

IN RE BERNARD L. BILSKI and RAND A. WARSAW

2007-1130

**UNITED STATES COURT OF APPEALS FOR THE FEDERAL
CIRCUIT**

**545 F.3d 943; 2008 U.S. App. LEXIS 22479; 88 U.S.P.Q.2D (BNA)
1385; 2008-2 U.S. Tax Cas. (CCH) P50,621**

October 30, 2008, Decided

Before MICHEL, Chief Judge, NEWMAN, MAYER, LOURIE, RADER, SCHALL, BRYSON, GAJARSA, LINN, DYK, PROST, and MOORE, Circuit Judges. Opinion for the court filed by Chief Judge MICHEL, in which Circuit Judges LOURIE, SCHALL, BRYSON, GAJARSA, LINN, DYK, PROST, and MOORE join. Concurring opinion filed by Circuit Judge DYK, in which Circuit Judge LINN joins. Dissenting opinion filed by Circuit Judge NEWMAN. Dissenting opinion filed by Circuit Judge MAYER. Dissenting opinion filed by Circuit [**9] Judge RADER.

[*949] MICHEL, Chief Judge.

Bernard L. Bilski and Rand A. Warsaw (collectively, "Applicants") appeal from the final decision of the Board of Patent Appeals and Interferences ("Board") sustaining the rejection of all eleven claims of their U.S. Patent Application Serial No. 08/833,892 ("892 application"). See *Ex parte Bilski*, No. 2002-2257, 2006 Pat. App. LEXIS 51, 2006 WL 5738364 (B.P.A.I. Sept. 26, 2006) ("Board Decision"). Specifically, Applicants argue that the examiner erroneously rejected the claims as not directed to patent-eligible subject matter under 35 U.S.C. § 101, and that the Board erred in upholding that rejection. The appeal was originally argued before a panel of the court on October 1, 2007. Prior to disposition by the panel, however, we sua sponte ordered en banc review. Oral argument before the en banc court was held on May 8, 2008. We affirm the decision of the Board because we conclude that Applicants' claims are not directed to patent-eligible subject matter, and in doing so, we clarify the standards applicable in determining whether a claimed method constitutes a statutory "process" under § 101.

I.

Applicants filed their patent application on April 10, 1997. The application [**10] contains eleven claims, which Applicants argue together here. Claim 1 reads:

A method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of:

- (a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate

based upon historical averages, said fixed rate corresponding to a risk position of said consumer;

(b) identifying market participants for said commodity having a counter-risk position to said consumers; and

(c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions

'892 application cl.1. In essence, the claim is for a method of hedging risk in the field of commodities trading. For example, coal power plants (i.e., the "consumers") purchase coal to produce electricity and are averse to the risk of a spike in demand for coal since such a spike would increase the price and their costs. Conversely, coal mining companies (i.e., the "market [**11] participants") are averse to the risk of a sudden drop in demand for coal since such a drop would reduce their sales and depress prices. The claimed method envisions an [*950] intermediary, the "commodity provider," that sells coal to the power plants at a fixed price, thus isolating the power plants from the possibility of a spike in demand increasing the price of coal above the fixed price. The same provider buys coal from mining companies at a second fixed price, thereby isolating the mining companies from the possibility that a drop in demand would lower prices below that fixed price. And the provider has thus hedged its risk; if demand and prices skyrocket, it has sold coal at a disadvantageous price but has bought coal at an advantageous price, and vice versa if demand and prices fall. Importantly, however, the claim is not limited to transactions involving actual commodities, and the application discloses that the recited transactions may simply involve options, i.e., rights to purchase or sell the commodity at a particular price within a particular timeframe. See J.A. at 86-87.

The examiner ultimately rejected claims 1-11 under 35 U.S.C. § 101, stating: "[r]egarding . . . claims 1-11, [**12] the invention is not implemented on a specific apparatus and merely manipulates [an] abstract idea and solves a purely mathematical problem without any limitation to a practical application, therefore, the invention is not directed to the technological arts." See Board Decision, slip op. at 3, 2006 Pat. App. LEXIS 51. The examiner noted that Applicants had admitted their claims are not limited to operation on a computer, and he concluded that they were not limited by any specific apparatus. See id. at 4, 2006 Pat. App. LEXIS 51.

On appeal, the Board held that the examiner erred to the extent he relied on a "technological arts" test because the case law does not support such a test. Id. at 41-42, 2006 Pat. App. LEXIS 51. Further, the Board held that the requirement of a specific apparatus was also erroneous because a claim that does not recite a specific apparatus may still be directed to patent-eligible subject matter "if there is a transformation of physical subject matter from one state to another." Id. at 42, 2006 Pat. App. LEXIS 51. Elaborating further, the Board stated: "'mixing' two elements or compounds to produce a chemical substance or mixture is clearly a statutory transformation although no apparatus is claimed to perform the step and although the step could be performed [**13] manually." Id. But the Board concluded that Applicants' claims do not involve any patent-eligible transformation, holding that transformation of "non-physical financial risks and legal liabilities of the commodity provider, the consumer, and the market participants" is not patent-eligible subject matter. Id. at 43, 2006 Pat. App. LEXIS 51. The Board also held that Applicants' claims "preempt[] any and every possible way of performing the steps of the [claimed process], by human or by any kind of machine or by any combination thereof," and thus concluded that they only claim an abstract idea ineligible

for patent protection. *Id.* at 46-47, 2006 Pat. App. LEXIS 51. Finally, the Board held that Applicants' process as claimed did not produce a "useful, concrete and tangible result," and for this reason as well was not drawn to patent-eligible subject matter. *Id.* at 49-50, 2006 Pat. App. LEXIS 51.

Applicants timely appealed to this court under 35 U.S.C. § 141. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

II.

Whether a claim is drawn to patent-eligible subject matter under § 101 is a threshold inquiry, and any claim of an application failing the requirements of § 101 must be rejected even if it meets all of the other legal requirements of patentability. *In re Comiskey*, 499 F.3d 1365, 1371 (Fed. Cir. 2007) [****14**]¹ (quoting *Parker v. [**951] Flook*, 437 U.S. 584, 593, 98 S. Ct. 2522, 57 L. Ed. 2d 451 (1978)); *In re Bergy*, 596 F.2d 952, 960 (CCPA 1979), vacated as moot sub nom. *Diamond v. Chakrabarty*, 444 U.S. 1028, 100 S. Ct. 696, 62 L. Ed. 2d 664 (1980). Whether a claim is drawn to patent-eligible subject matter under § 101 is an issue of law that we review de novo. *Comiskey*, 499 F.3d at 1373; *AT&T Corp. v. Excel Commc'ns, Inc.*, 172 F.3d 1352, 1355 (Fed. Cir. 1998). Although claim construction, which we also review de novo, is an important first step in a § 101 analysis, see *State St. Bank & Trust Co. v. Signature Fin. Group*, 149 F.3d 1368, 1370 (Fed. Cir. 1998) (noting that whether a claim is invalid under § 101 "is a matter of both claim construction and statutory construction"), there is no claim construction dispute in this appeal. We review issues of statutory interpretation such as this one de novo as well. *Id.*

A.

As this appeal turns on whether Applicants' invention as claimed meets the requirements set forth in § 101, we begin with the words of the statute:

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.

35 U.S.C. § 101. The statute thus recites four categories of patent-eligible subject matter: processes, machines, manufactures, and compositions of matter. It is undisputed that Applicants' claims are not directed to a machine, manufacture, or composition of matter. Thus, the issue before us involves what the term "process" in § 101 means, and how to determine whether a given claim--and Applicants' claim 1 in particular--is a "new and useful process."

As several amici have argued, the term "process" is ordinarily broad in meaning, at least in general lay usage. In 1952, at the time Congress amended § 101 to include "process,"⁴ the ordinary meaning of [****952**] the term was: "[a] procedure . . . [a] series of actions, motions, or operations definitely conducing to an end, whether voluntary or involuntary." WEBSTER'S NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE 1972 (2d ed. 1952). There can be no dispute that Applicants' claim would meet this definition of "process." [****17**] But the Supreme Court has held that the meaning of "process" as used in § 101 is narrower than its ordinary meaning. See *Flook*, 437 U.S. at 588-89 ("The holding [in *Benson*] forecloses a purely literal reading of § 101."). Specifically, the Court has held that a claim is not a patent-eligible "process" if it claims "laws of nature, natural phenomena, [or] abstract ideas." *Diamond v. Diehr*, 450 U.S. 175, 185, 101

S. Ct. 1048, 67 L. Ed. 2d 155 (1981) (citing *Flook*, 437 U.S. at 589, and *Gottschalk v. Benson*, 409 U.S. 63, 67, 93 S. Ct. 253, 34 L. Ed. 2d 273 (1972)). Such fundamental principles⁵ are "part of the storehouse of knowledge of all men . . . free to all men and reserved exclusively to none." *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130, 68 S. Ct. 440, 92 L. Ed. 588, 1948 Dec. Comm'r Pat. 671 (1948); see also *Le Roy v. Tatham*, 55 U.S. (14 How.) 156, 175, 14 L. Ed. 367 (1852) ("A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right."). "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." *Benson*, 409 U.S. at 67; see also *Comiskey*, 499 F.3d at 1378-79 (holding that [**18] "mental processes," "processes of human thinking," and "systems that depend for their operation on human intelligence alone" are not patent-eligible subject matter under *Benson*).

The true issue before us then is whether Applicants are seeking to claim a fundamental principle (such as an abstract idea) or a mental process. And the underlying legal question thus presented is what test or set of criteria governs the determination by the Patent and Trademark Office ("PTO") or courts as to whether a claim to a process is patentable under β 101 or, conversely, is drawn to unpatentable subject matter because [**19] it claims only a fundamental principle.

The Supreme Court last addressed this issue in 1981 in *Diehr*, which concerned a patent application seeking to claim a process for producing cured synthetic rubber products. 450 U.S. at 177-79. The claimed process took temperature readings during cure and used a mathematical algorithm, the Arrhenius equation, to calculate the time when curing would be complete. *Id.* Noting that a mathematical algorithm alone is unpatentable because mathematical relationships are akin to a law of nature, the Court nevertheless held that the claimed process was patent-eligible subject matter, stating:

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

Id. at 187 (emphasis added). [*953] The Court declared that while a claim drawn to a fundamental principle is unpatentable, "an application of a law of nature or mathematical [**20] formula to a known structure or process may well be deserving of patent protection." *Id.* (emphasis in original); see also *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94, 59 S. Ct. 427, 83 L. Ed. 506, 1939 Dec. Comm'r Pat. 857 (1939) ("While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.").

The Court in *Diehr* thus drew a distinction between those claims that "seek to pre-empt the use of" a fundamental principle, on the one hand, and claims that seek only to foreclose others from using a particular "application" of that fundamental principle, on the other. 450 U.S. at 187. Patents, by definition, grant the power to exclude others from practicing that which the patent claims. *Diehr* can be understood to suggest that whether a claim is drawn only to a fundamental principle is essentially an inquiry [**21] into the scope of that exclusion; i.e., whether the effect of allowing the claim would be to allow the patentee to pre-empt substantially all uses of that fundamental principle. If so, the claim is not drawn to patent-eligible subject matter.

In *Diehr*, the Court held that the claims at issue did not pre-empt all uses of the Arrhenius equation but rather claimed only "a process for curing rubber . . . which incorporates in it a more efficient solution of the equation." 450 U.S. at 188. The process as claimed included several specific steps to control the curing of rubber more precisely: "These include installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time." *Id.* at 187. Thus, one would still be able to use the Arrhenius equation in any process not involving curing rubber, and more importantly, even in any process to cure rubber that did not include performing "all of the other steps in their claimed process." See *id.*; see also *Tilghman v. Proctor*, 102 U.S. 707, 729, 26 L. Ed. 279, 1881 Dec. Comm'r Pat. 163 (1880) (holding patentable [**22] a process of breaking down fat molecules into fatty acids and glycerine in water specifically requiring both high heat and high pressure since other processes, known or as yet unknown, using the reaction of water and fat molecules were not claimed).

In contrast to *Diehr*, the earlier *Benson* case presented the Court with claims drawn to a process of converting data in binary-coded decimal ("BCD") format to pure binary format via an algorithm programmed onto a digital computer. *Benson*, 409 U.S. at 65. The Court held the claims to be drawn to unpatentable subject matter:

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 [*954] and in practical effect would be a patent on the algorithm itself.

Id. at 71-72 (emphasis added). Because the algorithm had no uses other than those that would be covered by the claims (i.e., any conversion [**23] of BCD to pure binary on a digital computer), the claims pre-empted all uses of the algorithm and thus they were effectively drawn to the algorithm itself. See also *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 113, 14 L. Ed. 601 (1853) (holding ineligible a claim pre-empting all uses of electromagnetism to print characters at a distance).

The question before us then is whether Applicants' claim recites a fundamental principle and, if so, whether it would pre-empt substantially all uses of that fundamental principle if allowed. Unfortunately, this inquiry is hardly straightforward. How does one determine whether a given claim would pre-empt all uses of a fundamental principle? Analogizing to the facts of *Diehr* or *Benson* is of limited usefulness because the more challenging process claims of the twenty-first century are seldom so clearly limited in scope as the highly specific, plainly corporeal industrial manufacturing process of *Diehr*; nor are they typically as broadly claimed or purely abstract and mathematical as the algorithm of *Benson*.

The Supreme Court, however, has enunciated a definitive test to determine whether a process claim is tailored narrowly enough to encompass only a particular application [**24] of a fundamental principle rather than to pre-empt the principle itself. A claimed process is surely patent-eligible under β 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing. See *Benson*, 409 U.S. at 70 ("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."); *Diehr*, 450 U.S. at 192 (holding that use of mathematical formula in

process "transforming or reducing an article to a different state or thing" constitutes patent-eligible subject matter); see also *Flook*, 437 U.S. at 589 n.9 ("An argument can be made [that the Supreme] 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'"); *Cochrane v. Deener*, 94 U.S. 780, 788, 24 L. Ed. 139, 1877 Dec. Comm'r Pat. 242 (1876) ("A process is . . . an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.").⁷ A claimed process involving a fundamental principle that uses a particular machine or [**25] apparatus would not pre-empt uses of the principle that do not also use the specified machine or apparatus in the manner claimed. And a claimed process that transforms a particular article to a specified different state or thing by applying a fundamental principle would not pre-empt the use of the principle to transform any other article, to transform the same article but in a manner not covered by the claim, or to do anything other than transform the specified article.

The process claimed in *Diehr*, for example, clearly met both criteria. The process operated on a computerized rubber curing apparatus and transformed raw, uncured rubber into molded, cured rubber products. *Diehr*, 450 U.S. at 184, 187. [*955] The claim at issue in *Flook*, in contrast, was directed to using a particular mathematical formula to calculate an "alarm limit"--a value that would indicate an abnormal condition during an [**26] unspecified chemical reaction. 437 U.S. at 586. The Court rejected the claim as drawn to the formula itself because the claim did not include any limitations specifying "how to select the appropriate margin of safety, the weighting factor, or any of the other variables . . . the chemical processes at work, the [mechanism for] monitoring of process variables, or the means of setting off an alarm or adjusting an alarm system." See *id.* at 586, 595. The claim thus was not limited to any particular chemical (or other) transformation; nor was it tied to any specific machine or apparatus for any of its process steps, such as the selection or monitoring of variables or the setting off or adjusting of the alarm.⁸ See *id.*

A canvas of earlier Supreme Court cases reveals that the results of those decisions were also consistent with the machine-or-transformation test later articulated in *Benson* and reaffirmed in *Diehr*. See *Tilghman*, 102 U.S. at 729 (particular process of transforming fats into constituent compounds held patentable); *Cochrane*, 94 U.S. at 785-88 (process transforming grain meal into purified flour held patentable); *Morse*, 56 U.S. (15 How.) at 113 (process of using electromagnetism to print characters at a distance that was not transformative or tied to any particular apparatus held unpatentable). Interestingly, *Benson* presents a difficult case under its own test in that the claimed process operated on a machine, a digital computer, but was still held to be ineligible subject matter.⁹ However, in *Benson*, the limitations tying the process to a computer were not actually limiting because the fundamental principle at issue, a particular algorithm, had no utility other than operating on a digital computer. *Benson*, 409 U.S. at 71-72. Thus, the claim's tie to a digital computer did not reduce the preemptive footprint of the claim since all uses of the algorithm were still [**28] covered by the claim.

B.

Applicants and several amici have argued that the Supreme Court did not intend the machine-or-transformation test to be the sole test governing § 101 analyses. As already noted, however, the Court explicitly stated in *Benson* that "[t]ransformation and reduction of an article 'to a [*956] different state or thing' is the clue to the patentability of a process claim that does not include particular machines." 409 U.S. at 70 (emphasis added). And the Court itself later [**29] noted in *Flook* that at

least so far it had "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.'" 437 U.S. at 589 n.9. Finally, the Court in *Diehr* once again applied the machine-or-transformation test in its most recent decision regarding the patentability of processes under β 101. 450 U.S. at 184.

We recognize, however, that the Court was initially equivocal in first putting forward this test in *Benson*. As the Applicants and several [**30] amici point out, the Court there stated:

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.

Benson, 409 U.S. at 71. In *Flook*, the Court took note that this statement had been made in *Benson* but merely stated: "As in *Benson*, we assume that a valid process patent may issue even if it does not meet [the machine-or-transformation test]." 437 U.S. at 589 n.9 (emphasis added). And this caveat was not repeated in *Diehr* when the Court reaffirmed the machine-or-transformation test. See *Diehr*, 450 U.S. at 184 (quoting *Benson*, 409 U.S. at 70) ("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."). Therefore, we believe our reliance on the Supreme Court's machine-or-transformation test as the applicable test for β 101 analyses of process claims is sound.

Nevertheless, we agree that future developments in technology and the sciences may present [**31] difficult challenges to the machine-or-transformation test, just as the widespread use of computers and the advent of the Internet has begun to challenge it in the past decade. Thus, we recognize that the Supreme Court may ultimately decide to alter or perhaps even set aside this test to accommodate emerging technologies. And we certainly do not rule out the possibility that this court may in the future refine or augment the test or how it is applied. At present, however, and certainly for the present case, we see no need for such a departure and reaffirm that the machine-or-transformation test, properly applied, is the governing test for determining patent eligibility of a process under β 101.

C.

As a corollary, the *Diehr* Court also held that mere field-of-use limitations are generally insufficient to render an otherwise ineligible process claim patent-eligible. See 450 U.S. at 191-92 (noting that ineligibility under β 101 "cannot be circumvented by attempting to limit the use of the formula to a particular technological environment"). We recognize that tension may be seen between this consideration and the Court's overall goal of preventing the wholesale pre-emption of fundamental principles. Why not permit patentees to avoid overbroad pre-emption by limiting claim scope to particular fields of use? This tension is resolved, however, by recalling the purpose behind the Supreme Court's discussion of pre-emption, namely that pre-emption is merely an indication that a claim seeks to cover a fundamental principle itself rather than only a specific application of that principle. See *id.* at 187; [**33] *Benson*, 409 U.S. at 71-72. Pre-emption of all uses of a fundamental principle in all fields and pre-emption of all uses of the principle in only one field both indicate that the claim is not limited to a particular application of the principle. See *Diehr*, 450 U.S. at 193 n.14 ("A mathematical formula in the abstract is nonstatutory subject matter regardless of whether the patent is intended to cover all uses of the formula or only limited uses.") (emphasis added). In

contrast, a claim that is tied to a particular machine or brings about a particular transformation of a particular article does not pre-empt all uses of a fundamental principle in any field but rather is limited to a particular use, a specific application. Therefore, it is not drawn to the principle in the abstract.

The Diehr Court also reaffirmed a second corollary to the machine-or-transformation test by stating that "insignificant postsolution activity will not transform an unpatentable principle into a patentable process." *Id.* at 191-92; see also *Flook*, 437 U.S. at 590 ("The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable [**34] process exalts form over substance."). The Court in *Flook* reasoned:

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.

437 U.S. at 590. Therefore, even if a claim recites a specific machine or a particular transformation of a specific article, the recited machine or transformation must not constitute mere "insignificant postsolution activity."

D.

We discern two other important aspects of the Supreme Court's β 101 jurisprudence. First, the Court has held that whether a claimed process is novel or non-obvious is irrelevant to the β 101 analysis. *Diehr*, 450 U.S. at 188-91. Rather, such considerations are governed by 35 U.S.C. β 102 (novelty) and β 103 (non-obviousness). *Diehr*, 450 U.S. at 188-91. Although β 101 refers to "new and useful" processes, it is overall "a general statement of the type of subject matter that is eligible for patent protection 'subject to the conditions and requirements of this title.'" *Diehr*, 450 U.S. at 189 (quoting β 101). As the legislative history of β 101 indicates, Congress did not intend the "new and useful" language of β 101 to constitute an independent requirement of novelty or non-obviousness distinct from the more specific and detailed requirements of $\beta\beta$ 102 and 103, respectively. *Diehr*, 450 U.S. at 190-91. So here, it is irrelevant to the β 101 analysis whether Applicants' claimed process is novel or non-obvious.

Second, the Court has made clear that it is inappropriate to determine the patent-eligibility of a claim as a whole based on whether selected limitations constitute patent-eligible subject matter. *Flook*, 437 U.S. at 594 ("Our approach to respondent's application is, however, not at all inconsistent with the view that a patent claim must be considered as a whole."); *Diehr*, 450 U.S. at 188 ("It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis."). After all, even though a fundamental principle itself is not patent-eligible, processes incorporating a fundamental principle may be patent-eligible. Thus, it is irrelevant that any individual step or limitation of such processes by itself would be unpatentable under β 101. See *In re Alappat*, 33 F.3d 1526, 1543-44 (Fed. Cir. 1994) (en banc) (citing *Diehr*, 450 U.S. at 187).

III.

In the years following the Supreme Court's [**37] decisions in *Benson*, *Flook*, and *Diehr*, our predecessor court and this court have reviewed numerous cases presenting a wide variety of process claims, some in technology areas unimaginable when those seminal Supreme Court cases were heard. Looking to these precedents, we find a wealth of detailed guidance and helpful examples on how to determine the patent-eligibility of process claims.

A.

Before we turn to our precedents, however, we first address the issue of whether several other purported articulations of β 101 tests are valid and useful. The first of these is known as the Freeman-Walter-Abele test after the three decisions [*959] of our predecessor court that formulated and then refined the test: *In re Freeman*, 573 F.2d 1237 (CCPA 1978); *In re Walter*, 618 F.2d 758 (CCPA 1980); and *In re Abele*, 684 F.2d 902 (CCPA 1982). This test, in its final form, had two steps: (1) determining whether the claim recites an "algorithm" [**38] within the meaning of *Benson*, then (2) determining whether that algorithm is "applied in any manner to physical elements or process steps." *Abele*, 684 F.2d at 905-07.

Some may question the continued viability of this test, arguing that it appears to conflict with the Supreme Court's proscription against dissecting a claim and evaluating patent-eligibility on the basis of individual limitations. See *Flook*, 437 U.S. at 594 (requiring analysis of claim as a whole in β 101 analysis); see also *AT&T*, 172 F.3d at 1359; *State St.*, 149 F.3d at 1374. In light of the present opinion, we conclude that the Freeman-Walter-Abele test is inadequate. Indeed, we have already recognized that a claim failing that test may nonetheless be patent-eligible. See *In re Grams*, 888 F.2d 835, 838-39 (Fed. Cir. 1989). Rather, the machine-or-transformation test is the applicable test for patent-eligible subject matter.¹

The second articulation we now revisit is the "useful, concrete, [**39] and tangible result" language associated with *State Street*, although first set forth in *Alappat*. *Alappat*, *State St.*, 149 F.3d at 1373 ("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 [patent-eligible invention] because it produces 'a useful, concrete and tangible result' . . .");² *Alappat*, 33 F.3d at 1544 ("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."); see also *AT&T*, 172 F.3d at 1357 ("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 β 101."). The basis for this language in *State Street* and *Alappat* was that the Supreme Court has explained that "certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application." *Alappat*, 33 F.3d at 1543; see also [**40] *State St.*, 149 F.3d at 1373. To be sure, a process tied to a particular machine, or transforming or reducing a particular article into a different state or thing, will generally produce a "concrete" and "tangible"

¹ Therefore, in *Abele*, *Meyer*, *Grams*, *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, 958 F.2d 1053 (Fed. Cir. 1992), and other decisions, those portions relying solely on the Freeman-Walter-Abele test should no longer be relied on.

² In *State Street*, as is often forgotten, we addressed a claim drawn not to a process but to a machine. 149 F.3d at 1371-72 (holding that the means-plus-function elements of the claims on appeal all corresponded to supporting structures disclosed in the written description).

result as those terms were used in our prior decisions. But while looking for "a useful, concrete and tangible result" may in many instances provide useful indications of whether a claim is drawn to a fundamental principle or a practical application of such a principle, that inquiry is insufficient to determine whether a claim is patent-eligible under β 101. And it was certainly never intended to supplant the Supreme Court's test. Therefore, we also conclude that the "useful, concrete and tangible result" inquiry [*960] is inadequate and reaffirm that the machine-or-transformation test outlined by the Supreme Court is the proper test to apply.³

We next turn to the so-called "technological arts test" that some amici urge us to adopt. We perceive that the contours of such a test, however, would be unclear because the meanings of the terms "technological arts" and "technology" are both ambiguous and ever-changing. And no such test has ever been explicitly adopted by the Supreme Court, this court, or our predecessor court, as the Board correctly observed here. Therefore, we decline to do so and continue to rely on the machine-or-transformation test as articulated by the Supreme Court.

We further reject calls for categorical exclusions beyond those for fundamental principles already identified by the Supreme Court. We rejected just such an exclusion in *State Street*, noting that the so-called "business method exception" was unlawful and that business method claims (and indeed all process claims) are "subject to the same legal requirements for patentability as applied to any other process or method." 149 F.3d at 1375-76. We reaffirm this conclusion.⁴

Lastly, we address a possible misunderstanding of our decision in *Comiskey*. Some may suggest that *Comiskey* implicitly applied a new β 101 test that bars any claim reciting a mental process that lacks significant "physical steps." We did not so hold, nor did we announce any new test at all in *Comiskey*. Rather, we simply recognized that the Supreme Court has held that mental processes, like fundamental principles, are excluded by β 101 because "[p]henomena of nature, though just discovered, mental processes, and abstract intellectual concepts . . . are the basic tools of scientific and technological work." *Comiskey*, 499 F.3d at 1377 (quoting *Benson*, 409 U.S. at 67) (emphasis added). And we actually applied the machine-or-transformation [**44] test to determine whether various claims at issue were [*961] drawn to patent-eligible subject matter.²⁴ *Id.* at 1379 ("Comiskey has conceded that these claims do not require a machine, and these claims evidently do not describe a process of manufacture or a process for the alteration of a composition of matter."). Because those claims failed the machine-or-transformation test, we held that they were drawn solely to a fundamental principle, the mental process of arbitrating a dispute, and were thus not patent-eligible under β 101. *Id.*

Further, not only did we not rely on a "physical steps" test in *Comiskey*, but we have criticized such an approach to the β 101 analysis in earlier decisions. In *AT&T*, we rejected a "physical limi-

³ As a result, those portions of our opinions in *State Street* and [**41] *AT&T* relying solely on a "useful, concrete and tangible result" analysis should no longer be relied on.

⁴ Therefore, although invited to do so by several amici, we decline to adopt a broad exclusion over software or any other such category [**43] of subject matter beyond the exclusion of claims drawn to fundamental principles set forth by the Supreme Court. See, e.g., *Br. of Amicus Curiae End Software Patents*; *Br. of Amicus Curiae Red Hat, Inc.* at 4-7. We also note that the process claim at issue in this appeal is not, in any event, a software claim. Thus, the facts here would be largely unhelpful in illuminating the distinctions between those software claims that are patent-eligible and those that are not.

tations" [**45] test and noted that "the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it nonstatutory subject matter." 172 F.3d at 1359 (quoting State St., 149 F.3d at 1374). The same reasoning applies when the claim at issue recites fundamental principles other than mathematical algorithms. Thus, the proper inquiry under β 101 is not whether the process claim recites sufficient "physical steps," but rather whether the claim meets the machine-or-transformation test.⁵ As a result, even a claim that recites "physical steps" but neither recites a particular machine or apparatus, nor transforms any article into a different state or thing, is not drawn to patent-eligible subject matter. Conversely, a claim that purportedly lacks any "physical steps" but is still tied to a machine or achieves an eligible transformation passes muster under β 101.⁶

B.

With these preliminary issues resolved, we now turn to how our case law elaborates on the β 101 analysis set forth by the Supreme Court. To the extent that some of the reasoning in these decisions relied on considerations or tests, such as "useful, concrete and tangible result," that are no longer valid as explained above, those aspects of the decisions should no longer be relied on. Thus, we reexamine the facts of certain cases under the correct test to glean greater guidance as to how to perform the β 101 analysis using the machine-or-transformation test.

The machine-or-transformation test is a two-branched inquiry; an applicant may show that a process claim satisfies β 101 either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article. See *Benson*, 409 U.S. at 70. Certain considerations are applicable to analysis under either branch. First, as illustrated by *Benson* and discussed below, the use of a specific machine or transformation of an article must impose meaningful [**47] limits on the claim's scope to impart patent-eligibility. See *Benson*, 409 U.S. at [*962] 71-72. Second, the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity. See *Flook*, 437 U.S. at 590.

As to machine implementation, Applicants themselves admit that the language of claim 1 does not limit any process step to any specific machine or apparatus. See Appellants' Br. at 11. As a result, issues specific to the machine implementation part of the test are not before us today. We leave to future cases the elaboration of the precise contours of machine implementation, as well as the answers to particular questions, such as whether or when recitation of a computer suffices to tie a process claim to a particular machine.

We will, however, consider some of our past cases to gain insight into the transformation part of the test. A claimed process is patent-eligible if it transforms an article into a different state or thing. This transformation must be central to the purpose of the claimed process. But the main aspect of the transformation test that requires clarification here is what sorts of things constitute "articles" such that [**48] their transformation is sufficient to impart patent-eligibility under β 101. It is virtually self-evident that a process for a chemical or physical transformation of physical objects or substances is patent-eligible subject matter. As the Supreme Court stated in *Benson*:

⁵ Thus, it is simply inapposite to the β 101 analysis whether process steps performed by software on a computer are sufficiently "physical."

⁶ Of course, a claimed process wherein all of the process steps may be performed entirely in the human mind [**46] is obviously not tied to any machine and does not transform any article into a different state or thing. As a result, it would not be patent-eligible under β 101.

[T]he arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores . . . are instances, however, where the use of chemical substances or physical acts, such as temperature control, changes articles or materials. The chemical process or the physical acts which transform the raw material are, however, sufficiently definite to confine the patent monopoly within rather definite bounds.

409 U.S. at 70 (quoting *Corning v. Burden*, 56 U.S. (15 How.) 252, 267-68, 14 L. Ed. 683 (1854)); see also *Diehr*, 450 U.S. at 184 (process of curing rubber); *Tilghman*, 102 U.S. at 729 (process of reducing fats into constituent acids and glycerine).

The raw materials of many information-age processes, however, are electronic signals and electronically-manipulated data. And some so-called business methods, such as that claimed in the present case, involve the manipulation of even more abstract constructs such as legal obligations, [**49] organizational relationships, and business risks. Which, if any, of these processes qualify as a transformation or reduction of an article into a different state or thing constituting patent-eligible subject matter?

Our case law has taken a measured approach to this question, and we see no reason here to expand the boundaries of what constitutes patent-eligible transformations of articles.

Our predecessor court's mixed result in *Abele* illustrates this point. There, we held unpatentable a broad independent claim reciting a process of graphically displaying variances of data from average values. *Abele*, 684 F.2d at 909. That claim did not specify any particular type or nature of data; nor did it specify how or from where the data was obtained or what the data represented. *Id.*; see also *In re Meyer*, 688 F.2d 789, 792-93 (CCPA 1982) (process claim involving undefined "complex system" and indeterminate "factors" drawn from unspecified "testing" not patent-eligible). In contrast, we held one of *Abele*'s dependent claims to be drawn to patent-eligible subject matter where it specified that "said data is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner." [**50] *Abele*, 684 F.2d at 908-09. This data [*963] clearly represented physical and tangible objects, namely the structure of bones, organs, and other body tissues. Thus, the transformation of that raw data into a particular visual depiction of a physical object on a display was sufficient to render that more narrowly-claimed process patent-eligible.

We further note for clarity that the electronic transformation of the data itself into a visual depiction in *Abele* was sufficient; the claim was not required to involve any transformation of the underlying physical object that the data represented. We believe this is faithful to the concern the Supreme Court articulated as the basis for the machine-or-transformation test, namely the prevention of pre-emption of fundamental principles. So long as the claimed process is limited to a practical application of a fundamental principle to transform specific data, and the claim is limited to a visual depiction that represents specific physical objects or substances, there is no danger that the scope of the claim would wholly pre-empt all uses of the principle.

This court and our predecessor court have frequently stated that adding a data-gathering step to an [**51] algorithm is insufficient to convert that algorithm into a patent-eligible process. E.g., *Grams*, 888 F.2d at 840 (step of "deriv[ing] data for the algorithm will not render the claim statutory"); *Meyer*, 688 F.2d at 794 ("[data-gathering] step[s] cannot make an otherwise nonstatutory claim statutory"). For example, in *Grams* we held unpatentable a process of performing a clinical test and, based on the data from that test, determining if an abnormality existed and possible causes

of any abnormality. 888 F.2d at 837, 841. We rejected the claim because it was merely an algorithm combined with a data-gathering step. Id. at 839-41. We note that, at least in most cases, gathering data would not constitute a transformation of any article. A requirement simply that data inputs be gathered--without specifying how--is a meaningless limit on a claim to an algorithm because every algorithm inherently requires the gathering of data inputs. Grams, 888 F.2d at 839-40. Further, the inherent step of gathering data can also fairly be characterized as insignificant extra-solution activity. See *Flook*, 437 U.S. at 590.

Similarly, *In re Schrader* presented claims directed to a method of conducting an auction [**52] of multiple items in which the winning bids were selected in a manner that maximized the total price of all the items (rather than to the highest individual bid for each item separately). 22 F.3d 290, 291 (Fed. Cir. 1994). We held the claims to be drawn to unpatentable subject matter, namely a mathematical optimization algorithm. Id. at 293-94. No specific machine or apparatus was recited. The claimed method did require a step of recording the bids on each item, though no particular manner of recording (e.g., on paper, on a computer) was specified. Id. But, relying on *Flook*, we held that this step constituted insignificant extra-solution activity. Id. at 294.

IV.

We now turn to the facts of this case. As outlined above, the operative question before this court is whether Applicants' claim 1 satisfies the transformation branch of the machine-or-transformation test.

We hold that the Applicants' process as claimed does not transform any article to a different state or thing. Purported transformations or manipulations simply of public or private legal obligations or relationships, business risks, or other such abstractions cannot meet the test because they are not physical objects or substances, [**53] and they are not representative of physical objects or substances. Applicants' [**964] process at most incorporates only such ineligible transformations. See Appellants' Br. at 11 ("[The claimed process] transforms the relationships between the commodity provider, the consumers and market participants ") As discussed earlier, the process as claimed encompasses the exchange of only options, which are simply legal rights to purchase some commodity at a given price in a given time period. See J.A. at 86-87. The claim only refers to "transactions" involving the exchange of these legal rights at a "fixed rate corresponding to a risk position." See '892 application cl.1. Thus, claim 1 does not involve the transformation of any physical object or substance, or an electronic signal representative of any physical object or substance. Given its admitted failure to meet the machine implementation part of the test as well, the claim entirely fails the machine-or-transformation test and is not drawn to patent-eligible subject matter.

Applicants' arguments are unavailing because they rely on incorrect or insufficient considerations and do not address their claim's failure to meet the requirements of the [**54] Supreme Court's machine-or-transformation test. First, they argue that claim 1 produces "useful, concrete and tangible results." But as already discussed, this is insufficient to establish patent-eligibility under β 101. Applicants also argue that their claimed process does not comprise only "steps that are totally or substantially practiced in the mind but clearly require physical activity which have [sic] a tangible result." Appellants' Br. at 9. But as previously discussed, the correct analysis is whether the claim meets the machine-or-transformation test, not whether it recites "physical steps." Even if it is true that Applicant's claim "can only be practiced by a series of physical acts" as they argue, see id. at 9, its clear failure to satisfy the machine-or-transformation test is fatal. Thus, while we agree with

Applicants that the only limit to patent-eligibility imposed by Congress is that the invention fall within one of the four categories enumerated in β 101, we must apply the Supreme Court's test to determine whether a claim to a process is drawn to a statutory "process" within the meaning of β 101. Applied here, Applicants' claim fails that test so it is not drawn to [**55] a "process" under β 101 as that term has been interpreted.

On the other hand, while we agree with the PTO that the machine-or-transformation test is the correct test to apply in determining whether a process claim is patent-eligible under β 101, we do not agree, as discussed earlier, that this amounts to a "technological arts" test. See Appellee's Br. at 24-28. Neither the PTO nor the courts may pay short shrift to the machine-or-transformation test by using purported equivalents or shortcuts such as a "technological arts" requirement. Rather, the machine-or-transformation test is the only applicable test and must be applied, in light of the guidance provided by the Supreme Court and this court, when evaluating the patent-eligibility of process claims. When we do so here, however, we must conclude, as the PTO did, that Applicants' claim fails the test.

Applicants' claim is similar to the claims we held unpatentable under β 101 in *Comiskey*. There, the applicant claimed a process for mandatory arbitration of disputes regarding unilateral documents and bilateral "contractual" documents in which arbitration was required by the language of the document, a dispute regarding the document was [**56] arbitrated, and a binding decision resulted from the arbitration. *Comiskey*, 499 F.3d at 1368-69. We held the broadest process claims unpatentable under β 101 because "these claims do not require a machine, and these claims evidently do not describe a process of manufacture [**965] or a process for the alteration of a composition of matter." *Id.* at 1379. We concluded that the claims were instead drawn to the "mental process" of arbitrating disputes, and that claims to such an "application of [only] human intelligence to the solution of practical problems" is no more than a claim to a fundamental principle. *Id.* at 1377-79 (quoting *Benson*, 409 U.S. at 67 ("[M]ental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.")).

Just as the *Comiskey* claims as a whole were directed to the mental process of arbitrating a dispute to decide its resolution, the claimed process here as a whole is directed to the mental and mathematical process of identifying transactions that would hedge risk. The fact that the claim requires the identified transactions actually to be made does no more to alter the character of the claim as a whole [**57] than the fact that the claims in *Comiskey* required a decision to actually be rendered in the arbitration--i.e., in neither case do the claims require the use of any particular machine or achieve any eligible transformation.

We have in fact consistently rejected claims like those in the present appeal and in *Comiskey*. For example, in *Meyer*, the applicant sought to patent a method of diagnosing the location of a malfunction in an unspecified multi-component system that assigned a numerical value, a "factor," to each component and updated that value based on diagnostic tests of each component. 688 F.2d at 792-93. The locations of any malfunctions could thus be deduced from reviewing these "factors." The diagnostic tests were not identified, and the "factors" were not tied to any particular measurement; indeed they could be arbitrary. *Id.* at 790. We held that the claim was effectively drawn only to "a mathematical algorithm representing a mental process," and we affirmed the PTO's rejection on β 101 grounds. *Id.* at 796. No machine was recited in the claim, and the only potential "transformation" was of the disembodied "factors" from one number to another. Thus, the claim effectively sought [**58] to pre-empt the fundamental mental process of diagnosing the location of a malfunc-

tion in a system by noticing that the condition of a particular component had changed. And as discussed earlier, a similar claim was rejected in *Grams*.⁷ See 888 F.2d at 839-40 (rejecting claim to process of diagnosing "abnormal condition" in person by identifying and noticing discrepancies in results of unspecified clinical tests of different parts of body).

Similarly to the situations in *Meyer* and *Grams*, Applicants here seek to claim a non-transformative process that encompasses a purely [**59] mental process of performing requisite mathematical calculations without the aid of a computer or any other device, mentally identifying those transactions that the calculations have revealed would hedge each other's risks, and performing the post-solution step of consummating those transactions. Therefore, claim 1 would effectively pre-empt any application of the fundamental concept of hedging and mathematical calculations inherent [*966] in hedging (not even limited to any particular mathematical formula). And while Applicants argue that the scope of this pre-emption is limited to hedging as applied in the area of consumable commodities, the Supreme Court's reasoning has made clear that effective pre-emption of all applications of hedging even just within the area of consumable commodities is impermissible. See *Diehr*, 450 U.S. at 191-92 (holding that field-of-use limitations are insufficient to impart patent-eligibility to otherwise unpatentable claims drawn to fundamental principles). Moreover, while the claimed process contains physical steps (initiating, identifying), it does not involve transforming an article into a different state or thing. Therefore, Applicants' claim is not drawn [**60] to patent-eligible subject matter under β 101.

CONCLUSION

Because the applicable test to determine whether a claim is drawn to a patent-eligible process under β 101 is the machine-or-transformation test set forth by the Supreme Court and clarified herein, and Applicants' claim here plainly fails that test, the decision of the Board is

AFFIRMED.

⁷ We note that several Justices of the Supreme Court, in a dissent to a dismissal of a writ of certiorari, expressed their view that a similar claim in *Laboratory Corp. of America Holdings v. Metabolute Laboratories, Inc.* was drawn to unpatentable subject matter. 548 U.S. 124, 126 S. Ct. 2921, 2927-28, 165 L. Ed. 2d 399 (2006) (Breyer, J., dissenting; joined by Stevens, J., and Souter, J.). There, the claimed process only comprised the steps of: (1) "assaying a body fluid for an elevated level of total homocysteine," and (2) "correlating an elevated level of total homocysteine in said body fluid with a deficiency of cobalamin or folate." *Id.* at 2924.