been patentable.... Thus, it is apparent that changes to intangible subject matter representative of or constituting physical activity or objects are included in this definition"); In re Ernst, 71 F.2d 169, 170, 22 USPQ 28, 29-30 (CCPA 1934); Prater I, 415 F.2d at 1387-88, 159 USPQ at 592 (discussing the Telephone Cases); 2 A.W. Deller, Patent Claims (2d ed. 1971), § 379 (process claims do not require transforming physical matter: "Another line along which the field of process claims has been extended by judicial approval is the production of power, light, heat, sound, electricity and by-products of their regulation, such as telephonically transmitted speech.").

This misunderstanding may be the reason why "transformation of subject matter" has not been accepted as the test for statutory subject matter of "process" claims.

In my opinion, the Supreme Court's definition of a statutory "process" as requiring that the steps operate to physically transform physical subject matter (matter or some form of energy) to a different state or thing succinctly describes the fundamental characteristic of "technology" and a process in the "useful arts" ("technological arts"). This definition is consistent with the meaning given to "arts" during the first 100 years of our patent system. See Robinson §§ 157-172 and "process" cases summarized in Gottschalk v. Benson. An "art" (now "process") historically referred to methods performed by new and known machines, methods of manufacture (making and treating machines, manufactures, and compositions of matter), and methods of controlling natural forces, not just any series of steps without regard to whether it produces some physical effect. See Robinson § 166 ("But though an art embraces so wide a field of inventive skill, it includes only such operations as are capable of producing physical effects."). Moreover, the Supreme Court's test is relatively objective compared to other tests because it is possible to identify and discuss the physical subject matter (matter or form of energy) being transformed and the physical steps used to transform it. For example, a thermodynamic process for converting heat into some other form of energy, such as mechanical force or motion is patentable even though heat, force, and motion are not tangible objects. A method that does not operate on matter or some form of energy in the physical universe is not "useful" to mankind in the technological sense of the Constitution's "useful arts." Nonstatutory methods include disembodied plans and schemes: for becoming rich, for a system of government, for the more efficient conduct of business, for a way of giving a discount, for playing games (e.g., bidding in bridge or betting in poker), for budgeting, for marketing products, etc. Not all physical acts perform a statutory transformation, e.g., a method of negotiating a contract, while it might involve physical acts, such as talking and writing, only transforms the rights and obligations of the parties.

The general statement in Sarkar that "a series of steps is a 'process' within § 101 unless it falls within a judicially determined category of nonstatutory subject matter exceptions," 588 F.2d at 1333, 200 USPQ at 137, taken in isolation, is admittedly inconsistent with our position that a series of steps must first meet the transformation of subject matter definition to be considered a statutory "process." The term "exceptions" is normally used to refer to subject matter that would be within one

of the four categories of § 101 "but for" some exceptional condition, as will be discussed infra. The general statement in Sarkar is considered to be dicta, because it is contradicted by the court's own analysis, which identifies two statutory requirements--that patentable processes be "invented," and that they be "tangible embodiments of ideas in the useful, or technological, arts." 588 F.2d at 1333, 200 USPQ at 137. Perhaps the transformation test and the exception test are the same. I think a more accurate statement is found in In re Pardo, 684 F.2d 912, 916, 214 USPQ 673, 677 (CCPA 1982): "[A]ny process, machine, manufacture, or composition of matter constitutes statutory subject matter unless it falls within a judicially determined exception to section 101." This statement says that subject matter must be within one of the categories before it is tested to determine whether it falls within an exception, which allows the interpretation that a series of steps must first qualify as a "process" under § 101. In my opinion, whether a series of steps initially falls within the statutory class of a "process," applying the Supreme Court's definition of transformation of subject matter, should be treated as a separate issue from whether it is within an exception.

Machine-implemented methods (processes tied to a particular machine or apparatus) are generally considered to be statutory subject matter. This is consistent with the transformation of subject matter definition because machines carry out physical transformations on tangible objects and substances, such as in manufacturing operations, and on nontangible physical phenomena, such as the conversion of electrical signals or the conversion of heat into other forms of energy (thermodynamics). Moreover, the performance of physical operations by a machine is clearly the kind of subject matter which was intended to be protected by the "useful arts" ("technological arts") as evidenced by the fact that the Constitutional provision was enacted in the context of the Industrial Revolution when the productivity of machines was being improved and machines were replacing manual operations. However, although there is always some form of physical transformation of electrical signals into a different state or signal within a computer, transformation of data by a known machine (e.g., a new use of a known general purpose digital computer) has evolved into a special case because of mathematical algorithms, which will be discussed in connection with State Street and AT&T, infra.

It is possible that exceptions exist to the requirements that a "process" must be tied to a particular machine or apparatus or must operate to change subject matter to "a different state or thing." See Gottschalk v. Benson,

409 U.S. 63, 71, 175 USPQ 673, 676 (1972), rev'g In re Benson, 441 F.2d 682, 169 USPQ 548 (CCPA 1971) ("It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a 'different state or thing.' We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents."); Parker v. Flook, 437 U.S. at 588 n.9, 198 USPQ at 196 n.9 ("The statutory definition of 'process' is broad.... An argument can be made, however, that this Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a 'different state or thing.' See Cochrane v. Deener, 94 U.S. 780, 787-888, 24 L.Ed. 139. As in Benson, we assume that a valid patent may issue even if it does not meet one of these qualifications of our earlier precedents. 409 U.S. at 71, 93 S.Ct., at 257."). However, great care should be taken before abandoning or creating exceptions to a definition which has proven useful over many years.

The Federal Circuit stated that a "'physical transformation' ... is not an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application," AT&T, 172 F.3d at 1358, 50 USPQ2d at 1452. However, the court noted that "the claims require the use of switches and computers," 172 F.3d at 1355, 50 USPQ2d at 1449, and transformation of data by a machine inherently requires a physical transformation. Thus, the statement in AT&T was not necessary and is dicta. Transformation of data by a machine is a special case. The court in AT&T might have been saying that statutory subject matter does not require "physical transformations" performed externally to the machine, such as using the calculated results to control a system. Cf. State Street, 149 F.3d at 1375, 47 USPQ2d at 1602 (Claim 1 is "statutory subject matter, even if the useful result is expressed in numbers, such as price, profit, percentage, cost, or loss.").

A statutory "process" is not limited to the means disclosed for performing it. As stated in Cochrane v. Deener:

> That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument or machinery is used to effect that object, whether a hammer, a pestle and mortar, or a mill. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process

> being the same. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed on the subject-matter to be transformed and reduced to a different state or thing.

94 U.S. at 787-88. See also Prater I, 415 F.2d at 1388, 159 USPQ at 592 ("[A] process is not limited to the means used in performing it." (Emphasis omitted.)). Indeed, it is possible for a statutory "process" to be performed manually. In In re Tarczy-Hornoch, 397 F.2d 856, 158 USPQ 141 (CCPA 1968), which overruled the "function of a machine" rejection of process claims, Judge Rich discussed the history of the doctrine and noted that even the "function of a machine" rejection did not apply where the process could be performed manually or by different apparatus. For example, "Walker on Patents, 4th ed. § 3, states that valid process patents may be granted for 'operations which consist entirely of mechanical transactions, but which may be performed by hand or by any of several different mechanisms or machines,'" id. at 864, 158 USPQ at 147, and "[t]he Expanded Metal and Waxham processes could have been performed in some manual fashion or by apparatus different from that disclosed by the patents," id. at 864, 158 USPQ at 148. It is implicit, however, that a statutory "process" still requires a physical transformation of physical subject matter (matter or energy) to a different state or thing if it is not tied to a particular machine. See Gottschalk v. Benson, 409 U.S. at 70, 175 USPQ at 676 ("Transformation and reduction of [subject matter] 'to a different state or thing' is the clue to patentability of a process claim that does not include particular machines.").

There is usually no difficulty identifying the physical transformation of subject matter even where no specific structure is recited. For example, a step of "mixing" two chemicals to produce a manufacture or composition of matter is a physical chemical and/or mechanical act, regardless of whether it is performed by a machine or a human. Other times, it will be more difficult to determine whether there is a transformation. In my opinion, the physical transformation of physical subject matter to a different state or thing, as required by a statutory "process" under § 101, is evidenced by chemical (including biotechnical), electrical (including computer), or mechanical (i.e., physical forces applied by a machine or a human to matter or energy) steps, i.e., physical transformation steps so as to be within the "useful arts." See Corning v. Burden, 56 U.S. at 267 ("But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations are called processes."); Expanded Metal Co. v.

Bradford, 214 U.S. 366, 385-86 (1909) (process not limited to chemical actions, but includes electrical and mechanical operations); 2 Patent Claims, Chapter XXIV on "Process Claims," §§ 381-383 (chemical, mechanical, and electrical processes). Cf. In re Iwahashi, 888 F.2d 1370, 1374, 12 USPQ2d 1908, 1911 (Fed. Cir. 1989) ("[E]very step-by-step process [under § 101], be it electronic or chemical or mechanical involves an algorithm in the broad sense of the term.... This is why the proscription against patenting has been limited to mathematical algorithms...."). "A manufacturing process is clearly an art [process], within the meaning of the law." Tilghman v. Proctor, 102 U.S. 707, 722 (1881). Operations of a machine are also processes. See Tarczy-Hornoch, 397 F.2d at 866, 158 USPQ 149 (overruling the "function of an apparatus" doctrine). Not all physical actions cause a transformation of physical subject matter (matter or energy), e.g., "negotiating a contract," "convening a meeting," etc. Of course, not every step must perform a physical transformation, only the claim as a whole must perform a statutory transformation.

However, as with any test, "[t]he line between a patentable 'process' and an unpatentable 'principle' is not always clear." Parker v. Flook, 437 U.S. at 590, 198 USPQ at 197. Incidental physical limitations, such as data gathering, field of use limitations, and post-solution activity, although they may involve physical transformations, are not enough to convert a nonstatutory "abstract idea" into a statutory "process." See "Incidental physical limitations," infra. A claim may contain a data gathering step that requires a physical transformation, but if the claim "as a whole" is not directed to a physical transformation, the claim will not be statutory subject matter. See, e.g., In re Grams, 888 F.2d 835, 12 USPQ2d 1824 (Fed. Cir. 1989) (sole physical step of "performing said plurality of clinical tests on the individual to measure the values of the set of parameters" did not convert it to a statutory process). The test is based on the claim "as a whole."

The statutory subject matter problem arises when a claimed series of steps is not tied to a particular machine or apparatus, and it cannot be determined that the steps of the claim as a whole are physical process steps transforming subject matter (matter or a form of energy) to a different state or thing.

Subject matter not within any category

Some man-made subject matter fails to fall within any of the statutory categories. See In re Warmerdam, 33 F.3d 1354, 1361, 31 USPQ2d 1754, 1760 (Fed. Cir. 1994) (data structure per se of

claim 6 is not in one of the categories of § 101); In re Bonczyk, 10 Fed. Appx. 908 (Fed. Cir. 2001) (non-precedential) ("fabricated energy structure" does not correspond to any statutory category of subject matter). Music, art, and literature, if claimed as such, do not fit into any of the statutory categories because they are not physical things or acts. Another example seen in the USPTO is a claim to a computer program per se, i.e., a claim reciting solely a program comprising a set of computer instructions for performing certain functions, instead of a series of steps performed on a computer. The instructions are not physical things which would qualify as a machine, manufacture, or composition of matter, and the claim is not recited as a series of steps as a process. Thus, a computer program per se is not statutory subject matter because it does not fall within any statutory class. See In re Chatfield, 545 F.2d 152, 159, 191 USPQ 730, 737 (CCPA 1976) (Rich, J., dissenting) ("It has never been otherwise than perfectly clear to those desiring patent protection on inventions which are new and useful programs for general purpose computers (software) that the only way it could be obtained would be to describe and claim (35 U.S.C. § 112) the invention as a 'process' or a 'machine.'"); In re Lowry, 32 F.3d 1579, 32 USPQ2d 1031 (Fed. Cir. 1994) (memory containing a stored data structure was statutory subject matter, which has been interpreted to mean that programs stored on a physical medium are statutory subject matter as a "manufacture").

A series of steps which is not tied to a particular machine or apparatus, and which does not transform physical subject matter to a different state or thing, does not meet the statutory definition of a "process" and is not patentable subject matter. It should not be necessary to address whether such a process which does not meet the definition also fits within one of the judicially recognized exclusions.

The judicially recognized exclusions

"Congress intended statutory subject matter to 'include anything under the sun that is made by man.'" Diamond v. Diehr, 450 U.S. at 182, 209 USPQ at 6. "This Court has undoubtably recognized limits to § 101 and every discovery is not embraced within the statutory terms. Excluded from such patent protection are laws of nature, physical phenomena and abstract ideas." Id. at 185, 209 USPQ at 7. Note the Supreme Court's use of the term "[e]xcluded"; the three categories are often referred to as "exceptions." "Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable as they are the basic tools of scientific and

technological work." Gottschalk v. Benson, 409 U.S. at 67, 175 USPQ at 675. "Laws of nature, physical phenomena and abstract ideas" are the only three exclusions recognized by the Federal Circuit. There is no separate exclusion for mathematical algorithms. See Alappat, 33 F.3d at 1543, 31 USPQ2d at 1556 ("[The Supreme Court] never intended to create an overly broad, fourth category of [mathematical] subject matter excluded from § 101."). There is also no "business method" exception. See State Street, 149 F.3d at 1375, 47 USPQ2d at 1602 ("We take this opportunity to lay this ill-conceived ['business method'] exception to rest.").

The judicially recognized exclusions may be understood as tools to ensure that the proper weight be given to both the "whoever invents or discovers any new and useful" phrase and the four statutory categories of "process, machine, manufacture, or composition of matter" of § 101. These phrases are the statutory means by which Congress delimited the Constitutional authorization to promote the progress of the "useful arts" ("technological arts"). The "invents or discovers" requirement excludes subject matter that existed in nature prior to the purported invention, while the statutory categories ensure that patents issue only for practical applications, not "abstract ideas." As stated in Sarkar, 588 F.2d at 1333, 200 USPQ at 137:

> Though every set of steps, of whatever nature, may properly be labeled a "process," § 101 ("Whoever invents") limits the patent system to invented processes. Sets of steps conducted entirely by nature are not subject to patenting; they are not invented by man. Sets of steps occurring only in the mind have not been made subject to patenting because mental processes are but disembodied thoughts, whereas inventions which Congress is constitutionally empowered to make patentable are tangible embodiments of ideas in the useful, or technological, arts. See In re Waldbaum, 457 F.2d 997, 1003, 59 Cust. & Pat. App. 940, 173 USPQ 430, 434 (1972) (commenting on the synonymity of useful arts and technological arts).
>
> Mathematical exercises, or methods of calculation, are within the myriad of mental processes of which the human mind is capable. Though they may be represented by written formulae, symbols, equations, or "algorithms," mathematical exercises remain disembodied. They may not, therefore, cross the threshold of § 101. . . .

> Thus, a series of steps is a "process" within § 101 unless it falls within a judicially determined category of nonstatutory subject matter exceptions.

See also In re Walter, 618 F.2d 758, 770, 205 USPQ 397, 409 (CCPA 1980) (pure mathematics is not an art or technology).

Laws of nature and physical phenomena

Of the three exceptions, "laws of nature, physical phenomena and abstract ideas," "laws of nature" and "physical phenomena" are not patentable because the discovery of a law of nature, a principle of physical science, or a natural phenomenon is not an invention made by man. "Thus, a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented his law of gravity. Such discoveries are 'manifestations of ... nature, free to all men and reserved exclusively to none.'" Diamond v. Chakrabarty, 447 U.S. at 309, 206 USPQ at 197 (citing Funk Seed Co. v. Kalo Co., 333 U.S. at 130, 76 USPQ at 281). See also Robinson § 135 ("In one sense, the word 'principle' denotes the physical force employed by an invention. The other appellations given to this force are very numerous, and most of them are wholly inappropriate. It has been called 'an elementary truth,' 'a priniciple of science,' 'a property of matter,' 'an element of matter,' 'a law of nature,' the root and ground of science;' ...." It cannot be patented for the three following reasons:): § 136 ("Firstly, a principle, considered as a natural physical force, is not the product of inventive skill."; § 137 ("Secondly, a principle, considered as a natural physical force, is the common property of all mankind."); and § 138 ("Thirdly, a principle, considered as a natural physical force, is not a complete and operative means."). And, as to living subject matter, Congress recognized that "the relevant distinction was not between living and inanimate things, but between products of nature, whether living or not, and human-made inventions." Id. at 313, 206 USPQ at 199. "Laws of nature" and "physical phenomena" may also represent inherent properties, e.g., the discovery that certain plants have a chemoprotective effect against cancer. "Laws of nature" and "physical phenomena" are often expressed using mathematical formula, such as $E=mc^2$. It is arguable that certain mathematical principles describing real world truths, such as the Pythagorean theorem, represent a law of nature as well as an abstract idea.

"Laws of nature" and "physical phenomena," if drafted as such, usually do not fit within a statutory category; e.g., a claim to "$E=mc^2$, where E is energy, m is mass, and c is the speed of light" does not fit the definitions of a "process, machine, manufacture, or composition of matter" because it is neither a series of acts nor a physical thing. Of course, a competent draftsman can always draft "laws of nature" and "physical phenomena" to appear to be in a statutory category, such as a product or process, which is why the exceptions must apply to subject matter that otherwise falls within one of the statutory classes of § 101. See Sarkar, 588 F.2d at 1333, 200 USPQ at 137 ("Sets of steps conducted entirely by nature are not subject to patenting; they are not invented by man."); Smithkline Beecham Corp. v. Apotex Corp., 365 F.3d 1306, 1331, 70 USPQ2d 1737, 1756 (Fed. Cir. 2004) (Gajarsa, J., concurring) ("SKB's paroxetine hemihydrate ... can be 'made' through a natural process of spontaneous conversion" and the claim covers a product of a "natural process").

Abstract ideas

"An idea of itself is not patentable, but a new device by which it may be made practically useful is." Rubber-Tip Pencil Co. v. Howard, 87 U.S. 498, 507 (1874). See also Burr v. Duryee, 68 U.S. at 570 ("We find ... no authority to grant a patent for a 'principle,' or a mode of operation, or an idea, or any other kind of abstraction."). Unlike "laws of nature" and "natural phenomena," "abstract ideas" are conceived by man and can be claimed as methods.

The nature of an "abstract idea" is harder to describe, so I start with some definitions. The term "abstract" is defined as "1. considered apart from concrete existence: an abstract concept. 2. Not applied or practical; theoretical. 3. Not easily understood; abstruse." The American Heritage Dictionary (2d ed. Houghton Mifflin Co. 1982). "Idea" is defined as "1. Something that exists in the mind, potentially or actually, as a product of mental activity, such as a thought, image, or conception. 2. An opinion, conviction, or principle .... 3. A plan, scheme, or method." Id. "Practical" is defined as "4. Capable of being used or put into effect; useful: practical knowledge of German.... 6. Concerned with the production or operation of something useful: Woodworking is a practical art." Id. "Application" is defined as "3.a. The act of putting something to a special use or purpose: an application of a new method. b. A specific use to which something is put: the application of science to industry. 4. The capacity of being usable; relevance: Geometry has practical application." Id. "Useful" is defined as

"Capable of being used advantageously." Id. Therefore, the "abstract idea" exception refers to disembodied plans, concepts, schemes, or theoretical methods. The opposite of an "abstract idea" is something having a concrete existence, tangible, and put to a practical use. In my opinion, an "abstract idea" is "applied" or "embodied," i.e., it is transformed into a "practical application" or a "concrete and tangible" instantiation, when it is utilized in an invention that is a "process, machine, manufacture, or composition of matter" under § 101. A "machine, manufacture, or composition of matter" covers concrete and tangible "things." A "process" that is tied to a particular machine or apparatus, or that transforms physical subject matter, performs concrete and tangible "acts."

The most well known example of an "abstract idea" is a mathematical algorithm, which is a "procedure for solving a given type of mathematical problem," Diamond v. Diehr, 450 U.S. at 186, 209 USPQ at 9. Mathematical algorithms per se, such as claim 13 in Gottschalk v. Benson, merely recite steps for transforming data (numbers) and are disembodied because they do not recite means (structure) for implementing the steps and because they do not require transformation of physical subject matter, such as electrical signals. Mathematical algorithms can be "abstract ideas" that do not represent a "law of nature" or a "physical phenomenon." See In re Meyer, 688 F.2d 789, 794-95, 215 USPQ 193, 197 (CCPA 1982) ("However, some mathematical algorithms and formulae do not represent scientific principles or laws of nature; they represent ideas or mental processes and are simply logical vehicles for communicating possible solutions to complex problems."). Importantly, "abstract ideas" are not limited to mathematical subject matter: any series of steps that, as claimed, is not physically embodied is an "abstract idea."

"Abstract ideas," if drafted as such, do not fall within a statutory category; e.g., a claim in the form "I claim the relationship $a^2 + b^2 = c^2$, where a and b are length of the legs of a right angle triangle and c is the length of the hypotenuse," does not fit the definitions of a "process, machine, manufacture, or composition of matter" because it is neither a series of acts nor a physical thing. Of course, a competent draftsman can always draft an "abstract idea" to appear to be in a statutory category, which is why the exception must apply to subject matter that otherwise falls within one of the statutory classes of § 101. Claims that qualify under § 101 as a "machine, manufacture, and composition of matter," or under § 100(b) as a "process" involving the use of a known machine, manufacture, or composition of matter, generally do not pose statutory subject matter problems because physical structure is not an abstract

idea. Transformation of data by a machine is a special case which will be discussed later in connection with State Street. The main problem is that "abstract ideas," such as mathematical algorithms, and other kinds of subject matter which do not appear to the USPTO to be included within the "useful arts" of the Constitution, are easily and naturally drafted as a series of steps, which fits the dictionary definition of a process. In my opinion, not all processes in the dictionary sense are statutory "processes" under § 101. The definition of a statutory "process" in Cochrane v. Deener requires a transformation of physical subject matter to a different state or thing. A series of steps which meets the definition of a statutory "process" is not an "abstract idea" because of the concrete, physical acts. Since a "process" is not required to recite the means (structure) to perform the steps, claims often do not recite how the steps are implemented, which can make it difficult to determine whether the subject matter is a statutory "process" or an "abstract idea."

A claim that covers ("preempts") any and every possible way that the steps can be performed is a disembodied "abstract idea" because it recites no particular implementation of the idea (even if one is disclosed). For example, in discussing the mathematical algorithm in Gottschalk v. Benson, the Supreme Court discussed the cases holding that a principle, in the abstract, cannot be patented and then stated:

> Here the "process" claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion. The end use may ... be performed through any existing machinery or future-devised machinery or without any apparatus.

409 U.S. at 68, 175 USPQ at 675. There is also concern that the scope of the claim is not commensurate with the scope of enablement. See also O'Reilly v. Morse, 56 U.S. 62 (1854) (Morse's eighth claim to use of electric or galvanic current for marking or printing intelligible characters, signs, or letters at a distance broader than the description in the specification).

Incidental physical limitations, such as data gathering, field of use limitations, and post-solution activity are not enough to convert a "abstract idea" into a statutory "process." See "Incidental physical limitations," infra. Some aspects of the "abstract idea" exception have not been explored by the courts. For example, it seems possible that some subject matter technically may not be an "abstract idea" because it requires actions, e.g., "negotiating a contract," but may not qualify as a "process" because the actions do not transform physical subject

matter and, so, do not involve any kind of "technology." For this reason, the nonstatutory subject matter analysis under the transformation definition of a statutory "process" is best treated as independent from the "abstract idea" exception.

Two different views of exclusions

Exclusions have been thought of in two ways: as exceptions and as exclusions.

In the more useful and more common meaning, exceptions refer to subject matter which would be within one of the four categories, as drafted, "but for" some exceptional condition, i.e., they take out subject matter that would otherwise be included. See Sarkar, 588 F.2d at 1333, 200 USPQ at 137 ("a series of steps is a 'process' within § 101 unless it falls within a judicially determined category of nonstatutory subject matter exceptions"); Pardo, 684 F.2d at 916, 214 USPQ at 677 ("any process, machine, manufacture, or composition of matter constitutes statutory subject matter unless it falls within a judicially determined exception to section 101"); State Street, 149 F.3d at 1375 n.9, 47 USPQ2d at 1602 n.9 ("Of course, the subject matter must fall into at least one category of statutory subject matter [before determining whether it encompasses statutory subject matter]."). This meaning of an exception accounts for the fact that a competent draftsman can readily draft a claim to appear to be within one of the four categories of § 101.

The less useful characterization is that exclusions represent subject matter that is excluded by the terms of § 101. See Alappat, 33 F.3d at 1553 n.13, 31 USPQ2d at 1565 n.13 (Archer, C.J., concurring in part and dissenting in part) ("It is erroneous therefore to characterize, as the majority does, nonstatutory subject matter such as a mathematical algorithm as an "exception" to § 101. Defining patentable subject matter is the raison d'être of § 101."). "Laws of nature, physical phenomena and abstract ideas," if drafted as such (e.g., "I claim $E=mc^2$"), do not fit within any of the statutory definitions because they do not have structure, as required by a "machine, manufacture, or composition of matter," and are not a series of steps, as required by a "process." Or, a claim to a series of steps might fit the dictionary definition of a process, but might be excluded from § 101 because it does not meet the definition of a statutory "process" as requiring a physical transformation of physical subject matter.

In my opinion, it is more correct that exclusions refer to subject matter that would otherwise be within one of the categories of § 101. Subject matter which does not fall within one of the categories of § 101 is nonstatutory for that reason and one does not need to get to the exceptions.

Machines and machine-implemented processes: The Federal Circuit's test in State Street Bank and AT&T

Pre-State Street

It is beyond the scope of this opinion to provide a comprehensive history of § 101. The Supreme Court cases of Parker v. Flook and Diamond v. Diehr are analyzed at length in the literature. See, e.g., 1 Patents § 1.03[6]. I focus primarily on certain § 101 issues as they developed in the Court of Customs and Patent Appeals (CCPA) and the Federal Circuit.

Early statutory subject matter issues were addressed under the "mental steps" doctrine, the "function of a machine" doctrine, or under the "method of doing business" exception. Although several cases discuss a "method of doing business" exception, no cases were ever held unpatentable on this basis. See State Street, 149 F.3d at 1375, 47 USPQ2d at 1603 ("The business method exception has never been invoked by this court, or the CCPA, to deem an invention unpatentable."). The "function of a machine" doctrine, which was applied to deny a process claim where the steps described the inherent function of the disclosed apparatus, was overruled in Tarczy-Hornoch. "The mental-steps doctrine was based upon the familiar principle that a scientific concept or mere idea cannot be the subject of a valid patent. The doctrine was regularly invoked to deny patents to inventions consisting primarily of mathematical formulae or methods of computation." (Citations and footnotes omitted.) Diamond v. Diehr, 450 U.S. at 195, 209 USPQ at 12 (Stevens, J., dissenting). Claims that were broad enough to cover being performed by a human using his mind, although they were capable of being performed by a machine, were rejected under the "mental steps" doctrine; see "Claims read on nonstatutory and statutory subject matter," infra. The CCPA held that claims limited to machines and machine-implemented processes were patentable subject matter, i.e., they were not subject to rejection under the "mental steps" theory. See In re Bernhart, 417 F.2d 1395, 163 USPQ 611 (CCPA 1969) (machine claims and machine-implemented process claims do not fall within the "mental steps" exclusion); In re Mahoney, 421 F.2d 742, 745, 164 USPQ 572, 575 (CCPA 1970) (§ 112, second paragraph, and § 101 "mental steps" rejections overcome since the claims are limited to a machine implementation and "since the

machine-implemented process is clearly statutory."). The "mental steps" doctrine was in effect overruled in Musgrave, by limiting mental steps to steps incapable of being performed by a machine or apparatus. See Musgrave, 431 F.2d at 889-90 and 889 n.4, 167 USPQ 287 & 287 n.4.

A rejection based on "mental steps" and "mathematical steps" was reversed in In re Benson, 441 F.2d at 687 & 688, 169 USPQ at 552 & 553 ("Claim 8 is for a method to be practiced in part on particular apparatus specified to be a 'reentrant shift register'" and did not include coverage of the process implemented by the human mind. Claim 13, which could be carried out with hardware or manually, was said to have no practical use other than the more effective operation of a digital computer, which was in the "technological arts."). Certiorari was granted and the Supreme Court reversed. Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673. The Court stated that "[t]he patent sought is on a method of programming a general-purpose digital computer to [solve a mathematical algorithm]," 409 U.S. at 65, 175 USPQ at 674, and, thus, recast the statutory subject matter issue in terms of mathematical algorithms or abstract ideas, instead of the "mental steps" doctrine. Legal writers have noted at least five possible explanations for the holding. See, e.g., 1 Patents § 1.03[6][c]. Three of the reasons remain particularly relevant to process claims. First, the mathematical algorithm was to a principle, in the abstract, or a mental process, which "are not patentable, as they are the basic tools of scientific and technological work." Gottschalk v. Benson, 409 U.S. at 67, 175 USPQ at 675. The Court stated: "The conversion of BCD numerals to pure binary numerals can be done mentally .... The mathematical procedures can be carried out in existing computers long in use, no new machinery being necessary. And, as noted, they can also be performed without a computer." (Emphasis added.) Id. at 67, 175 USPQ at 675. The Court noted that "the 'process' claim is so abstract and sweeping as to cover both known and unknown uses ... [and] be performed through any existing machinery or future-devised machinery or without any apparatus" (emphasis added), id. at 68, 175 USPQ at 675. This is considered a second reason in 1 Patents § 1.03[6][c], but I consider it part of the first reason related to claim breadth. The fact that the claims that are so broad as to read on being performed mentally (nonstatutory subject matter) as well as by a machine (possibly statutory subject matter) are nonstatutory is implicitly the "mental steps" doctrine. See section entitled "Claims that read on statutory and nonstatutory subject matter are unpatentable," infra; Diamond v. Diehr, 450 U.S. at 201 n.18, 209 USPQ at 14 n.18 (Stevens, J., dissenting) (commentators have suggested that the Court implicitly relied upon the mental steps

doctrine and that the analysis in Benson was entirely consistent with the mental steps doctrine). The more accepted terminology today is that the claim is so broad that it is an "abstract idea" rather than "mental steps." The Court did not comment on the fact that claim 8 contained the structure of a "reentrant shift register," an element of all general purpose digital computers, whereas claim 13 did not recite any machine. Claim 8 is the reason why machine-implemented mathematical algorithms were subsequently held to be nonstatutory.

Second, the method did not transform or reduce subject matter to a different state or thing. The Supreme Court stated that "[t]ransformation and reduction of an article 'to a different state or thing' is the clue to patentability of a process claim that does not include particular machines," 409 U.S. at 70, 175 USPQ at 676. As noted in Schrader, 22 F.3d at 295, 30 UPSQ2d at 1459-60, the statement in Gottschalk v. Benson is imperfect because the subject matter transformed is not limited to objects and substances. Nevertheless, claim 13 clearly recites no structure and does not transform any physical subject matter, tangible or intangible; it only operates on binary coded decimal numbers. The fact that there is no physical transformation supports the first reason that the claims are so broad that they are directed to directed to an abstract idea rather than a practical application thereof.

Third, the Court stated the following "nutshell":

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

Gottschalk v. Benson, 409 U.S. at 71-72, 175 USPQ at 676. I view this as related to the first point, that one cannot patent a principle or abstract idea, and that where a claim is so broad that it covers every "substantial practical application," this is "in practical effect would be a patent on the [abstract idea] itself" that would "preempt" others from using the principle. The Court seems to say that performing a mathematical algorithm on a digital computer could preempt every "substantial practical application." Thus, the fact that claim 8 was directed to a

method performed on a computer, and not the mathematical algorithm per se as in claim 13, did not make it statutory.

Thus, Gottschalk v. Benson can be explained in terms of (1) the claims being so broad as to read on an abstract idea ("mental steps") as well as on a machine-implemented method; (2) the claims not meeting the transformation definition of a process; and (3) the claims, even if performed on a machine, were so broad as to cover every "substantial practical application" and "in practical effect would be a patent on the [abstract idea] itself." The Court did not hold that the claims were unpatentable because they covered a computer program.

Because claim 8 in Benson contained a "reentrant shift register," it was considered that machine-implemented processes would be nonstatutory if "patenting the 'machine process' in practical effect would be a patent on the algorithm itself." In re Waldbaum (Waldbaum II), 559 F.2d 611, 616, 194 USPQ 465, 469 (CCPA 1977). Most claims in the subsequent cases recited machine apparatus claims and machine-implemented process claims, probably because pre-Gottschalk v. Benson case law held that such claims were patentable subject matter. The CCPA held that if the claim was directed essentially to a mathematical algorithm, even if the solution is for a specific purpose and was performed on a machine, the method was nonstatutory. See In re Christensen, 478 F.2d 1392, 178 USPQ 35 (CCPA 1973) (method of determining the porosity of subsurface formations in situ using mathematical formula held nonstatutory); Waldbaum II (method of operating a data processor using specific machine steps to calculate the relative numbers of 0s and 1s in a data word held nonstatutory); In re Richman, 563 F.2d 1026, 195 USPQ 340 (CCPA 1977) (method of calculating an airborne radar boresight correction angle based using actual terrain measurements in a radar held nonstatutory); In re de Castelet, 562 F.2d 1236, 1244, 195 USPQ 439, 446 (CCPA 1977) (machine method of generating a curve from data supplied to a computer for controlling a numerical control system type model forming means, including steps of "transforming the electrical signals" and "transmitting electrical signals ... from said computer to said model forming means," held nonstatutory: "We think the instant claims recite a process for solving a set of mathematical equations per se, the solution being a set of points along a curve, and not a process which merely uses equation solutions as one step in achieving some result other than solution of the equations."). Claims which only used the results of mathematical algorithms and did not include the mathematical algorithms itself were held to be statutory subject matter. See In re Deutsch, 553 F.2d 689, 692, 193 USPQ 645, 648 (CCPA 1977) ("Unlike the abandoned claims, which included formulae and

algorithms, the claims on appeal are drawn to system-operated methods in which system control is applied at less frequent intervals than those at which individual plant controls are applied.... Thus, the claimed invention lies in the timing and sequencing of control application, not in the control means ('[mathematical] optimization technique') itself."); Chatfield, 545 F.2d at 158, 191 USPQ at 736 ("Chatfield's independent claims contain neither a mathematical formula nor a mathematical algorithm. Mathematical algorithms appear only in the dependent claims and do not themselves constitute the method per se.").

The application of Gottschalk v. Benson was initially considered to be limited to method claims. See In re Noll, 545 F.2d 141, 149, 191 USPQ 721, 727 (CCPA 1976) ("We conclude that Benson must be limited to method claims such as those presented in that case."). Practitioners started drafting claims in means-plus-function format as apparatus claims to avoid a mathematical algorithm rejection. Eventually, in In re Freeman, 573 F.2d 1237, 197 USPQ 464 (CCPA 1978), the CCPA adopted Judge Rich's viewpoint (based on a line of dissenting opinions) that the form of the claim is often an exercise in drafting and is not determinative. See In re Johnson, 589 F.2d 1070, 1077, 200 USPQ 199, 206 (CCPA 1978) ("[Judge Rich's] viewpoint was adopted by this entire Court in In re Freeman"); Diamond v. Diehr, 450 U.S. at 202-03, 209 USPQ at 14-15 (Steven, J., et al. dissenting) (discussing dissenting opinions below). However, to the best of my knowledge, only apparatus claims in means-plus-function format were ever held to be nonstatutory subject matter. Under the interpretation of 35 U.S.C. § 112, last paragraph, that was applied by the PTO (and, it seems, by the CCPA) at the time, means-plus-function limitations in ex parte prosecution were broadly construed to cover any and every means for performing the function and, thus, claims in "means for" format were considered equivalent to a process. See Freeman, 573 F.2d at 1247, 197 USPQ at 472 ("[I]f allowance of a method claim is proscribed by Benson, it would be anomalous to grant a claim to apparatus encompassing any and every 'means for' practicing that very method."); In re Maucorps, 609 F.2d 481, 486, 203 USPQ 812, 816 (CCPA 1979) ("As admitted by appellant at oral argument, method claims drawn to the steps performed by appellant's 'means' would be non-statutory and an attempt to claim appellant's algorithms in their application to a model of a sale organization.... That 35 U.S.C. § 112 authorizes the claiming of 'means for' performing a function cannot rescue appellant's claims from the requirements of § 101, because § 112 does not authorize the claiming of apparatus entirely in terms of 'means for' performing a non-statutory method."); In re Sherwood, 613 F.2d 809, 817 n.9,

204 USPQ 537, 545 n.9 (CCPA 1980) ("In Freeman, for the purpose of testing compliance with § 101, process and 'means for' claims were treated in the same manner. We do the same here."); Walter, 618 F.2d at 768, 205 USPQ at 408 (discussion of "The 'Means For' Apparatus Claims"); Pardo, 684 F.2d at 916 n.6, 214 USPQ at 677 n.6; In re Abele, 684 F.2d 902, 909, 214 USPQ 682, 688 (CCPA 1982) ("[W]e see no basis for treating [appellants'] apparatus claims [in 'means for' format] differently from their method claims."); and Meyer, 688 F.2d at 795 n.3, 215 USPQ at 198 n.3. The structure corresponding to the means limitations in all these cases was apparently a general purpose computer. The PTO's treatment of claims in means-plus-function format as process claims was criticized in Iwahashi, 888 F.2d at 1375 n.1, 12 USPQ2d at 1912 n.1 and Alappat, 33 F.3d at 1545 n.25, 31 USPQ2d at 1558 n.25, and the district court's treatment of claims in means-plus-function format as process claims was found to be error in State Street, 149 F.3d at 1371, 47 USPQ2d at 1599; however, the Federal Circuit in these three cases did not mention, distinguish, or overrule the similar treatment in Freeman, Maucorps, Sherwood, Walter, Pardo, Abele, and Meyer.

Starting with Freeman, the CCPA developed a more formal two-part test for statutory subject matter which eventually became known as the Freeman-Walter-Abele test, referring to the test in Freeman, as modified by Walter and Abele. Step one of the two-part test was to determine whether a mathematical algorithm was present. Step two was eventually modified to require "no more than that the algorithm be 'applied in any manner to physical elements or process steps,' provided that its application is circumscribed by more than a field of use limitation or non-essential post-solution activity. Thus, if the claim would be 'otherwise statutory,' albeit inoperative or less useful without the algorithm, the claim likewise presents statutory subject matter when the algorithm is included." (Citation omitted.) Abele, 684 F.2d at 907, 214 USPQ at 686. If no mathematical algorithm was present, it was not necessary to get to the second step, and the subject matter was statutory. See Freeman, 573 F.2d at 1246, 197 USPQ at 471 (Using a computer to typeset alphanumeric information: "The method claims here at issue do not recite process steps which are themselves mathematical calculations, formulae, or equations."); In re Toma, 575 F.2d 872, 877, 197 USPQ 852, 856-57 (CCPA 1978) ("Translating between natural languages is not a mathematical problem as we understand the term to have been used in Benson."); In re Phillips, 608 F.2d 879, 883, 203 USPQ 971, 975 (CCPA 1979) ("Our analysis of the claims on appeal reveals no recitation, directly or indirectly, of an algorithm in the Benson and Flook sense."); Pardo, 684 F.2d at 916, 214 USPQ at 676 ("Applying the

first part of the Freeman analysis to the appealed claims, we are unable to find any mathematical formula, calculation, or algorithm either directly or indirectly recited in the claimed steps of examining, compiling, storing, and executing."). It was not always easy to determine whether the claim directly or indirectly recited a mathematical algorithm.

Once a mathematical algorithm was found, directly or indirectly, the second part of the test was applied. These cases illustrate the difficulty in defining a statutory process. Several cases find statutory subject matter based on the physical transformation of tangible materials or intangible electrical signals representing a physical thing. See Johnson, 589 F.2d 1070, 200 USPQ 199 (claims reciting methods for producing an output trace which is different from, and an enhancement of, an input seismic trace were statutory); Sherwood, 613 F.2d at 819, 204 USPQ at 546 ("The claimed invention, contrary to the solicitor's arguments, converts one physical thing into another physical thing just as any other electrical circuitry would do."); Diamond v. Diehr, 450 U.S. at 192-93, 209 USPQ at 10 ("That respondent's claims involve the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing cannot be disputed.... Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws."); In re Taner, 681 F.2d 787, 790, 214 USPQ 678, 681 (CCPA 1982) ("Appellants' claimed process involves the taking of substantially spherical seismic signals obtained in conventional seismic exploration and converting ('simulating from') those signals into another form, i.e., into a form representing the earth's response to cylindrical or plane waves. Thus the claims set forth a process and are statutory within § 101."); Abele, 684 F.2d 902, 214 USPQ 682 (claim 5 directed to calculation of number and display of the result was nonstatutory, whereas claim 6, which depended from claim 5 and stated that the data was "X-ray attenuation data produced in a two dimensional field by a computer tomography scanner," was statutory because it required a CAT-scan process); Arrhythmia Research Tech., Inc. v. Corazonix Corp., 958 F.2d 1053, 1059, 22 USPQ2d 1033, 1038 (Fed. Cir. 1992) ("These claimed steps of 'converting', 'applying', 'determining', and 'comparing' are physical process steps that transform one physical electrical signal into another. The view that 'there is nothing necessarily physical about 'signals' is incorrect.").

Other cases find no physical steps or that the physical steps were insufficient to define statutory subject matter. See In re Gelnovatch, 595 F.2d 32, 41-42, 201 USPQ 136, 145 (CCPA 1979) (claims to a "computer method": "But, where, as here, the

claims solely recite a method whereby a set of numbers is computed from a different set of numbers by merely performing a series of mathematical computations, the claims do not set forth a statutory process."); Sarkar, 588 F.2d at 1335, 200 USPQ at 139 (physical step of measuring the channel dimensions at specifically chosen distance intervals along the length of the channel treated as formula-dictated "data gathering" step and does not establish that the claimed invention as a whole is an application of the mathematical algorithm); Maucorps, 609 F.2d 481, 203 USPQ 812 (computer-implemented model of a sales organization in means-plus-function format nonstatutory); Meyer, 688 F.2d at 796, 215 USPQ at 199 ("[A]ppellants' independent claims [process and means-plus-function format] are to a mathematical algorithm representing a mental process that has not been applied to physical elements or process steps and is, therefore, not limited to any otherwise statutory process, machine, manufacture, or composition of matter."); Grams, 888 F.2d 835, 12 USPQ2d 1824 (Fed. Cir. 1989) (method of diagnosing an abnormal condition in an individual nonstatutory; step of performing clinical tests on individuals to obtain data did not convert it to a statutory process); Schrader, 22 F.3d 290, 30 USPQ2d 1455 (method of bidding on a plurality of related items; the step of entering of bids in a "record" did not convert it to a statutory process); and Warmerdam, 33 F.3d at 1359-60, 31 USPQ2d at 1758-59 (method of generating a data structure representing the shape of a physical object; the argument that the claims were broad enough to cover methods which involve physically, instead of mathematically, locating the medial axis of the object was not persuasive). Thus, it was clear that an apparatus claim (in means-plus-function format) and a machine-implemented process claim were not statutory subject matter just because of the presence of a machine.

In Alappat, the Federal Circuit addressed the issue of statutory subject matter of claims in means-plus-function format under 35 U.S.C. § 112, sixth paragraph. Alappat noted that, as explained in In re Donaldson Co., 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1848-49 (Fed. Cir. 1994) (en banc), the USPTO must construe claim elements expressed in means-plus-function terms under 35 U.S.C. § 112, sixth paragraph, to cover the corresponding structure, material, or acts described in the specification, and equivalents thereof, to the extent that the specification provides such disclosure. The court held that the Board majority erred as a matter of law in refusing to apply § 112, sixth paragraph, in the § 101 determination. The court held that the claim in means-plus-function format read on the specific circuits in the disclosure and was a machine, which produced a "useful, concrete, and tangible result," and,

therefore, was statutory subject matter. The court did not mention Freeman, Maucorps, Sherwood, Walter, Pardo, Abele, and Meyer, relied upon by the Board majority, in which claims in means-plus-function format were treated as process claims. As discussed in the section "Claims read on statutory and nonstatutory subject matter," infra, the court mooted the issue of whether the claim was nonstatutory because it was broad enough to cover both nonstatutory subject matter (performing the functions with a general purpose computer) and statutory subject matter (the specific disclosed circuit), by holding that a programmed general purpose computer is a statutory apparatus.

After Alappat, the USPTO issued Examination Guidelines for Computer-Related Inventions (Guidelines) 1184 Off. Gaz. Pat. & Trademark Office 87 (March 26, 1996), which were incorporated into the Manual of Patent Examining Procedure (MPEP) § 2106 (6th ed., Rev. 3, July 1997). The Guidelines have been revised to reflect subsequent decisions in State Street and AT&T. See MPEP § 2106 (8th ed., Rev. 1, February 2003).

Different aspects of the history of statutory subject matter and computer-implemented mathematical algorithms are discussed in Diamond v. Diehr, 450 U.S. at 193-205 (Stevens, J., dissenting), AT&T, 172 F.3d at 1356 & 1356 n.3, 50 USPQ2d at 1450 & 1450 n.3, and Patentable Subject Matter, 1106 Off. Gaz. Pat. & Trademark Office 5 (September 5, 1989).

Thus, before State Street, the CCPA and the Federal Circuit addressed and settled many difficult issues involving computers and mathematical algorithms. Claims were not nonstatutory just because they covered a computer program performed on a general purpose digital computer. Mathematical algorithms did not have to preempt every possible use to be nonstatutory; it was sufficient that the claim was to a mathematical algorithm. Mathematical algorithms did not become statutory subject matter just because they were performed on a machine. The proper analysis for statutory subject matter was held to be based on the subject matter as a whole; the "point of novelty" approach was abandoned. The court addressed different types of mathematical algorithms and ways the algorithms were directly or indirectly claimed. The presence of various physical steps attached to the mathematical algorithm, such as data gathering, field of use limitations, and post-solution activity did not necessarily convert the claim into statutory subject matter. A number of cases focused on the transformation aspect of transforming electrical signals as an indicia of a statutory process. However, nonstatutory subject matter under § 101 was always a difficult issue to address because it was difficult to determine

whether a mathematical algorithm was present and whether a process was otherwise statutory.

State Street and AT&T involved machines

The Federal Circuit addressed the issue of statutory subject matter in connection with machine-implemented mathematical algorithms and the "abstract idea" exception. It stated that "certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, i.e., 'a useful, concrete and tangible result.'" State Street, 149 F.3d at 1373, 47 USPQ2d at 1600-01 (citing Alappat, 33 F.3d at 1544, 31 USPQ2d at 1557). "[T]he 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.'" AT&T, 172 F.3d at 1357, 50 USPQ2d at 1451. "[O]ur inquiry here focuses on whether the mathematical algorithm is applied in a practical manner to produce a useful result." Id. at 1360, 50 USPQ2d at 1453.

The terms in the "practical application, i.e., 'a useful, concrete and tangible result'" test were not defined. Some guidance on how to determine whether subject matter produces a "practical application, i.e., 'a useful, concrete and tangible result'" can be gleaned from the four examples discussed in State Street and AT&T. The examples share at least three characteristics: (1) the claimed transformation of data was by a machine (e.g., a computer), which is consistent with the origin of the test in Alappat, 33 F.3d at 1544, 31 USPQ2d at 1557 ("This is not a disembodied mathematical concept which may be characterized as an 'abstract idea,' but rather a specific machine to produce a useful, concrete, and tangible result." (Emphasis added.)); (2) the data being transformed by the machine corresponded to something in the "real world," i.e., it was representative of physical activity or objects, not just a number--the nature of the data indicates the algorithm is applied in a "useful" way; and (3) no physical transformation or control took place outside of the machine, i.e., the "useful result" was expressed as a number in the machine. As stated in State Street, 149 F.3d at 1373, 47 USPQ2d at 1601:

> Unpatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not "useful." From a practical standpoint, this means that the algorithm must

> be applied in a "useful" way. In Alappat, we held that data, transformed by a machine through a series of mathematical calculations to produce a smooth waveform display on a rasterizer monitor, constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced "a useful, concrete and tangible result" – the smooth waveform.
>
> Similarly, in Arrhythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed. Cir. 1992), we held that the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete or tangible thing – the condition of a patient's heart.
>
> Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result" – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades. [Emphasis added.]

These refer to holdings of the cases, so the machine element cannot be dismissed. Note that nothing was done with the computed data outside of the machine. In Alappat, illumination intensity data was output "to be displayed on a display means," an intended use, but no actual display step was claimed. In Arrhythmia, the last step or function was comparing to determine the presence of high frequency energy in the late QRS signal. In State Street, no external use of the processed data was recited.

In AT&T, dealing with a "method for use in a telecommunications system in which interexchange calls initiated by each subscriber are automatically routed over the facilities of a particular one of a plurality of interexchange carriers associated with that subscriber," the Federal Circuit described the district court's conclusion as follows, 172 F.3d at 1355, 50 USPQ2d at 1449:

> The district court concluded that the method claims of the '184 patent implicitly recite a mathematical algorithm. The court was of the view that the only physical step in the

> claims involves data-gathering for the algorithm. Though the court recognized that the claims require the use of switches and computers, it nevertheless concluded that use of such facilities to perform a non-substantive change in the data's format could not serve to convert non-patentable subject matter into patentable subject matter. Thus the trial court, on summary judgment, held all of the method claims at issue invalid for failure to qualify as statutory subject matter. [Citations omitted.] [Emphasis added.]

The Federal Circuit stated, 172 F.3d at 1358, 50 USPQ2d at 1452:

> As previously explained, AT&T's claimed process employs subscribers' and call recipients' PICs as data, applies Boolean algebra to those data to determine the value of the PIC indicator, and applies that value through switching and recording mechanisms to create a signal useful for billing purposes. . . .
>
> . . . It is clear from the written description of the '184 patent that AT&T is only claiming a process that uses the Boolean principle in order to determine the value of the PIC indicator. The PIC indicator represents information about the call recipients's PIC, a useful, non-abstract result that facilitates differential billing of long-distance calls made by an IXC's subscriber. Because the claimed process applies the Boolean principle to produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle, on its face the claimed process comfortably falls within the scope of § 101. [Emphasis added.]

Although I am aware of arguments in other cases before the Board that the claims in AT&T did not require a machine, I conclude that the court in AT&T interpreted the claims to be a machine-implemented process. Thus, according to AT&T, transformation of data by a process implemented on a machine constitutes a practical application because a PIC indicator represents information about the call recipient's PIC, a useful, non-abstract result that facilitates differential billing of long-distance calls made by an IXC's subscriber.

The court did not hold or suggest that transformation of data without a machine is statutory subject matter depending on what the data represents. Importantly, the court did not hold that mere transformation of data by a machine is sufficient to establish statutory subject matter: it required a "practical application, i.e., 'a useful, concrete and tangible result.'"

This is consistent with cases which hold that a mathematical method performed on a computer is not necessarily statutory. See Gottschalk v. Benson (claim 8 to "method of converting signals from binary coded decimal form into binary" on a machine (evidenced by the "reentrant shift register") was not a "process" under 35 U.S.C. §§ 100(b) and 101); Waldbaum II (method of operating a data processor); Gelnovatch (a computer method); Maucorps (a computing system); Alappat, 33 F.3d at 1567, 31 USPQ2d at 1577 (Archer, C.J., concurring in part and dissenting in part) ("[A] claim formally to a general purpose computer running a certain program cannot be deemed to satisfy § 101 simply because the computer is a physical, tangible device."). The presence of a machine was important in both State Street and AT&T. This is consistent with earlier cases, such as Abele, 684 F.2d at 908, 214 USPQ at 687 (claim 5 directed to calculation of number and display of the result was nonstatutory, whereas claim 6, which depended from claim 5, and which stated that the data was "X-ray attenuation data produced in a two dimensional field by a computer tomography scanner," was statutory subject matter because it required a CAT-scan process).

It appears that one instance where subject matter would not be statutory under the State Street test is a machine claim or machine-implemented process claim to a mathematical algorithm operating on numbers which do not represent any physical activity or thing, such as a new way of calculating a discrete cosine transform on a general purpose digital computer. I reason that the subject matter produces a "concrete and tangible result" because a machine is physical and transforms physical electrical signals, but it does not produce a "useful result" because the data does not correspond to anything in the real world (i.e., the mathematical algorithm is not applied).

So far there are no examples of subject matter being held to be nonstatutory under the State Street/AT&T test. In Bonczyk, 10 Fed. Appx. 908, the Federal Circuit held that a "fabricated energy structure" was nonstatutory as not corresponding to any statutory category of subject matter and did not apply the State Street test. In AT&T, the court noted that the earlier cases of Grams, Schrader, and Warmerdam did not ascertain whether the end result was useful, concrete, and tangible, but did not speculate whether the claimed subject matter would have been nonstatutory under the new test. See AT&T, 172 F.3d at 1360, 50 USPQ2d at 1453. It is noted, however, that none of the claims rejected under § 101 in Grams, Schrader, or Warmerdam recited a machine or machine-implemented process and, thus, would presumably not fall within the State Street test.

Other discussion

Other discussion in State Street and AT&T is informative.

The Federal Circuit made it clear that "laws of nature, physical phenomena and abstract ideas" are the only recognized exceptions. "[The Supreme Court] never intended to create an overly broad, fourth category of [mathematical] subject matter excluded from § 101." AT&T, 172 F.3d at 1357, 50 USPQ2d at 1451, quoting, Alappat, 33 F.3d at 1543, 31 USPQ2d at 1556. That is, mathematical algorithms per se are "abstract ideas." There is also no "business method" exception. See State Street, 149 F.3d at 1375, 47 USPQ2d at 1602 ("We take this opportunity to lay this ill-conceived ['business method'] exception to rest."). Of course, subject matter has to be within one of the categories of § 101 before the question of an exception arises. In my opinion, a claim to a series of steps may be nonstatutory if it does not fall within the definition of a "process" under § 101 because it does not meet the definition of transforming physical subject matter to a different state, in which case it is not necessary to also show that the subject matter falls within an exception or that it does not meet the State Street test.

The Federal Circuit also effectively marginalized the Freeman-Walter-Abele test for statutory subject matter, stating:

> After Diehr and Chakrabarty, the Freeman-Walter-Abele test has little, if any, applicability to determining the presence of statutory subject matter. As we pointed out in Alappat, 33 F.3d at 1543, 31 USPQ2d at 1557, application of the test could be misleading, because a process, machine, manufacture, or composition of matter employing a law of nature, natural phenomenon, or abstract idea is patentable subject matter even though a law of nature, natural phenomenon, or abstract idea would not, by itself, be entitled to such protection.

State Street, 149 F.3d at 1374, 47 USPQ2d at 1601. See also AT&T, 172 F.3d at 1359, 50 USPQ2d at 1453:

> Although our en banc Alappat decision called this [Freeman-Walter-Abele] test "not an improper analysis," we then pointed out that "the ultimate issue always has been whether the claim as a whole is drawn to statutory subject matter." 33 F.3d at 1543 n.21, 31 USPQ2d at 1557 n.21. Furthermore, our recent State Street decision questioned the continued viability of the Freeman-Walter-Abele test, 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."

It is not clear why the Federal Circuit considers the two-part test to have little applicability after Diamond v. Diehr since the two-part test is completely consistent with the last sentence from the following discussion in Diamond v. Diehr, 450 U.S. at 191-92, 209 USPQ at 10:

> We recognize, of course, that when a claim recites a mathematical formula (or scientific principle or phenomenon of nature), an inquiry must be made into whether the claim is seeking patent protection for that formula in the abstract. A mathematical formula as such is not accorded the protection of our patent laws, Gottschalk v. Benson, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment, Parker v. Flook. Similarly, insignificant post-solution activity will not transform an unpatentable principle into a patentable process. To hold otherwise would allow a competent draftsman to evade the recognized limitations on the type of subject matter eligible for patent protection. On the other hand, when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101. [Footnote omitted.] [Citations omitted.]

The Federal Circuit's stated reason is that the application of the test could be misleading, because a process, machine, manufacture, or composition of matter employing a law of nature, natural phenomenon, or abstract idea is patentable subject matter even though a law of nature, natural phenomenon, or abstract idea would not, by itself, be entitled to such protection. However, the inquiry of whether the claimed subject matter is "otherwise statutory" is the second part of the test. There are reasons why the court may want to get away from the two-part test. It has always been difficult to define a "mathematical algorithm" and to determine the presence of a mathematical algorithm in the claim under the first part of the test, as discussed in Judge Rader's concurrence in Arrhythmia. It is analytically simpler to address the "ultimate question" of whether the claimed subject matter as a whole is "otherwise statutory" under the second part of the test, without trying to identify the presence of subject matter which would be nonstatutory if claimed by itself. See Alappat,

33 F.3d at 1543 n.21, 31 USPQ2d 1557 n.21 ("[E]ven in those cases where the courts have applied a variant of the two-part analysis of [Freeman and Walter] ... the ultimate issue always has been whether the claim as a whole is drawn to statutory subject matter." (Citations omitted.)); AT&T, 172 F.3d at 1359-60, 50 USPQ2d at 1453 (analysis should "focus on the inquiry deemed 'the ultimate issue' by Alappat, rather than on the physical limitations inquiry of the Freeman-Walter-Abele test").

Because the Federal Circuit has effectively overruled the Freeman-Walter-Abele test, and has made it clear that mathematical algorithms are not a separate exclusion, but part of the "abstract idea" exclusion, there is no need to determine the presence of a mathematical algorithm and it appears that the State Street test is not limited to subject matter containing mathematical algorithms.

The Federal Circuit held that the statutory category to which a claim is directed is not determinative of statutory subject matter, as long as it falls into at least one category of statutory subject matter. See State Street, 149 F.3d at 1372, 47 USPQ2d at 1600 ("[F]or purposes of a § 101 analysis, it is of little relevance whether claim 1 is directed to a 'machine' or a 'process,' as long as it falls within at least one of the four enumerated categories of patentable subject matter, 'machine' and 'process' being such categories."); id. at 1375, 47 USPQ2d at 1602 ("The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to--process, machine, manufacture, or composition of matter--but rather on the essential characteristics of the subject matter, in particular, its practical utility."); AT&T, 172 F.3d at 1357-58, 50 USPQ2d at 1451; Alappat, 33 F.3d at 1542, 31 USPQ2d at 1556 (precedent suggests that the mathematical subject matter exception to § 101 does apply to true apparatus claims, citing Johnson, 589 F.2d at 1077, 200 USPQ at 206 ("Benson applies equally whether an invention is claimed as an apparatus or process, because the form of the claim is often an exercise in drafting.")); Alappat, 33 F.3d at 1567, 31 USPQ2d at 1577 (Archer, C.J., concurring in part and dissenting in part) ("[A] claim formally to a general purpose computer running a certain program cannot be deemed to satisfy § 101 simply because the computer is a physical, tangible device."). Previously, only process claims and apparatus claims in means-plus-function language under § 112, last paragraph, were analyzed under § 101, as discussed in the "Pre-State Street" section, supra. State Street makes it easier to address computer not in means-plus-function format and and computer-implemented process claims. However, I do not think it should be presumed

that the Federal Circuit intends to indirectly hold that any series of steps is a "process" under § 101, regardless of whether it is machine implemented and regardless of whether it transforms subject matter. Thus, it will still not be easy to determine the threshold question of whether a non-machine-implemented method is a "process" under § 101.

The Federal Circuit stated that "'machine' claims having 'means' clauses may only be reasonably viewed as process claims if there is no supporting structure in the written description that corresponds to the claimed 'means' elements." State Street, 149 F.3d at 1371, 47 USPQ2d at 1599. A disclosure which consists solely of functional blocks would apparently meet this criterion. But see In re Dossel, 115 F.3d 942, 946-47, 42 USPQ2d 1881, 1885 (Fed. Cir. 1997) (assuming implementation on a general or special purpose computer to support claimed "reconstruction means" although "[n]either the written description nor the claims uses the magic word 'computer.'"). As evidenced by State Street, disclosure of a general purpose computer would be supporting structure. At issue in State Street was U.S. Patent 5,193,056, issued to Boes, and assigned to Signature Financial Group, Inc. The only structure disclosed in the Boes patent was "a personal computer 44 programmed with software 50" (col. 6, line 49). "The personal computer 44 used by portfolio/fund accountant 43 is capable of producing printed output 46 and storing data on data disk 52, which preferably is a floppy disk, although other types of storage media may be used." (Col. 6, lines 52-56.) The personal computer had a cathode ray tube (CRT) display (col. 7, line 60) and a way (undisclosed, but conventionally a keyboard) to allow a user to manually enter data (col. 8, lines 53-58). The court construed the "computer processor means" in claim 1 as "a personal computer including a CPU", construed "first means for initializing the storage medium" as "an arithmetic logic circuit configured to prepare the data disk to magnetically store selected data," and second, third, fourth, and fifth means as the arithmetic logic circuit configured to perform the various functions. Thus, although Boes did not describe the internal structure of the computer as having a CPU and arithmetic logic circuit, or the correspondence to the claimed means, this conventional computer structure was considered to be the structure corresponding to the claimed means. The court's conclusion in State Street that means-plus-function claims cannot be treated as process claims if a general purpose computer is disclosed in the written description represents a departure, without any explanation, from the earlier cases of Freeman, Maucorps, Sherwood, Walter, Pardo, Abele, and Meyer, where claims in means-plus-function format were treated as indistinguishable from process claims even though the only supporting structure was

a programmed general purpose computer. However, since the form of the claim is not determinative of statutory subject matter, there appears to be no need to rely on the controversial treatment of machine claims as process claims.

Conclusions

The statutory subject matter test in State Street and AT&T was whether transformation of data by a machine or a machine-implemented process produces a "practical application, i.e., 'a useful, concrete and tangible result.'" I draw the following conclusions about the State Street test:

First, the test is limited to the context of transformation of data in machines and machine-implemented processes. The court was not considering a process claim that could be performed without a machine. Machines and machine-implemented processes have generally been considered statutory subject matter, except in the special case where the mere manipulation of a mathematical algorithm is involved. A machine implementation implicitly requires a physical transformation of subject matter, e.g., transformation of electrical signals into a different state or signal within a computer. A machine-implemented process is at least potentially "a new use of a known ... machine" and, therefore, within the statutory definition of a "process" in § 100(b). It is probably still true that, as stated in In re Benson, "machines--the computers--are in the technological field, are a part of one of our best-known technologies, and are in the 'useful arts' rather than the 'liberal arts,' as are all other types of 'business machines,' regardless of the uses to which their users may put them," 441 F.2d at 688, 169 USPQ at 553, with the exception noted in Gottschalk v. Benson, that a machine which executes a mathematical algorithm is not patentable under § 101. Thus, the test is not, at this time, a general test for statutory subject matter not tied to a machine.

Second, it is not limited to mathematical subject matter. The court stated that two-part Freeman-Walter-Abele test, the first part of which is to determine the presence of a mathematical algorithm, is of little value and that the focus should be on the ultimate issue of whether the claim as a whole is drawn to statutory subject matter.

Third, what the data represents is important. The claimed machine or machine-implemented process was held to recite a "useful, concrete and tangible result" because the data transformed by the machine was representative of something in the

real world. It appears that the nature of the data is what indicates the algorithm is applied in a "useful" way.

Fourth, no physical transformation had to take place outside of the machine, i.e., the computed end result did not have to control some external system.

Fifth, in the absence of definitions of what is meant by a "practical application, i.e., 'a useful, concrete and tangible result,'" I interpret the test to be a restatement of existing legal principles, rather than a completely new test. "Concrete and tangible" are the opposite of an "abstract idea" and are interpreted to mean that the claimed subject matter is "embodied" within at least one of the categories of inventions of § 101. A number calculated by a machine, as in Alappat, State Street, and AT&T, is a "concrete and tangible result" because of the physical nature of the machine. A "useful result" is interpreted to mean that the subject matter satisfies the utility requirement of § 101. A "practical application" requires both a "useful result" and a "concrete and tangible result." Thus, a computer-implemented process would normally be a statutory "process," and also produce a "concrete and tangible result," because the computer is physical and transforms electrical signals, but the process may fail to satisfy the "utility" requirement if it is merely a mathematical algorithm which transforms data that does not correspond to something in the real world. (Although eligible subject matter and utility are separate requirements of § 101, the court appears to use the "utility" requirement as part of the statutory subject matter analysis.) Conversely, a claim to a non-machine-implemented process may have "utility" to society, but the subject matter may not be "embodied" in subject matter within the "useful arts" ("technological arts") as specified by the categories of § 101 so as to produce a "concrete and tangible result." See 1 Patents § 1.01 ("Theoretical or abstract discoveries are excluded as are discoveries, however practical and useful, in nontechnological arts, such as the liberal arts, the social sciences, theoretical mathematics, and business and management methodology.").

Sixth, the test appears to be a substitute for analyzing nonstatutory subject matter in terms of the exceptions for "laws of nature, physical phenomena and abstract ideas." Since the statutory category to which a claim is directed is not determinative of statutory subject matter, it is possible that real physical machines and manufactures (things that are not truly an "abstract idea") may be nonstatutory subject matter.

Non-machine-implemented processes

The test in State Street and AT&T does not cover all nonstatutory subject matter situations. The claims in State Street and AT&T (and Arrhythmia Research and Alappat, which were discussed in State Street), were all directed to subject matter that constituted transformation of data by a machine or a machine-implemented process. Therefore, the test does not necessarily apply to the situation of method claims which are not expressly or implicitly performed by machines, i.e., "non-machine-implemented processes," which may or may not involve transformation of data. Non-machine-implemented processes are typified by the mathematical algorithm cases of Gottschalk v. Benson (claim 13 recited a "data processing method," but did not expressly or implicitly require that it was performed on a computer), Parker v. Flook (method of updating an alarm limit), Sarkar (method for mathematically modeling an open channel), Grams (method of diagnosing an abnormal condition in an individual), Schrader (method of bidding on a plurality of related items), and Warmerdam (method of generating a data structure representing the shape of a physical object), all of which were held nonstatutory. However, the issue of nonstatutory subject matter and non-machine-implemented process claims is not limited to claims involving mathematical algorithms. The present application is only one example of many non-machine-implemented process claim cases now pending in the USPTO.

It is known that claims have to be drafted to be within at least one of the statutory categories of § 101. Subject matter within the categories of "machine, manufacture, or composition of matter" requires physical structure. However, a "process" under § 101 is not limited to the means (structure) used in performing it and structure for performing the steps is often not claimed. Usually, the chemical, electrical, and mechanical acts that indicate a statutory transformation of subject matter are evident from the nature of the steps or the claim language (e.g., mixing, signaling, etc.). However, the absence of structural limitations or clear language indicating a physical transformation of physical subject matter can make it difficult to determine whether the series of steps is a statutory "process." The problem is that "abstract ideas," such as mathematical algorithms, and other kinds of subject matter, which do not appear to belong in the "useful arts," are easily and naturally drafted as a series of steps, which fits the dictionary definition of a process. The USPTO then has the difficult job of showing why the subject matter is nonstatutory.

There are several issues that make the analysis of non-machine-implemented processes difficult. First, some claims may be interpreted as broad enough to cover both nonstatutory subject matter (e.g., a non-machine-implemented mathematical algorithm) and statutory subject matter (e.g., assuming the process, if performed by a machine, would be statutory subject matter), in which case the USPTO considers the claim to be unpatentable (although the issue has never been expressly decided). (By contrast, there has never been an argument that a process performed without a machine would be patentable subject matter, but the same process performed on a machine would be unpatentable.) Claims are given their broadest reasonable interpretation and implicit limitations are not read into the claims to make the claimed subject matter statutory. In particular, the fact that the method may be disclosed to be performed by a machine will not be read into a claim which does not require it. Second, which is related to the first issue, there is a question whether the so-called "technological arts" standard, at least as originally expressed in Musgrave, which gives no weight to how the steps are performed (machine steps versus "mental steps" ("abstract ideas")), is a valid test for statutory subject matter. Third, since process claims do not need to recite the means (structure) to perform the steps, there is a question of how to determine whether the claims recite a transformation of "physical subject matter" to a different state or thing when no structure is recited in the claims. Fourth, there is a question of whether minor physical limitations are sufficient to define a statutory process. Fifth, although it is not an issue in this case, there is a question of what to do with processes that can only be performed by a human, such as sports moves like high jumping or golfing. I try to address these issues in the following discussions for completeness, although not all of them apply to the present appeal.

Claims that read on statutory and nonstatutory subject matter are unpatentable

One important, but unresolved legal issue, is whether claimed subject matter that is broad enough to read on both statutory subject matter and nonstatutory subject matter should be considered to be statutory or nonstatutory. Although certain CCPA cases, discussed infra, appear to hold that claims that are broad enough to read on statutory as well as nonstatutory processes are patentable if they are within the "technological arts," these cases appear to have been implicitly overruled by the Supreme Court in Gottschalk v. Benson. While most cases in the following discussion involve mathematical algorithms, the principle to be discussed is not so limited. The history of this

issue involves the now abandoned "mental steps doctrine" and the "technological arts" test for statutory subject matter on which the examiner has relied in this case.

Assume that a series of steps if performed by a machine would be statutory subject matter, but that the same series of steps without a machine would be considered nonstatutory subject matter. For example, transformation of data by a machine might be statutory subject matter, while transformation of data without a machine (e.g., a mathematical algorithm that could be performed mentally) would be nonstatutory subject matter as an "abstract idea" or for failing to meet the transformation definition of a "process." Because a generally claimed process is not limited to the means (structure) disclosed as being used in performing it, it is common for process claims to recite steps without the means (structure) to perform the steps. The situation is that the claim does not recite how the steps are implemented and does not expressly or implicitly recite a machine implementation. Therefore, the claim covers both the "abstract idea," which the USPTO considers nonstatutory subject matter, as well as a machine implementation, which might be statutory subject matter; i.e., the steps could be performed by a machine, and a machine may be disclosed, but the claim itself does not require a machine. This is a very old situation, as described in connection with the "mental steps" cases by R.I. Coulter, The Field of the Statutory Useful Arts (Part I), 34 J. Pat. Off. Soc'y. 417, 426 (1952), cited in Musgrave, 431 F.2d at 889 n.4, 167 USPQ 287 n.4:

> There is an important point that should not be overlooked. In all of the technological "mental step" cases, the claims say nothing about mental steps or a human operator. The situation is that one or more steps are of such nature that they can be performed by a human operator, who is required to use his brain, and that no device for automatically performing such steps is specifically described in the specification. The claims are held not to define a statutory "useful art" even though, if the method were performed without a human operator (which is not excluded from the claims), it would constitute a statutory "useful art." In the Abrams case, for instance, there was no intimation that the specified petroleum prospecting method would not be a "useful art" if the criticized steps were performed by devices.

Although the old cases use the term "mental steps," the situation was that "the claims say nothing about mental steps or a human operator," Coulter, 34 J. Pat. Off. Soc'y at 426, i.e., the claims are silent about any means of performing the steps, so a

more appropriate description is an "abstract idea." The term "mental steps" may originate from the fact that, as a practical matter, methods have to be performed somehow and the term "mental steps" distinguishes a process that may be performed without a machine over one that requires machine implementation. While the "mental steps" cases depended on what structure was disclosed, the real issue is what structure is required by the claims.

In Prater, process claim 9 was broad enough to read on both statutory (machine-implemented) subject matter and nonstatutory (abstract or mental steps) subject matter. In Prater I, the CCPA found no problem with this claim breadth, stating that "patent protection for a process disclosed as being a sequence or combination of steps, capable of performance without human intervention and directed to an industrial technology--a 'useful art' within the intendment of the Constitution--is not precluded by the mere fact that the process could alternatively be carried out by mental steps," 415 F.2d at 1389, 159 USPQ at 593. On rehearing, the court held that process claim 9, which read on a mental process augmented by pencil and paper markings, which appellants acknowledged was not their invention, as well on as a machine implemented process, fails to comply with the requirement of § 112, second paragraph, which requires "claims particularly pointing out and claiming the subject matter which the applicant regards as his invention." See Prater II, 415 F.2d at 1404, 162 USPQ at 550. Thus, the court acknowledged that claim 9 read on both statutory and nonstatutory subject mater, but refrained from deciding whether the subject matter of claim 9 was nonstatutory. The § 112, second paragraph, reasoning was raised in several subsequent cases in addition to the § 101 rejection.

The CCPA avoided the statutory/nonstatutory issue in Bernhart, 417 F.2d 1395, 163 USPQ 611. The invention was a method and apparatus for automatically making a two-dimensional portrayal of a three-dimensional object from any desired angle and distance and any desired plane of projection. The court reversed the § 101 rejection of the apparatus claims based on several rationales, which are not relevant to the present analysis. Method claim 13 recited the steps of programming a computer to compute positions of planar axes, programming the computer to render an output representative of the coordinates of planar point positions, and applying the output of the computer to a plotting apparatus. The court referred to Prater II and noted that it had not ruled on whether claims covering truly mental steps could be statutory under § 101, but had held that applicants claimed more than they regarded as their invention thus rendering the claims unpatentable under § 112, second paragraph. Id. at 1400-01, 163 USPQ at 616-17. The court found

that the disclosure shows only machinery for carrying out the process and thus a statutory process was disclosed. Id. at 1401, 163 USPQ at 617. The court held that claim 13 "in no way covers any mental steps but requires both a 'digital computer' and a 'planar plotting apparatus' to carry it out," id., and held the method defined by claim 13 to be statutory.

The CCPA expressly avoided the statutory/nonstatutory issue in Mahoney, 421 F.2d 742, 164 USPQ 572. In Mahoney, the Board found that the claims read on both mental and nonmental implementation of a process and affirmed a rejection under 35 U.S.C. §§ 100, 101. The Board also agreed with the examiner that "a claim which embraces that which cannot be patented is not in conformity with [§ 112, second paragraph]." id. at 744, 164 USPQ at 574. Although it was not clear that there was a § 112 rejection, since both parties treated the case as containing a § 112 rejection, the court did also. The court noted that there was no dispute as to the statutory nature of the subject matter disclosed, which was a machine-implemented process. Id. at 745, 164 USPQ at 575. As to the § 101 statutory/nonstatutory issue the court stated:

> Both sides in this case have assumed that if a claim reads on both mental and nonmental implementation of a process, the claim is drawn to nonstatutory subject matter. We refrained from deciding that question in Prater, supra, and we decline to decide it here. We shall assume, as appellant has, that such a claim would be nonstatutory under 35 U.S.C. 101.

Id. The court first considered the § 112, second paragraph, rejection and stated:

> To inject any question of statutory subject matter into that paragraph is to depart from its wording and to complicate the law unnecessarily. The proper consideration here is whether the appealed claims cover only what appellant regards as his invention. Appellant, through counsel, has said at several points in this case that he intends the claims to cover only the machine implementation thereof. If the appealed claims accomplish that intent, not only will appellant have overcome the § 112 rejection, but he will also have overcome the § 101 rejection, since the machine-implemented process is clearly statutory. This question of what the claims reasonably cover is therefore dispositive of the case before us.

Id. at 745-46, 164 USPQ at 575. The court held that while there was "no express reference to a machine-implemented or nonmental process ... we have found that the term 'bit' when used in conjunction with 'bit stream' has a meaning in the art which precludes reading the claims on a mentally performable process" and reversed the decision of the Board. Id. at 747, 164 USPQ at 576. That is, since the claim reads only on the machine implementation it defines what applicant regards as his invention under § 112 and recites statutory subject matter under § 101. The court distinguished the case from Prater II where the claims did encompass performing the manipulations mentally with the possible aid or pencil and paper.

In Musgrave, "the court declined to follow the approach of Bernhart and Mahoney, i.e., determining whether the claim, interpreted reasonably, read upon mental implementation of the process or was confined to machine implementation." 1 Patents § 1.03[6][b]. The court noted that the mental steps doctrine was "purely a question of case law," 431 F.2d at 890, 167 USPQ at 287, and found the case law "to be something of a morass," id. The court seemed to hold that "mental steps" were only steps incapable of being performed by a machine or apparatus, id. at 889-890, 163 USPQ at 287, such as those involving subjective human judgments, which effectively disposed of the mental steps doctrine. The court found unsound the board's interpretation of "mental" as "encompassing steps performable by apparatus, as well as mentally." Id. at 890, 163 USPQ at 287. As to the board's assertion "that steps were 'mental' and rendered the claims non-statutory because they were not physical acts applied to physical things," id. at 892-893, 163 USPQ at 289, the court stated that there was no requirement that processes to be patentable, must operate on substances. The court held that process claims which read on both purely mental processes ("abstract ideas"), i.e., doing the steps mentally, as well as machine implemented processes, were statutory as long as the steps were in the "technological arts":

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

> progress of "useful arts." Const. Art. 1, sec. 8. [Emphasis added.]

Id. at 893, 167 USPQ at 289-90. Thus, the court equated the "technological arts" with the "useful arts." The court gave no guidance how to determine whether a series of steps is within the "useful arts" ("technological arts") if no machine is recited. Judge Baldwin noted in his concurrence that the "technological arts" holding was new law and that since the majority did not place any limits on the holding, this would allow claims to purely mental steps. Id. at 894-95, 167 USPQ at 290-91. See also Diamond v. Diehr, 450 U.S. at 201 n.16, 209 USPQ at 14 n.16 (Stevens, J. et al., dissenting) ("The author of the second Prater opinion, Judge Baldwin, disagreed with the Musgrave 'technological arts' standard for process claims. He described the standard as 'a major and radical shift in this area of the law.' As Judge Baldwin read the majority opinion, claims drawn solely to purely mental processes were now entitled to patent protection. Judge Baldwin's understanding of Musgrave seems to have been confirmed in In re Foster." (Citations omitted.)).

The "technological arts" test for statutory subject matter of Musgrave was approved in In re Foster, 438 F.2d 1011, 1015, 169 USPQ 99, 101 (CCPA 1971):

> Under this [Musgrave "technological arts"] analysis, it is not important whether the claims contain mental steps or not if the process is within the technological arts. In the present case there can be no dispute that the process of removing distortion from seismograms is within the technological arts as was the closely related process of correcting seismic data in Musgrave. Therefore, we conclude that the method claims are directed to a statutory process.

The court also disagreed with the board's rejection that where claims read on both statutory and nonstatutory subject matter they "embrace that which can not be patented and must be denied as an overclaiming of the invention," id., under 35 U.S.C. § 112, second paragraph. The court "concluded that the claims are directed to a statutory process and, therefore, they do not embrace that which cannot be patented," id., and noted that this complication of § 101 with § 112 reasoning had been rejected in Mahoney, id. In response to appellants' indication that they intended to cover only the machine and machine-implemented process, the court found that some claims read on "manual manipulation," which goes beyond that which "applicant regards as his invention," and affirmed the rejection under the second paragraph of 35 U.S.C. § 112 "despite the fact that we have

already found that the claims involve statutory subject matter," id. at 1016, 169 USPQ at 102.

The "technological arts" standard was refined in In re Benson, 441 F.2d 682, 169 USPQ 548 (CCPA 1971) to hold that computers, regardless of the uses to which they are put, are within the technological arts for purposes of § 101. Although there was a question of whether there was a rejection under § 112, second paragraph, the court found that "the board relied on only one ground, predicated on 35 U.S.C. § 101, that claims 8 and 13 are either directed to or at least embrace non-statutory subject matter" (emphasis added), id. at 686, 169 USPQ at 551. The appeal involved method claims 8 and 13. The court found that "Claim 8 is for a method to be practiced on particular apparatus specified to be a 'reentrant shift register,'" id. at 687, 169 USPQ at 552, and the claimed "operations of storing, shifting, and masking 'signals' ... can only mean signals of the kind upon which the disclosed electronic digital computer hardware operates," id., and held that "Claim 8 therefore covers only a machine-implemented process and the apparatus for carrying it out has been disclosed," id. As to method claim 13, the court noted that the Patent Office held claim 13 to be nonstatutory because it is basically "mental" in character. The court acknowledged that claim 13 covered "a process consisting of a sequence of steps which can be carried out by machine implementation as disclosed in the specification, by still another machine as disclosed during prosecution, and even manually although in actual practice it seems improbable anyone would ever do that, speed measured in milli- or even micro-seconds being essential in the practical utilization of such a process" (emphasis added). Id. at 688, 169 USPQ at 553. Thus, the court seemed to acknowledge the basis of the rejection was that the claims read on mental and manual steps. The court stated, however:

> Realistically, the process of claim 13 has no practical use other than the more effective operation and utilization of a machine known as a digital computer. It seems beyond question that the machines--the computers--are in the technological field, are a part of one of our best-known technologies, and are in the 'useful arts' rather than the 'liberal arts,' as are all other types of 'business machines,' regardless of the uses to which their users may put them. How can it be said that a process having no practical value other than enhancing the internal operation of those machines is not likewise in the technological or useful arts?" We conclude that the Patent Office has put

> forth no sound reason why the claims in this case should be held to be non-statutory.

Id. The court's holding that the machine-implemented process of claim 8 was statutory subject matter is understandable under then-existing law. However, although the court interpreted claim 13 to cover both machine and mental/manual implementations, rather than decide the § 101 statutory/nonstatutory issue, the court appeared to follow the "technological arts" test by holding it to be statutory subject matter.

Certiorari was granted in In re Benson, and the Supreme Court reversed. Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673. As previously discussed in the section "Pre-State Street," the Supreme Court recast the statutory subject matter issue in terms of mathematical algorithms, instead of the "mental steps" doctrine. Also, while the holding of Gottschalk v. Benson is not clear, it can be partly explained in terms of the claims not meeting the transformation of subject matter definition of a "process" under § 101, and claim 13 reading on an abstract idea ("mental steps") as well as a machine-implemented method. In any case, however, the important fact is that the Supreme Court did not apply the "technological arts" test. See Diamond v. Diehr, 450 U.S. at 201, 209 USPQ at 14 (Stevens, J. et al., dissenting) ("Justice Douglas' opinion for a unanimous Court made no reference to the lower court's rejection of the mental-steps doctrine or to the new technological-arts standard."). Thus, it appears that the "technological arts" test, at least in the Musgrave sense that a claim which covers both an abstract idea and a machine-implemented process is statutory as long as it is in the "technological arts," was implicitly overruled by Gottschalk v. Benson because the Court made no mention of it.

In the interval between the two Benson decisions, the CCPA decided two § 101 cases. In In re McIlroy, 442 F.2d 1397, 170 USPQ 31 (CCPA 1971), the claims defined a method for retrieving symbolic data from a stored string. The Board affirmed a rejection under § 101 "on the premise that only machine-implemented methods can be statutory, at least where information processing is concerned, and that the claims do not require machine implementation." Id. at 1398, 170 USPQ at 31. The court stated:

> Under our decision in In re Musgrave, 431 F.2d 882, 57 CCPA 1352 (1970), machine implementation versus mental implementation is not a determinative dichotomy in deciding whether a method is statutory under 35 U.S.C. § 101. Further, in our decision in In re Benson, Cust. & Pat. App.,

> 441 F.2d 682, decided May 6, 1971, we held that "a process having no practical value other than enhancing the internal operation of [digital computers]" was in the technological or useful arts and hence was statutory under § 101.

Id. at 1398, 170 USPQ at 31. Thus, McIlroy affirms the "technological arts" test of Musgrave, which appears to have been overruled by Gottschalk v. Benson. However, the method claims in McIlroy recited structure implicitly (claim 1 recited operations involving a "memory") or expressly (claim 7 recited a "machine method") and, thus, would have been statutory under the previous "mental steps" doctrine.

In Waldbaum I, claim 1 was directed to a method of controlling the operation of a data processor to determine the number of 1s in a data word and included many structural limitations, such as memory, registers, means for storing, means for performing logical operations, etc. "[T]he Board advanced a 'mental steps' rejection, i.e., that since the apparatus limitations in the claims were merely functional, the claims embrace 'that which could be only an act of the mind rather than calling for an act on a physical thing * * *.'" Id. at 1002, 173 USPQ at 43. The court stated:

> With regard to the "mental steps" rejection, whether appellant's process is a "statutory" invention depends on whether it is within the "technological arts." The phrase "technological arts," as we have used it, is synonymous with the phrase "useful arts" as it appears in Article I, Section 8 of the Constitution. It is clear that appellant's process, which is useful in the internal operation of computer systems, is within the "useful arts." Appellant's process is therefore a statutory process within the meaning of 35 U.S.C. § 101. [Citations omitted.]

457 F.2d at 1003, 173 USPQ at 434. Thus, Waldbaum I affirms the "technological arts" test of Musgrave. Prosecution was reopened following Gottschalk v. Benson and the claims were again rejected under 35 U.S.C. §§ 100 and 101. The CCPA sustained the § 101 rejection based on the reasoning in Gottschalk v. Benson, not on the "technological arts" test. See Waldbaum II, 599 F.2d 611, 194 USPQ 465. This is further evidence that the "technological arts" test, at least as expressed in Musgrave and In re Benson, has been overruled.

The "technological arts" test of Musgrave, Foster, In re Benson, and McIlroy held that a claim which reads on both statutory (e.g., machine-implemented) and nonstatutory ("mental

steps" or in modern terms an "abstract idea") subject matter is statutory under § 101 as long as the steps were in the "technological arts." The "technological arts" test eliminated the statutory subject matter distinction between machine-implemented processes and "mental steps" ("abstract ideas"). It appears that the "technological arts" test as applied in these cases was implicitly overruled in Gottschalk v. Benson. Thus, claims which are broad enough to read on nonstatutory and statutory subject matter, e.g., because they do not recite any structure or physical transformations, may raise a nonstatutory subject matter issue under § 101.

Subsequent to Gottschalk v. Benson, several cases referred to "technological arts," but only in the sense that computer-implemented processes that did not claim mathematical algorithms were statutory subject matter. The CCPA did not hold after Gottschalk v. Benson that a claim which covers both an abstract idea and machine implementation is statutory as long as it is in the "technological arts." In Deutsch, 553 F.2d 689, 193 USPQ 645, the claims were directed to a method of operating a system of manufacturing plants. The court held: "Because the claimed invention considered as a whole does not preempt a mathematical formula, an involved algorithm, or a program per se, and because it is within the technologically useful art of controlling and optimizing a system of manufacturing plants to a particular end use, it is a statutory 'process' within the purview of 35 USC 101." Id. at 693, 193 USPQ at 649.

In Toma, 575 F.2d 872, 197 USPQ 852, the claims were directed to a method of operating a digital computer to translate from a source natural language, e.g., Russian, to a target natural language, e.g., English. The examiner rejected the claims as nonstatutory under Gottschalk v. Benson because the algorithm has no substantial practical application except in connection with a digital computer. The court noted that one class of claims that was clearly not rendered nonstatutory by Benson was those claims which do not directly recite a Benson-type algorithm. Id. at 877, 197 USPQ at 856-57. The court noted that the Supreme Court in Benson used the term "algorithm" in the specific sense of a mathematical procedure and found the claim did not directly or indirectly recite a mathematical algorithm. Accordingly, the court held that the claims were not rendered nonstatutory by Benson. This appears to be the principal holding of the case. The court noted another issue:

> The examiner, in his Final Rejection and in his Examiner's Answer, appears to have rejected the claims because a computerized method of translating is not, the examiner

> submitted, in the "technological arts." The examiner cited [Musgrave, In re Benson, and McIlroy] ... for the proposition that all statutory subject matter must be in the "technological" or "useful" arts, and that, as far as computer-related inventions are concerned, only those inventions which "enhance the internal operation of the digital computer" are in the "technological" or "useful" arts. The examiner further stated that natural language translation is a "liberal art" and that effecting the translation by means of a machine does not transform the activity into a "technological art." The board's perfunctory treatment of this theory of rejection does not indicate approval or disapproval of it.

Id. at 877, 197 USPQ at 857. The court held:

> [T]he method for enabling a computer to translate natural languages is in the technological arts, i.e., it is a method of operating a machine. The "technological" or "useful" arts inquiry must focus on whether the claimed subject matter (a method of operating a machine to translate) is statutory, not on whether the product of the claimed subject matter (a translated text) is statutory, not on whether the prior art which the claimed subject matter purports to replace (translation by a human mind) is statutory, and not on whether the claimed subject matter is presently perceived to be an improvement over the prior art, e.g., whether it "enhances" the operation of a machine. This was the law prior to Benson and was not changed by Benson. [Footnote omitted.]

Id. at 877-878, 197 USPQ at 857. The court also stated:

> [T]he examiner has taken language from the cited cases and attempted to apply that language in a different context. Musgrave, In re Benson, and McIlroy all involved data processing methods useful in a computer, but not expressly limited to use in a computer. Furthermore, all of those cases involved a "mental steps" rejection. The language which the examiner has quoted was written in answer to "mental steps" rejections and was not intended to create a generalized definition of statutory subject matter. Moreover, it was not intended to form a basis for a new § 101 rejection as the examiner apparently suggests.

Id. at 878, 197 USPQ at 857. The "technological arts" rejection was reversed.

The issue of whether a claim that reads on both statutory and nonstatutory subject matter, is nonstatutory under § 101 was presented, but not decided, in Alappat. In Alappat, the Board found that a claim in means-plus-function format was broad enough to cover performing the steps on a general purpose computer, as well as on the specific disclosed circuitry. The Board treated the claim in means-plus-function format as a process claim in accordance with the procedure in Freeman, Maucorps, Sherwood, Walter, Pardo, Abele, and Meyer, and held that the claim was directed to nonstatutory subject matter as a mathematical algorithm (contrary to the court's statement that the Board held the claim to be unpatentable "merely" because it reads on a programmed general purpose digital computer, 33 F.3d at 1544, 31 USPQ2d at 1558). That is, the Board interpreted the claim as broad enough to read on both statutory subject matter (the specific disclosed circuit) and nonstatutory subject matter (performing with a general purpose computer was equivalent to a process) and held it to be nonstatutory. Alappat admitted that a general purpose computer was equivalent structure, and that a method which amounted to a mathematical method which was only supported by a programmed general purpose computer would be nonstatutory. Alappat, 33 F.3d at 1565, 31 USPQ2d at 1575. "Alappat's argument is that 'bona fide hardware supporting the "means plus function" recitals' in claim 15 renders the claimed subject matter statutory, but then the claim may cover general purpose digital computers as equivalents through § 112, ¶6, even though that subject matter could not be claimed outright." Id. That is, Alappat considered that a claim which covers statutory as well as nonstatutory subject matter is statutory. The court construed the claim under 35 U.S.C. § 112, sixth paragraph, in accordance with the specific circuit to be "a specific machine to produce a useful, concrete, and tangible result," id. at 1544, 31 USPQ2d at 1557. The court noted that a programmed general purpose computer was also an apparatus. Id. at 1545, 31 USPQ2d at 1558. The court held that the claim could not be construed as a process claim because it must be construed as apparatus, id. at 1545 n.25, 31 USPQ2d at 1558 n.25. The court did not acknowledge or address Freeman, Maucorps, Sherwood, Walter, Pardo, Abele, and Meyer, relied upon by the Board, in which means-plus-functions claims were treated as process claims for the purpose of the § 101 analysis. The court mooted the issue of whether the claim was nonstatutory because it was broad enough to cover both nonstatutory subject matter (performing the functions with a general purpose computer) and statutory subject matter (the specific disclosed circuit), by holding that a programmed general purpose computer is a statutory apparatus. Under the subsequent State Street test, the subject matter would be statutory

regardless of whether the machine is the specific circuitry or a general purpose computer.

The statutory/nonstatutory question was also addressed in Judge Gajarsa's concurrence in Smithkline Beecham Corp. v. Apotex Corp. Judge Gajarsa found that the claim to paroxetine hemihydrate covers both the synthetic product and a product of "a natural physical process whereby paroxitine anhydrate (a pre-existing synthetic crystal that today is in the public domain) could, under normal climactic conditions and with no human intervention, bond with water molecules and convert itself into paroxetine hemihydrate." 365 F.3d at 1330, 70 USPQ2d at 1755. Judge Gajarsa stated: "In short, patent claims drawn broadly enough to encompass products that spread, and appear, and 'reproduce' through natural processes cover subject matter unpatentable under Section 101--and are therefore invalid." Id. at 1331, 70 USPQ2d at 1756. That is, claims which are broad enough to cover both the nonstatutory natural product and the statutory synthetic product would be nonstatutory. Nevertheless, this was only in a concurrence.

Conclusion

The aspect of the "technological arts" test of Musgrave which states that a claim which covers both "mental steps" ("abstract idea") and a machine-implemented process, is statutory subject matter as long as it is in the "technological arts," has been implicitly overruled in Gottschalk v. Benson. Therefore, it is possible for a claim to read on both nonstatutory subject matter (an abstract idea) and statutory subject matter (if the abstract idea was implemented by a machine, which is not claimed, it might be statutory). In my opinion, the USPTO should continue its longstanding practice of holding the claimed subject matter to be unpatentable because, while a claim is pending and can be amended, a claim must be given its broadest reasonable interpretation and a claim's meaning should be delimited by express terms rather than by claim interpretation or by reading limitations from the disclosure into the claim. Cf. In re Lintner, 458 F.2d 1013, 1015, 173 USPQ 560, 562 (CCPA 1972) ("Claims which are broad enough to read on obvious subject matter are unpatentable even though they also read on nonobvious subject matter."); In re Muchmore, 433 F.2d 824, 826, 167 USPQ 681, 683 (CCPA 1970) ("it is clear that claim 14 is too broad in the sense of section 103, since it reads on both obvious and unobvious subject matter"). In the USPTO, applicant can amend the claims to limit them to statutory subject matter. Cf. Prater II, 415 F.2d at 1404 n.30, 162 USPQ at 550 n.30 (Where a patent is at issue: "By construing a [patent] claim as covering only

patentable subject matter, courts are able, in appropriate cases, to hold claims valid in order to protect the inventive concept of the inventor's contribution to the art. The patentee at that time usually may not amend the claims to obtain protection commensurate with his actual contribution to the art."). The alternative would be to interpret the claim as limited to statutory subject matter and leave it to the district courts to sort out what in the claim is nonstatutory subject matter from what is statutory. In my opinion, this is contrary to the duty of the USPTO. See Graham v. John Deere Co., 383 U.S. at 18, 148 USPQ at 467 ("[T]he primary responsibility for sifting out unpatentable material lies in the Patent Office. To await litigation is--for all practical purposes--to debilitate the patent system.").

"Technological arts" test

I am aware from this and other cases that the Patent Examining Corps considers Musgrave, Toma, and Bowman to impose a separate "technological arts" test for statutory subject matter. Apparently, the Corps defines "technological arts" as subject matter involving the use of "technology" and does not consider a process performed without a computer or other apparatus, or which must be performed in whole or part by a human, to be in the "technological arts."

There is no question that claimed subject matter must be within the "useful arts" of the Constitution. "Useful arts" is synonymous with "technological arts." The "useful arts," and thus the "technological arts," are defined by Congress in the four categories of invention in § 101, subject to the exceptions for "laws of nature, physical phenomena and abstract ideas." It is clear that a "machine, manufacture, and [man-made] composition of matter" are man-made "things" that fall with the "useful arts." A "process" is much more difficult to analyze because, although every series of steps is a process within the dictionary definition, and may have been conceived by man, not every series of steps is considered a "process" under § 101. The Supreme Court's definition of a statutory "process" as requiring the transformation of physical subject matter (which can be tangible or intangible, and which I interpret to be the transformation of matter or a form of energy) from one state into another provides the "useful arts" aspect. In my opinion, the definition of "engineering" as "the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to man in structures, machines, products, systems, and processes," supra, best describes what is meant by "useful arts," and the four classes of § 101 are consistent with

this definition. Therefore, I consider the "useful arts" or "technology" requirement implicit in the classes of § 101.

Musgrave held that a claim that covers both "mental steps" and a machine-implemented process, is statutory subject matter as long as it is "in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of 'useful arts.'" Musgrave, 431 F.2d at 893, 167 USPQ at 289-90. This statement can be viewed either as merely equating the "technological arts" with the "useful arts," a matter of definition that does not create a separate test, or as creating a separate "technological arts" test. The majority views the statement as not creating a separate "technological arts" test. However, it appears that it was intended to create a new test, at least in the situation where the claims are broad enough to cover both mental and machine-implemented steps. One of the judges in Musgrave considered it to create a new test. See id. at 895, 167 USPQ at 291 (Baldwin, J., concurring) ("First and foremost [of the problems with the majority's new holding] will be the problem of interpreting the meaning of 'technological arts.'"). See also Diamond v. Diehr, 450 U.S. at 201, 209 USPQ at 14 (Stevens, J. et al., dissenting) ("The court [in Musgrave] also announced a new standard for evaluating process claims under § 101: any sequence of operational steps was a patentable process under § 101 as long as it was within the 'technological arts.'" (Emphasis added.)); id. at 201 n.16, 209 USPQ at 14 n.16 ("The author of the second Prater opinion, Judge Baldwin, disagreed with the Musgrave 'technological arts' standard for process claims. He described the standard as 'a major and radical shift in this area of the law.' As Judge Baldwin read the majority opinion, claims drawn solely to purely mental processes were now entitled to patent protection. Judge Baldwin's understanding of Musgrave seems to have been confirmed in In re Foster." (Citations omitted.)); id. at 201, 209 USPQ at 14 ("The 'technological arts' standard was refined in In re Benson, in which the court held that computers, regardless of the uses to which they are put, are within the technological arts for purposes of § 101." (Citation omitted.)). However, this new "technological arts" test was implicitly overruled by the Supreme Court in Gottschalk v. Benson. See id. at 450 U.S. at 201, 209 USPQ at 14 ("Justice Douglas' opinion for a unanimous Court [in Gottschalk v. Benson] made no reference to the lower court's rejection of the mental-steps doctrine or to the new technological-arts standard." (Emphasis added.)). Thus, to the extent Musgrave created a separate "technological arts" test, which was followed in Foster, McIlroy, and In re Benson, it has been implicitly overruled by Gottschalk v. Benson.

In addition, Musgrave is not a good case for the Corps to rely on because it held that a claim to a sequence of steps that could be performed entirely mentally could be statutory subject matter if it was in the "technological arts," but does not explain how mental steps are in the "technological arts." Also, since mental steps could be statutory subject matter, Musgrave did not require a computer to define statutory subject matter and, thus, does not support the reasoning that a computer is necessary for a statutory process in the "technological arts" and that a process performed solely by a human is nonstatutory. These facts of Musgrave are often not appreciated.

The principal holding of Toma was that the claim was statutory subject matter because it did not recite a mathematical algorithm in the Gottschalk v. Benson sense. As to the examiner's rejection that the computerized method of translating was not in the "technological arts," the court stated that, first: "[T]he method for enabling a computer to translate natural languages is in the technological arts, i.e., it is a method of operating a machine. The "technological" or "useful" arts inquiry must focus on whether the claimed subject matter ... is statutory ...." 575 F.2d at 877, 197 USPQ at 857. This equates the "useful arts" and the "technological arts" and states that a claim to computer which performs a function that is not just a mathematical algorithm is statutory subject matter. The court also stated that, second: "The language which the examiner has quoted was written in answer to 'mental steps' rejections and was not intended to create a generalized definition of statutory subject matter. Moreover, it was not intended to form a basis for a new § 101 rejection as the examiner apparently suggests." Id. Thus, Toma expressly rejects a separate "technological arts" test, at least for non-mental step process claims. The fact that the computer method in Toma was found to be in the technological arts does not necessarily imply that a method without a computer is not in the technological arts, as apparently assumed by the examiner. In my opinion, Toma simply reflects the position after Gottschalk v. Benson that computer-implemented processes are statutory subject matter unless it merely recites a mathematical algorithm.

Ex parte Bowman, which is not a precedential Board opinion, states that "the invention ... does not promote the progress of ... the useful arts, and does not fall within the definition of technological arts," 61 USPQ2d at 1671. Bowman equates the "technological arts" with the "useful arts" and does not appear to impose a separate "technological arts" test or, if it does, it does not define an objective test for "technological arts."

"Technological arts" is synonymous with the "useful arts" of the Constitution. The "technology" requirement is implicit in the statutory classes of § 101, and is not a separate test. No court has ever held subject matter to be nonstatutory applying a separate "technological arts" test. A "process" does not necessarily require a computer to be statutory subject matter and the performance of steps by a human does not necessarily mean that the subject matter is nonstatutory because it is possible to transform subject matter without a machine. A separate and distinct "technological arts" test would be very difficult to apply since what constitutes "technology" can always be debated and because some things, which may not seem "technological" in nature, clearly fall within the § 101 categories (e.g., a board game is a "manufacture" and a food product can be a "manufacture" or a "composition of matter"), and things which seem non-technical to engineers have been stated to be in the "technological arts," see Schrader, 22 F.3d at 297, 30 USPQ2d at 1461 (Newman, J., dissenting) (non-computer-implemented method of bidding is "in technologically useful arts"). Furthermore, I have seen too many examples of examiners making conclusory statements that a product or method is not within the "technological arts" or does not involve "technology" to think that such a test would be workable or fair. Thus, I agree with the majority that the "technological arts" is not a separate test for statutory subject matter.

Transformation of subject matter

As discussed in the definition of a "process," although claims often do not recite the means (structure) for performing the steps, a statutory transformation of physical subject matter (matter or energy) to a different state or thing is evidenced by chemical, electrical, or mechanical steps, such as a manufacturing step or the function of machine. It is easy to see that steps for the transformation of tangible material and substances, such as making a new chemical by the physical steps of mixing, heating, etc., and the transformation of physical yet intangible subject matter, such as converting electrical currents into electromagnetic waves in an antenna or performing a CAT-scan operation, constitute a statutory process without the recitation of specific structure for performing the steps. Where a series of steps is expressly tied to a machine or specific apparatus, the physical transformation of subject matter by chemical, electrical, or mechanical steps is clear. Transformation of data by a machine or a machine-implemented method is a special case addressed by the test in State Street. It will not always be easy to determine whether an act performs a transformation. For example, is hitting a baseball a "transformation" because it

results in a change in direction or velocity? What about acts like paying a bill or changing the price of a good for sale? What about acts such as manually drawing on a chart? However, I believe the Supreme Court's transformation test is the most workable test and can be developed by examples.

There is sometimes a question whether the claim implicitly requires a statutory physical transformation by a machine or is directed to an abstract idea, such as manipulation of data. "One distinction is made between transformation of physical 'signals' from one physical state to a different physical state, a statutory process in the electrical arts, and mere mathematical manipulation of 'data' which, by itself, is not a statutory process." Patentable Subject Matter, 1106 Off. Gaz. Pat. & Trademark Office at 9. The fact that a machine is disclosed for performing the steps, or that the steps are capable of being performed by a machine, should not be read into the claims. The problem faced by the USPTO is that, unlike in Prater II, applicants are seldom willing to state that the claims are limited to machine implementation and it is difficult to tell whether the claims actually require a machine or a transformation of physical subject matter.

It seems more logically rigorous to keep the transformation definition of a "process" and the "abstract idea" exception as separate concepts. There may be processes that involve physical steps that cannot truly be considered "abstract ideas," but which are, nevertheless, nonstatutory subject matter under the transformation of subject matter definition of a "process." Cf. State Street (a machine, manufacture, or machine-implemented process, something which is not strictly an "abstract idea," can be nonstatutory subject matter if it does not produce a "useful, concrete and tangible result").

Incidental physical limitations

It is often difficult to tell exactly where to draw the line between statutory and nonstatutory processes. "The line between a patentable 'process' and an unpatentable 'principle' is not always clear." Parker v. Flook, 437 U.S. at 590, 198 USPQ at 197. "The distinction may thus be fine indeed between statutory and nonstatutory subject matter, considering the glorious flexibility and frustrating limitations of the English language on the one hand, and the ingenuity of patent draftsmen on the other." de Castelet, 562 F.2d at 1243, 195 USPQ at 445. Often, in the past, minor physical limitations were added to what would

otherwise be nonstatutory subject matter to try to get over that line. However, as stated in Parker v. Flook:

> The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance. A competent draftsman could attach some form of post-solution activity to almost any mathematical formula; the Pythagorean Theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques. The concept of patentable subject matter under § 101 is not "like a nose of wax which may be turned and twisted in any direction ...." White v. Dunbar, 119 U.S. 47, 51. [Footnote and parallel citations omitted.]

437 U.S. at 590, 198 USPQ at 197. As further stated in Diamond v. Diehr:

> We recognize, of course, that when a claim recites a mathematical formula (or scientific principle or phenomenon of nature), an inquiry must be made into whether the claim is seeking patent protection for that formula in the abstract. A mathematical formula as such is not accorded the protection of our patent laws, Gottschalk v. Benson, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment, Parker v. Flook. Similarly, insignificant post-solution activity will not transform an unpatentable principle into a patentable process. To hold otherwise would allow a competent draftsman to evade the recognized limitations on the type of subject matter eligible for patent protection. On the other hand, when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101. [Footnote omitted.] [Citations omitted.]

450 U.S. at 191-92, 209 USPQ at 10. In determining whether a process claim "as a whole" was directed to statutory subject matter, a body of case law developed around "field of use limitations," "data-gathering steps," and "post-solution activity." See Patentable Subject Matter, 1106 Off. Gaz. Pat. & Trademark Office at 8-10. It should not make any difference

whether the "unpatentable principle" mentioned in Parker v. Flook and Diamond v. Diehr is a mathematical algorithm or some other type of abstract idea. The issue is especially difficult in claims which would be an abstract idea except for the presence of some physical steps.

In each of the non-machine-implemented process claim cases except Benson, which recited no physical step in claim 13, there was one or more arguably physical effects or results that the applicant unsuccessfully relied on to make the subject matter a statutory process. In Parker v. Flook it was a "post-solution" activity step of adjustment of the alarm limit; in Sarkar it was a step of measuring the cross-channel dimensions; in Grams it was performing clinical tests on individuals to obtain data; in Schrader it was the entering of bids in a "record"; and in Warmerdam appellant argued that the claims were broad enough to cover methods which involve physically, instead of mathematically, locating the medial axis of the object. Therefore, the mere presence of physical transformation steps is not enough to define statutory subject matter, although there is no general rule to say when a physical limitation is sufficient to define statutory subject matter. The cases for "field of use limitations," "data-gathering steps," and "post-solution activity" should still be good precedent for non-machine-implemented process claims.

Claims that cover only human activity

There is a problematic type of process claim where, although the claim is usually silent about how the steps are performed, some or all of the claimed steps must be performed by a human, either because they are uniquely human acts or because no presently known machine is capable of performing the steps. Claims having steps which involve subjective human judgment, such as "aesthetic, emotional, imaginative, or creative thought or reasoning on the part of the practitioners . . . [or] human 'value judgments,'" Musgrave, 431 F.2d at 889 n.4, 167 USPQ 287 n.4, may be regarded as indefinite under 35 U.S.C. § 112, second paragraph, rather than nonstatutory under § 101, id. at 893, 167 USPQ at 290. 1 Patents § 1.03[4]. This discussion refers only to human acts, physical or mental, which do not involve any subjective judgment.

A process is not limited to the means (structure) to perform it. A process may be statutory even if the steps are completely performed by a human. However, the key to a statutory "process" under § 101 is that it physically transforms physical subject matter to a different state or thing. For example, a step of

"mixing" two chemicals to produce a manufacture or composition of matter is a physical, chemical, and/or mechanical act, a manufacturing step, regardless of whether it is performed by a machine or a human. Similarly, a physical step which could be performed by a machine (e.g., applying a force to transform an object) requires a transformation of subject matter even if the step is performed by a human. It is generally considered that machine-implemented processes are within the "useful arts" of the Constitution, except for the special case of transformation of data by a machine, now addressed by the State Street test. I am not aware of any cases that hold that a process, to be statutory subject matter, must be capable of being performed by a machine.

However, I do not consider a process that is performed with human physical actions, or a combination of mental and physical actions, where the physical actions do not transform physical subject matter to a different state of thing, to be statutory subject matter within the "useful arts" ("technological arts") of § 101. Perhaps a part of the concern with some human-performed methods is that the steps may not be guaranteed to produce the results or be repeatable, whereas machine-implemented process steps will reliably produce the expected result; however, this seems to be more of an enablement issue. Examples of human-performed steps are dance and sports moves; e.g., a high jumping or swimming technique, which may require both mental thoughts and physical acts. Arguably any human activity (muscle contraction), neural activity (thoughts, emotions), or endocrine activity (secretion of adrenal glands) involves chemical and physical changes that can be measured and (in theory) controlled or influenced. However, I submit that chemical, electrical, or mechanical transformations taking place by or within a human being are not the type of transformation indicating a process within the "useful arts" of § 101. While people sometimes refer to a "patented move" in sports, the USPTO has so far tried to resist patenting such human-performed subject matter. Surgical methods are performed by humans, but they involve the application of scientific medical knowledge to transform human and animal tissue; they are classifiable as a type of manufacturing process.

Since a "process" also "includes a new use of a known process, machine, manufacture, composition of matter, or material," 35 U.S.C. § 100(b), a "new use" must also meet the requirement for "transformation of physical subject matter to a different state or thing" to be a statutory "process." "New uses" of known devices which require only human acts raise a question of whether there is sufficient physical transformation to constitute statutory subject matter, e.g., a method of swinging a golf club.

Where one or more of the claimed steps is transforming physical subject matter (tangible or intangible) to a different state or thing by chemical, electrical, or mechanical steps and, therefore, meets the definition of a "process" under § 101, the presence of steps which may be performed by a human does not make the subject matter nonstatutory. See Alco Standard Corp. v. Tennessee Valley Authority, 808 F.2d 1490, 1496, 1 USPQ2d 1337, 1341 (Fed. Cir. 1987) ("The inclusion in a patent of a process that may be performed by a person, but that also is capable of being performed by a machine, is not fatal to patentability. Diamond v. Diehr, 450 U.S. 175 (1981). The presence of the steps of correlating and combining, which a machine is capable of doing, does not invalidate the '006 patent.").[1] That is, all steps of a process do not have to be carried out only by a machine to be within the "useful arts." For example, the process in claim 11 of Diamond v. Diehr involved several steps, e.g., opening and closing a press, which could be performed by a human or automatically by a machine (the claims, as usual, did not say how they were performed), but the overall process was still a physical and chemical process for molding precision synthetic rubber products.

ANALYSIS

Claim interpretation

Appellant acknowledges that claim 1 does not expressly or implicitly recite a machine implementation. The claim limitations of step a), "choosing an absolute performance standard," and step f), "determining a relative performance measure," seem to require some human selection of a performance standard and do not appear to be capable of being performed automatically by a machine. Most of the steps indirectly include a mathematical algorithm: step b), "measuring an absolute performance standard of said primary firm," corresponds to the steps of inputting data in step 5 of Fig. 2 and computing a weighted sum of absolute performance data in step 6 of Fig. 2; step c), "measuring an absolute performance of each firm of said set of comparison firms," corresponds to the steps of inputting

[1] Although there is no jump cite for Diamond v. Diehr, the quote probably refers to the holding that "a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer." Diamond v. Diehr, 450 U.S. at 187, 209 USPQ at 81.

data in step 7 of Fig. 2 and computing a weighted sum of absolute performance measures for each rival firm in step 8 of Fig. 2; step d), "determining a performance comparison base," corresponds to the step of computing a weighted average in step 9 of Fig. 2; step e), "comparing said measurement of absolute performance of said primary firm with said performance comparison base," corresponds to the subtraction step in step 10 of Fig. 2; and step g), "determining the managerial compensation amount derived from said relative performance measure according to a monotonic managerial compensation amount transaction," corresponds to the computation step 11 in Fig. 2. The last step h), "transferring compensation to said manager, said transferred compensation having a value related to said managerial compensation amount," corresponds to step 4 of Fig. 1.

Possible tests

The cases seem to provide four possible tests for statutory subject matter of non-machine-implemented process claims:

(1) Transformation. The 1877 Cochrane v. Deener definition of a statutory "process" requires a transformation of physical subject matter to a different state or thing. As noted in Schrader, the subject matter transformed can be tangible or intangible, which I interpret to be matter or some form of energy to be consistent with the definition of "technology." This Supreme Court test has a good pedigree and I think defines the essential nature of a statutory "process" and "technology." I believe that all cases where statutory subject matter was found can be explained with this test.

(2) Exceptions. The exceptions for "laws of nature, physical phenomena and abstract ideas," are, logically, a second test, i.e., "but for" the exceptional condition, the claimed process would be patentable subject matter. Exceptions, while providing counterexamples, often fail to provide positive definitions. Moreover, an "abstract idea" can be found in any process and the detection of its presence, like the finding of a mathematical algorithm, is not dispositive. It is difficult to determine whether a process is merely a "law of nature," "physical phenomena," or "abstract idea," because the claims are usually drafted to recite minor physical limitations such as data-gathering steps, field of use limitations, and post-solution activity. The question is whether the claim "as a whole" is directed to the kind of subject matter that was intended to be protected.

(3) "Useful, concrete and tangible result". The State Street test of a "practical application, i.e., 'a useful, concrete and tangible result," was stated in the context of transformation of data by a machine or a machine-implemented process. The test has not yet been applied as a general test for statutory subject matter of non-machine-implemented processes. The terms are not defined, nor has any authority been cited for this test. Machines are concrete physical things and processes performed on machines would seem to produce a "concrete and tangible result." To the extent the State Street test applies to non-machine-implemented process claims, I would interpret a "concrete and tangible result" to be another way of saying that the claim must not be directed to an "abstract idea" and to require a transformation of physical subject matter under the definition of a "process" in test (1), and/or a finding that the subject matter is not an "abstract idea" under test (2); i.e., it must recite eligible subject matter. The "useful result" part of the test is interpreted to mean that subject matter, which qualifies as a statutory "process," has utility according to the utility requirement of § 101. A "practical application" requires that the subject matter produces a "useful result" and a "concrete result" and tangible result." The State Street test appears to combine the separate § 101 requirements for eligible subject matter (subject matter within a category of "process, machine, manufacture, or composition of matter") and utility.

(4) "Technological arts". For the reasons stated in the section entitled "'Technological arts' test," I conclude that there is no separate "technological arts" test. The "technology" requirement implied by "technological arts" is contained within the definitions of the statutory classes. While I understand the desire for a simple test, I believe that sanctioning such a test would inevitably lead to bare conclusory statements that "the claimed subject matter is not within the technological arts and does not involve technology" with no way for applicants to show otherwise.

Analysis

The three tests are applied below.

(1)

Claim 1, as is common with method claims, does not recite how the steps are implemented. The claimed steps are broad enough to be performed without a machine and appellant admits

that a machine is not disclosed or claimed. The claimed steps do not require transformation of any physical subject matter, such as an electrical signal, into a different state or thing. Steps a) and f) are directed to the abstract ideas of selecting a performance standard and measure and, as claimed, require no physical embodiment or transformation. Steps b), c), d), e), and g), all correspond to computation steps, which, since no machine is claimed, are disembodied. The only things transformed are numbers related to performance data of the primary firm and the comparison firms, numbers related to the relative performance, and numbers related to a managerial compensation amount. The last step h) does not recite any physical implementation.

Although steps b) and c), as recited and disclosed, imply data input steps, there is nothing necessarily physical about these steps as claimed. However, even if there was, this would be nothing more than routine data gathering which does not make the subject matter statutory. See Sarkar, 588 F.2d at 1335, 200 USPQ at 139 ("If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a 'process' under § 101."); Grams, 888 F.2d at 839-40, 12 USPQ2d at 1828. The last step h), "transferring compensation to said manager, said transferred compensation having a value related to said managerial compensation amount," as broadly recited, does not transform any physical subject matter to a different state or thing, or require any specific kind of physical activity, it merely transfers ownership of money. The transferring step can be manually recording an amount in a ledger, payment of paper money, an IOU, a verbal commitment, an electronic direct deposit, etc. Not all physical acts are the kinds of acts that give rise to a statutory process. Further, step h) is considered to be nothing more than an incidental post-solution activity step, which cannot convert a nonstatutory abstract idea into a statutory process. See Parker v. Flook, 437 U.S. at 590, 198 USPQ at 197 ("The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance."); Diamond v. Diehr, 450 U.S. at 191-92, 209 USPQ at 10 ("[I]nsignificant post-solution activity will not transform an unpatentable principle into a patentable process."). These statements in Supreme Court cases cannot be ignored.

In accordance with State Street, we do not rely on the presence of the mathematical algorithm in a Freeman-Walter-Abele analysis, but, instead, focus on the ultimate question of whether claim 1, as a whole, recites a statutory process. Here the

claimed plan to reduce incentives for industry collusion is based on business, economic, game theory, or antitrust knowledge, not the application of natural science or engineering knowledge to physical structure or to physical acts which transform physical subject matter (matter or a form of energy) to a different state so as to be a practical application of "technology." I hold that claim 1 is directed to nonstatutory subject matter because the steps do not transform physical subject matter from one state to another, as required by the definition of a § 101 "process."

(2)

The subject matter of claim 1 is also directed to an "abstract idea" or, at least, it is nonstatutory because it broadly covers both the nonstatutory "abstract idea" and any physical implementation of it that might possibly be statutory. Claim 1 describes a plan or scheme for compensating a manager to reduce incentives for industry collusion. It is nothing but an disembodied "abstract idea" until it is instantiated in some physical way within one of the categories of the "useful arts" in § 101 so as to become a practical application of the idea. None of the claimed steps recite how the steps are physically implemented; thus, the steps remain a disembodied "abstract idea." Because the steps, including the last step of "transferring compensation," cover any and every possible way of performing the steps of the plan, by human or by any kind of machine, this is evidence that claim 1 is so broad that it is directed to the "abstract idea" itself, rather than a practical means for implementing the concept. Even if, for some reason, the last step of "transferring compensation" is considered a concrete physical act, not every physical act is the kind of act that gives rise to a statutory process. Further, step h) is incidental post-solution activity that does not transform a nonstatutory abstract idea into a statutory process. See Parker v. Flook, 437 U.S. at 590, 198 USPQ at 197; Diamond v. Diehr, 450 U.S. at 191-92, 209 USPQ at 10. While physical acts of individuals or organizations would, no doubt, be required to implement the steps, and while the actual implementation of the plan in some specific way might be considered statutory subject matter, these unrecited limitations can not be read into the claim. The fact that claim 1 might cover both statutory and nonstatutory subject matter does not make it statutory. Thus, I further conclude that claim 1 is directed to nonstatutory subject matter because it is falls within the "abstract idea" exception.

(3)

I concluded in (1) that the claimed subject matter on appeal does not fall within the definition of a "process" under § 101 because it does not transform physical subject matter into a different state or thing, and concluded in (2) that it is an "abstract idea." Thus, because a "concrete and tangible result" is the opposite of an "abstract idea" and requires some sort of physical instantiation, I conclude that claim 1 does not recite a "concrete and tangible result" or a "practical application" of the plan for reducing incentives for industry collusion under the State Street test requiring a "useful, concrete and tangible result." While the plan may be "useful" in the sense that it is capable of having utility to society, assuming that is what is meant by the term in the State Street test, the State Street test requires the result to be "useful" and "concrete" and "tangible," so merely being "useful" is not enough. Claim 1 describes the abstract idea itself, not a concrete and tangible embodiment of the idea. For these reasons, I disagree with the examiner's conclusion (answer, p. 3) that the claims recite a "useful, concrete and tangible result" under the State Street test. Therefore, I also hold that claim 1 is directed to nonstatutory subject matter because it does not recite a "practical application" or produce a "concrete and tangible result" under the State Street test, to the extent that the test applies to non-machine-implemented process claims.

CONCLUSION

For the reasons stated above, I agree that there is no separate and distinct "technological arts" test, but conclude that claim 1 is not directed to statutory subject matter under 35 U.S.C. § 101 for different reasons than those expressed by the examiner. I would enter new grounds of rejection as to claims 1, 2, 6, 7, 19-22, 32, and 35-40.

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