AT & T CORP. V. EXCEL COMMUNICATIONS, INC.

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Section 101 of the Patent Act states that "whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter" may seek patent protection. In recent years, the Federal Circuit, apparently believing that "any" means *any*, has been broadening the scope of statutory subject matter and rejecting various judicially created exceptions to the categories of statutory subject matter. This year, in *AT & T Corp. v. Excel Communications, Inc.*,[1] the Federal Circuit took another step toward allowing literally any process to be patentable. This Note will explore the consequences of this trend, in particular whether there is a limit on "any" and what can be done in the absence of meaningful Section 101 limitations to preserve the quality of patents.

I. BACKGROUND

Section 101 of the Patent Act, which establishes the scope of patentable subject matter,[2] has traditionally been read very broadly. The Supreme Court has noted that "Congress intended statutory subject matter to include 'anything under the sun that is made by man.' "[3] However, the Supreme Court has carved out a small number of unpatentable categories of subject matter: laws of nature, natural phenomena, and abstract ideas.[4]

With the rise of the digital computer, courts have repeatedly confronted claims involving mathematical algorithms, usually defined as "procedure[s] for solving a given type of mathematical problem"[5] While a mathematical algorithm standing alone is an abstract idea, it can be incorporated into a process that achieves a useful result, which Section 101 suggests ought to be patentable. Thus, the courts have been struggling for years to resolve the tension between abstract ideas and useful results.

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1. 50 U.S.P.Q. 2d 1447, 1448 (1999), *cert. denied*, 68 U.S.L.W. 3249 (U.S. Oct. 12, 1999) (No. 99-95).

2. 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.

3. *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980), quoting S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952); H.R. Rep. No. 1923, 82d Cong., 2d Sess., 6 (1952).

4. *See* Diamond v. Diehr, 450 U.S. 175, 185 (1981).

5. Gottschalk v. Benson, 409 U.S. 63, 65 (1972).

A. Early cases: Strict limitations and physical elements

The Supreme Court first addressed the patentability of mathematical algorithms in *Gottschalk v. Benson*,[6] where two inventors sought patent protection for a method of converting decimal (base ten) numbers into the binary numbers used by digital computers.[7] The Supreme Court invalidated the claims, but muddied the waters by stating several possible rationales.[8] First, the Court suggested that the method was unpatentable because "[t]he conversion . . . can be done mentally"[9] and mental processes are unpatentable because they are among "the basic tools of scientific and technological work."[10] The Court then proposed that "[t]ransformation 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."[11] The Court also reasoned that because the claimed algorithm had no application outside of digital computers, "the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself."[12]

The Court of Customs and Patent Appeals ("C.C.P.A.") seized on this last rationale in *In re Freeman*,[13] where it announced a two-step analysis for claims involving mathematical algorithms. First, the court must decide "whether the claim directly or indirectly recites an 'algorithm.' "[14] Next, a claim reciting an algorithm "must be further analyzed to ascertain whether in its entirety it wholly preempts that algorithm.[15] The C.C.P.A. limited *Benson* to mathematical algorithms, reasoning that the alternative was "the

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6. 409 U.S. 63 (1972).

7. The method involved first converting the decimal numbers into "binary coded decimal numbers," a technique that was well-known in the art. The invention lay in the algorithm for converting the binary-coded numbers to binary. The problem and the solution of Benson and Tabbot are described in DONALD CHISUM, CHISUM ON PATENTS, §1.03[6][C].

8. *See id.* Chisum analyzes this decision extensively, pointing out the flaws in some of the Court's rationales.

9. 409 U.S. at 67.

10. *Id.* The Court relied on *LeRoy v. Tatham*, 55 U.S. (14 How.) 156 (1852).

11. *Id.* at 70. The Court relied on its earlier definition of a process as "a mode of treatment of certain materials to produce a given result" and "an act, or series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing." *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1877).

12. 409 U.S. at 72.

13. 573 F.2d 1237 (C.C.P.A. 1978).

14. *Id.* {need page cite}

15. *Id.*

absurd view that the Court was reading the word 'process' out of the statute."[16]

When the Supreme Court again confronted the issue in *Parker v. Flook,*[17] it rejected preemption as the sole criterion of unpatentability. Flook claimed a method for updating alarm limits used to control certain kinds of chemical reactions; the method included steps of measuring the values of variables such as temperature, using a presumably new algorithm to calculate a value for the alarm limit based on the measurements, and updating the limit to the calculated value.[18] The Court acknowledged that the claims did not pre-empt the algorithm but nevertheless invalidated them.[19] The Court rejected "[t]he notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process" because "[a] competent draftsman could attach some form of post-solution activity to almost any mathematical formula."[20] The Court instead analyzed the claim as if the algorithm were "a familiar part of the prior art"[21] and determined that "the application, considered as a whole, contains no patentable invention."[22]

In *In re Walter*, [23] the C.C.P.A. reformulated the second part of the *Freeman* test in response to *Flook*, holding that claims should be allowed under Section 101 "[i]f it appears that the mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claim (in apparatus claims) or to refine and limit claim steps (in process claims)."[24] Claims should not be allowed if "the mathematical algorithm is merely presented and solved by the claimed invention, as was the case in *Benson* and *Flook*, and is not applied in any manner to physical elements or process steps," regardless of post-solution activity or the presence of "a preamble merely reciting a field of use of the mathematical algorithm."[25]

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16. *Id*. {need page cite}
17. 437 U.S. 584 (1978).
18. *See id.* at 585.
19. *See id.* at 589-90.
20. *Id.* at 590.
21. *See Id.* at 591-92.
22. *Id.* at 594.
23. 618 F.2d 758 (C.C.P.A. 1980).
24. *Id.* at {page cite}.
25. *Id.* {page cite needed}.

B. Physical transformation requirements

In 1981, the Supreme Court attempted to clarify its approach to mathematical algorithm claims. In *Diamond v. Diehr*,[26] the Court interpreted *Benson* and *Flook* as "stand[ing] for no more than [the] long established principles" that exclude patent protection for laws of nature, physical phenomena, and abstract ideas.[27] The Court explained that it had rejected the claims in those earlier cases because the applicants had attempted to patent formulas in the abstract. [28] The Court then upheld Diehr's claims to a process for curing rubber articles because the claims "involve the transformation of an article, in this case raw uncured synthetic rubber, into a different state or thing" and "[i]ndustrial processes such as this are the type which have historically been eligible to receive the protection of our patent laws."[29] In so holding, the Court emphasized that Diehr had claimed the entire process, not merely a formula for calculating curing time, and that the process included other steps, such as constantly monitoring the temperature and automatically opening the mold.[30] However, the Court reiterated that merely "attempting to limit the use of [a] formula to a particular technological environment" and including "insignificant post-solution activity" are insufficient to overcome the rule against patenting abstract formulas.[31]

The C.C.P.A. and its successor, the Court of Appeals for the Federal Circuit, relied on the transformation language of *Diehr* for the next few years. Thus, in *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*,[32] the Federal Circuit upheld method and apparatus claims directed to producing "a measure in microvolts of a specific heart activity" from an electrocardiograph signal on the grounds that the measurement was a transformation of the signal.[33] On a similar rationale, in *In re Schrader*,[34] the Federal Circuit rejected a claim to a process for conducting an auction

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26. 450 U.S. 175 (1981).
27. *Id.* at 185.
28. *Id*. at 186-87.
29. *Id.* at 184. Diehr claimed a method for curing molded rubber articles that included steps of constantly monitoring the temperature of the mold and using a well-known equation to calculate a new curing time based on the measurement, then opening the mold automatically when the elapsed time equals the calculated time. *See id.* at 178-79.
30. *See id.* at 187.
31. *Id.* at 192. According to the Court, these factors distinguished *Benson* and *Flook* from *Diehr*.
32. 958 F.2d 1053 (Fed. Cir. 1992).
33. *Id*.
34. 22 F.3d 290 (Fed. Cir. 1994).

that involved "only information exchange and data processing" rather than "a process of transforming or reducing an article to a different state or thing."[35] The court held that the data-gathering step was "insufficient to impart patentability to a claim involving the solving of a mathematical algorithm"[36] and reiterated that in cases where it had upheld algorithm patents, the claims "involved the transformation or conversion of subject matter representative of or constituting physical activity or objects."[37]

C. Recent developments: relaxing the standards

In 1994, in *In re Alappat*,[38] the Federal Circuit began to step away from transformation requirements or other specific tests. The court noted that in *Benson*, *Flook*, and *Diehr*, the Supreme Court had not designated mathematical algorithms as a distinct category of unpatentable subject matter.[39] Instead, the Supreme Court had simply tried to explain that mathematical subject matter may be an abstract idea "until reduced to some type of practical application;" such subject matter is not, in and of itself, entitled to patent protection."[40] Thus, the "proper inquiry" regarding mathematical subject matter is "whether the claimed subject matter as a whole is a disembodied mathematical concept, … which in essence represents nothing more than a 'law of nature,' 'natural phenomenon,' or 'abstract idea."[41] If it is, then the subject matter is unpatentable.[42]

In 1998, in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*,[43] the Federal Circuit abandoned the mathematical algorithm exception, at least as applied to apparatus claims. Citing *Alappat*, the court held that "[u]npatentable mathematical algorithms are identifiable by showing they are merely abstract ideas … . From a practical standpoint, this means that to be patentable, an algorithm must be applied in a 'useful' way."[44] Thus, an application of an algorithm is patentable if it produces a "useful, concrete, and tangible result."[45] The court then held that a data

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35. *Id*. at 292. The process involved collecting bids for various items being sold at auction and computing a "completion" that would result in each item's being sold once (and only once) while maximizing the total price of all items. *See id.*
36. *Id.* at 293.
37. *Id.* at 294.
38. 33 F.3d 1526 (Fed. Cir. 1994).
39. *See id.* at 1543.
40. *Id*.
41. *Id.* at 1544.
42. *Id*.
43. 149 F.3d 1368 (Fed. Cir. 1998).
44. *Id*. at 1373.
45. *Id.*

processing system for managing investment accounts produced such a result: "a final share price momentarily fixed for recording and reporting purposes."[46] The court rejected the *Freeman-Walker-Abele* test's requirement of physical limitations as having "little, if any applicability to determining the presence of statutory subject matter" in light of *Diehr* and *Chakrabarty*.[47]

II. CASE HISTORY

A. The technology

1. Telephone service and billing: a crash course

Telephone subscribers sign up with a local exchange carrier ("LEC"), such as Pacific Bell.[48] The LEC provides a network for local telephone calls and access to the networks of long-distance, or interexchange, carriers ("IXCs"), or Sprint, which route calls between local service areas.[49] "Facilities-based" IXCs, such as AT & T, "own, operate, lease, or otherwise control" the networks they use to route calls, while "resellers," such as Excel Communications, provide billing and other services to customers but do not own or control network equipment.[50]

A telephone subscriber may place any long-distance call using any IXC.[51] However, each subscriber chooses one long-distance service provider as her primary interexchange carrier ("PIC"), and whenever the subscriber dials long distance using 1+ the number, the LEC routes the call to the network of her PIC.[52]

Whenever a subscriber places a long-distance telephone call, a switch within the telephone network, usually belonging to the IXC carrying the call, generates a message record that includes the telephone numbers of the caller and the recipient, as well as the duration of the call.[53] The switch then transmits this message record to an accumulation system.[54]

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46. *Id.*
47. *Id.* at 1374.
48. *See* 50 U.S.P.Q. 2d at 1448 (1999).
49. *See* U.S. Pat. No. 5,333,184, at col. 1, lines 41-45. LECs are required to provide access to all IXCs. *See* AT & T v. Excel Communications, Inc., No. CIV.A. 96-434-SLR, 1998 WL 175878, at *1 (D. Del. March 27, 1998), *rev'd*, 50 U.S.P.Q. 2d 1447 (1999), *cert. denied*, 68 U.S.L.W. 3249 (U.S. Oct 12, 1999) (No. 99-95).
50. *See* AT & T v. Excel Communications, 1998 WL 175878, n. 1.
51. As we all know from the incessant "10-10-" number promotions.
52. *See* U.S. Pat. No. 5,333,184, at col. 1, lines 35-39.
53. *See id.* at col. 1, lines 12-16.
54. *See id.* at col. 1, lines 14-18.

The accumulation system, in turn, periodically distributes the records it has received to a processing system, which converts each record into exchange message interface ("EMI") format.[55] The processing system forwards each EMI message record to a rating system, which computes the charges for the call and adds that information to the message record.[56] Telephone service providers subsequently retrieve EMI message records and use them to generate customers' bills.[57]

2. The '184 Patent

U.S. Patent No. 5,333,184 ("the '184 patent"), held by AT & T, teaches a method for enhancing an EMI message record by adding a new field called a "PIC indicator."[58] The '184 patent discloses several possible formulas for determining the value to be stored in the PIC indicator, all of which depend on the caller's and the recipient's PICs. In a particularly simple form, the PIC indicator may be a numerical code that identifies the recipient's PIC.[59] Alternatively, the PIC indicator may have a Boolean (true or false) value indicating whether the recipient's PIC is or is not the IXC that carried the call;[60] accordingly, for calls carried by AT & T, the PIC indicator would be set to "true" if the recipient is an AT & T subscriber and to "false" otherwise. In a third implementation, the PIC indicator is a Boolean value indicating whether both the caller and recipient have as their PIC the IXC that carried the call;[61] in this implementation, the PIC indicator for calls carried by AT & T would be set to "true" only if both caller and recipient were AT & T subscribers.

Regardless of the method used to calculate it, the PIC indicator is added to the EMI message record for each call.[62] The rating system can then use PIC information when it computes the charges for the call.[63] Thus, AT & T could offer its subscribers a discount on calls to other AT & T subscribers.[64]

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55. *See id.* at col. 1, lines 18-22. EMI is an industry-wide standard format. *See id.*
56. *See id.* at col. 1, lines 22-26.
57. *See id*. at col. 1, lines 26-29.
58. *See id*., Abstract.
59. *See id.* at col. 4, lines 14-16.
60. *See id.* at col. 4, lines 16-19 and claim 1.
61. *See id.* at col. 4, lines 19-22 and claim 2.
62. *See id.* at col. 4, lines 40-43.
63. *See id.* at col. 4, lines 44-46 and claim 6.
64. Differential billing based on the recipient is not new. A number of years ago, MCI offered a "Friends and Family" plan under which MCI subscribers received discounts on calls to members of their "calling circle," which was a selected group of other MCI subscribers. However, the billing operation relied on the phone numbers of the re-

B. The district court decision

AT & T sued Excel Communications, Excel Communications Marketing, and Excel Telecommunications (collectively "Excel") for infringement of ten of the method claims of the '184 patent.[65] Excel moved for summary judgment on the grounds that the '184 patent did not meet the statutory requirements for patentable subject matter under 35 U.S.C. § 101.

The U. S. District Court for the District of Delaware granted Excel's motion.[66] The district court first determined that "the claims at issue implicitly recite a mathematical algorithm,"[67] following the *In re Schrader* definition of an algorithm as " 'a conditional sequence of steps or operations for solving a class of problems,' " which "need not involve numbers."[68] To determine patentability, the court then asked "whether the process claimed 'is performing a function which the patent laws were designed to protect.' "[69] The court observed that in the claimed invention, "information that is already known within a telecommunications system . . . is simply retrieved for an allegedly new use"[70] and that in the generation of the PIC indicator, the substantive data remained the same despite being changed from an analog to a digital format.[71] Holding that a mere

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cipients, not merely on whether they were MCI subscribers, and it presumably would not infringe the '184 patent. {I need to find some sort of documentation of the terms of this plan… any ideas?}

65. Claim 1, which is representative of the asserted claims, reads:

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

{*Note*: Neither of the court opinions describe the allegedly infringing conduct. I'm guessing that Excel was, at least allegedly, operating either an EMI formatter or a rating system that put in a PIC indicator. Should I get the complaint and find out? If so, how do I get my hands on the complaint?}

66. AT & T Corp. v. Excel Communications, Inc., 1998 WL 175878 (D. Del. March 27, 1998).
67. *Id.* at *6.
68. *Id.*, quoting In re Schrader, 22 F.2d 290, 293 n. 5 (Fed. Cir. 1994).
69. *Id.*, quoting Diamond v. Diehr, 450 U.S. 175, 192 (1981).
70. *Id.* at *6.
71. *Id.*

change in the data's format did not suffice to establish patentable subject matter, the court ruled that the asserted claims were unpatentable under Section 101.[72] AT & T appealed to the Federal Circuit. While this appeal was pending, the Federal Circuit issued its decision in *State Street Bank*.[73]

C. The Federal Circuit's decision

The Federal Circuit upheld the method claims of the '184 patent against the Section 101 challenge, rejecting the mathematical algorithm exception. It justified its step away from prior doctrine as a step forward that would allow the law to "adapt to new and innovative concepts, while remaining true to basic principles."[74]

1. No distinction between method and apparatus claims

Because Excel did not own or control the telecommunications equipment over which its subscribers placed calls,[75] AT & T alleged infringement only of method claims of the '184 patent. The Federal Circuit refused to distinguish this case from *In re Alappat* or *State Street Bank* on this basis, holding instead that "we consider the scope of Section 101 to be the same regardless of the form — machine or process — in which a particular claim is drafted."[76]

2. The Rule: Useful, Concrete and Tangible Result

The Federal Circuit then reviewed and endorsed the mathematical algorithm analysis of *State Street Bank*. It noted that the very term *algorithm* is ambiguous since "[a]ny step-by-step process, be it electronic, chemical, or mechanical, involves an 'algorithm' in the broad sense of the term."[77] Because processes are expressly included in Section 101, it follows that any proscription against patenting algorithms must be "narrowly limited to mathematical algorithms in the abstract."[78]

Thus, as in *State Street Bank*, the court held that the proper test was whether the algorithm is applied to achieve a useful, concrete, and tangible

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72. *Id*. at *6–7.

73. See 50 U.S.P.Q. 2d at 1452 for the Federal Circuit's comment on the timing. *State Street Bank* is discussed above.

74. *Id.* at 1450.

75. In the parlance of the telecommunications world, Excel is known as a "resale carrier," meaning that it provides billing and customer service and pays owners of telecommunication facilities to carry its calls using their equipment. See *AT & T v. Excel Communications*, 1998 WL 175878 at n. 1.

76. *Id.* at 1451.

77. 50 U.S.P.Q. 2d at 1450.

78. 50 U.S.P.Q. 2d 1447, 1450.

result without precluding other applications.[79] Applying this test, the court concluded that AT & T's claimed process was a useful application of Boolean algebra that did not attempt to preclude other applications of the Boolean principle and that the process therefore "comfortably falls within the scope of Section 101."[80]

3. The Federal Circuit did not require any physical limitations

Earlier cases had treated the presence of a physical element as crucial. Under *Freeman* and *Walter*, method claims reciting a mathematical algorithm were allowed only if the algorithm was implemented to "refine and limit claim steps."[81] Merely transforming numbers was not enough.[82] When the courts did uphold an algorithm claim upheld, they did so because the claim involved a physical transformation.[83]

In *Excel*, the Federal Circuit rejected this approach. It stated that a physical transformation was "not an invariable requirement, but merely one example" of how an algorithm can be applied to achieve a useful, concrete, and tangible result.[84] The court then went further, rejecting Excel's argument that because the patent disclosure did not set forth physical limitations, its method claims were unpatentable.[85] The court ruled that when method claims are at issue, "a structural inquiry is unnecessary."[86] The court reiterated its view that the *Freeman-Walter-Abele* test, which required a physical step, " 'has little, if any, applicability to determining the presence of statutory subject matter' " in light of recent decisions.[87] The court then proceeded to dismiss as "unhelpful" its own earlier decisions in *In re Grams*[88] and *Schrader*, where it had rejected method claims directed to algorithms for lack of sufficient physical steps.[89]

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79. *Id.* at 1450–51. In support of this test, the Federal Circuit discussed three cases: *Diamond v. Diehr*, 450 U.S. 175 (1981) (use of algorithm in a useful process that does not pre-empt other uses is patentable); *State Street Bank*, 149 F.3d 1368 (1998). (algorithm is patentable if it is applied to produce a "useful, concrete, and tangible result."); and *In re Alappat*, 33 F.3d 1526 (1994) (inquiry must focus on whether the claim is to an abstract idea or to a reduction of a mathematical concept to a practical application).

80. *Id.* at 1452.

81. cite to *Walter*.

82. *See, e.g.*, Schrader.

83. *See, e.g.*, Diehr, Arrhythmia.

84. 50 U.S.P.Q.2d at 1452.

85. *Id.* at 1452.

86. *Id.*

87. *Id.* at 1453, quoting *State Street Bank*, 149 F.3d at 1374.

88. 888 F.2d 835 (Fed. Cir. 1989).

89. *See* 50 U.S.P.Q.2d at 1453. *Schrader* is discussed in § I.

4. Policy Points

Judge Plager, writing for the Federal Circuit, began with a policy justification for abandoning the older cases, describing how the court, like its predecessor "has struggled to make our understanding of the scope of Section 101 responsive to the needs of the modern world."[90] The court observed that the rise of computer technology required the law to "adapt to new and innovative concepts, while remaining true to basic principles."[91] Thus, the PTO guidelines of 1968, which "essentially reject[ed] the notion that computer programs were patentable" had yielded to "more expansive principles formulated with computer technology in mind."[92] Apparently, the Federal Circuit regards this case as the next logical step.

Plager ended by asserting, with little elaboration, that the "useful, concrete and tangible result" test resolved two concerns raised by Justice Stevens in his dissent in *Diehr*, namely the lack of clear rules for determining which computer-related inventions contain statutory subject matter and the fact that almost any process could be described as an algorithm and therefore declared unpatentable subject matter under the algorithm exception.[93] According to Judge Plager, the lack of clear rules "should be less of a concern today" in view of the refocused Section 101 analysis.[94] Furthermore, under the new test, any ambiguity in the term "algorithm" is insignificant because the presence of an algorithm is no longer the focus of the inquiry.[95]

III. DISCUSSION[96]

A. The Federal Circuit has effectively overruled the Supreme Court

The Federal Circuit's decision in *Excel* stands in direct contradiction to the Supreme Court's ruling in *Flook*. As interpreted by the *Diehr* Court,

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90. 50 U.S.P.Q.2d at 1450.

91. *Id.*

92. *Id.*

93. *See* Diehr, 450 U.S. at 219. In light of these concerns, Justice Stevens advocated "an unequivocal holding that no program-related invention is a patentable process" unless it contributes something other than use of a computer to the art and "an unequivocal explanation that the term 'algorithm' … is synonymous with the term 'computer program.' " *Id*.

94. 50 U.S.P.Q. 2d at 1454.

95. *Id*.

96. **WARNING** to readers of this draft: This section is undergoing extensive renovation for the purpose of refocusing on what *Excel* adds to *State Street*. From this point forward, the style gets awful and the footnotes get even worse. Please pardon the dust.

Flook's claims were held invalid because he attempted to patent a mathematical algorithm in the abstract. Although Flook had limited his claims to a certain class of chemical reactions involving hydrocarbons, "[a] mathematical formula does not suddenly become patentable subject matter" simply because "the applicant acquiesce[s] to limiting the reach of the patent . . . to a particular technological use."[97] Furthermore, the step of updating the alarm limits was ruled insufficient for patentability because "token postsolution activity" does not render a claim to a mathematical formula patentable.[98]

Measured by these criteria, the claims of the '184 patent should be equally unpatentable. Claim 1, for instance, recites a mathematical algorithm (specifically, Boolean algebra) when it states that the PIC indicator's value "is a function of whether or not the interexchange carrier associated with said terminating subscriber is a predetermined one of said interexchange carriers."[99] The preamble limits the claim to a particular technological use, namely "a telecommunication system" in which subscribers have access to "a plurality of interexchange carriers."[100] The claim recites two method steps: "generating a message record" and "including, in said message record, a [PIC] indicator."[101] Thus, this claim includes only presolution activity of the kind standard in the art, the algorithm itself, and a post-solution step of storing the result in the message record. It is impossible to find a basis for distinguishing the '184 patent's claims from Flook's, and the Federal Circuit did not even try. Instead, it stated only that "In *Diehr*, the [Supreme] Court expressly limited its earlier decision[] in *Flook*."[102] But, as noted above, *Diehr* reiterates that trivial postsolution activity and a preamble limiting the claim to a particular technical field do not render a claim to an abstract algorithm patentable. The *Flook* analysis would not apply to the '184 patent only if AT & T was not claiming an algorithm in the abstract. But if there is a difference, it is that AT & T's claim is more abstract. Flook at least provided the specific formula for calculating the new limit.[103]

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97. Diehr, 450 U.S. at 191, n.14.

98. *Id.*

99. U.S. Pat. No. 5,333,184, claim 1. Although the claim does not recite a step of calculating this value, the District Court held (and apparently AT & T did not contest on appeal) that an algorithm for determining the value was implied. *See* AT & T v. Excel Communications, 1998 WL 175878 at *6.

100. U.S. Pat. No. 5,333,184, claim 1.

101. *Id.*

102. 50 U.S.P.Q. 2d at 1450.

103. *See* Flook, 437 U.S. at 596-97. I will include the equation in a footnote when I find a readable version of it.

In light of *Excel*, there may be no case in which the Federal Circuit would apply *Flook* to hold an algorithm unpatentable. Nor is the Supreme Court likely to intercede; it denied Excel's petition for certiorari.[104]

B. What is not a "useful, concrete, and tangible" result?

It appears that the Supreme Court has abandoned the effort to curtail patents on algorithms.[105] Seekers of patents, seekers of invalidity judgments, and those who must judge their respective claims must therefore learn to live in the world of algorithm patents the Federal Circuit has created. To live in that world, the players must know the rules.

1. What is useful, concrete, and tangible

The Federal Circuit continues to broaden the definition of "useful, concrete, and tangible result" as it allows an increasing array of algorithm claims. In *Arrhythmia*, a machine that transformed electrocardiograph signals into a measurement of the condition of a patient's heart constituted a practical application of an algorithm.[106] In *Alappat*, the court held that a machine that transformed data to produce a smooth waveform display on a monitor constituted patentable subject matter. That same year, in *Schrader*, the court rejected claims to a process that transformed a set of bids into a set of sale prices, suggesting that "useful" might imply that the transformation must be substantive, if not physical. But four years later, in *State Street Bank*, the court held that a machine that transformed data representing dollar values into "a final share price momentarily fixed" constituted a practical application.[107] Now, in *Excel*, the court has held that a process of transforming a message record without a PIC indicator into a message record with a PIC indicator constitutes a practical application of an algorithm to achieve a useful, concrete, and tangible result. These cases suggest that "useful, concrete, and tangible" may mean merely that the inventor has identified some purpose for performing a calculation. If so, then algorithm claims qualify under Section 101 unless the algorithm simply did not work or the claimed use was contrary to public policy.[108]

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104. *See* AT & T v. Excel Communications, Inc., 68 U.S.L.W. 3249 (Oct. 12, 1999).

105. {It might be worth tossing some of policy reasons behind these efforts into the background section, space permitting. It also might be worth noting that at least someone on the Supreme Court wants to return to the fray; Justice Stevens added a comment to the Court's denial of cert that in view of the important issues at stake, he thought it worth emphasizing that a denial of cert is not a decision on the merits.}

106. According to the Federal Circuit's interpretation of *Arrhythmia* in *State Street Bank*. *See* 149 F.3d at 1373.

107. State Street Bank, 149 F.3d at 1373.

108. There is stuff on this in the MPEP, which I need to check.

2. Can you patent a thought process?

The decision in *Excel* pushes the Federal Circuit closer to destroying a crucial policy-based limitation on patentable subject matter. While a patent monopoly may prevent others from making, using, or selling a patentee's invention, it may not prevent others from using their minds; to prohibit thought would inhibit, rather than promote, progress in the useful arts.[109] This rationale underlies the rejection of claims to laws of nature and abstract ideas, which are the basic tools of technological progress.[110] As the Federal Circuit raises the threshold for unpatentable abstract ideas, it comes closer to patenting thought.

To see the danger, consider the following (admittedly implausible) hypothetical. Suppose that Excessive Telecom[111] decides to engage in a differential-billing plan. Cursed with poor business judgment, Excessive opts to hire 20,000 people to examine its EMI message records, look for each recipient's phone number in a directory of Excessive subscribers, and add a Boolean indicator to the message record with a value of "true" if the recipient is an Excessive subscriber and "false" otherwise. The Excessive employees are doing exactly what AT & T is entitled to prohibit under the literal language of the '184 patent.[112] Yet to find infringement on these facts would be to prevent the 20,000 employees from thinking certain thoughts in a certain order.[113] This suggests that "any" in Section 101 cannot literally mean *any*; the Federal Circuit must stop expanding its definitions somewhere, although it is impossible to say exactly where that point will be. Perhaps the court will simply read "when performed by a machine" into method claims such as AT & T's.

C. A last line of defense

Of course, Section 101 does not end the inquiry into patentability. Claimed inventions must also satisfy the statutory requirements of novelty[114] and non-obviousness.[115] Thus, the collapse of Section 101 does not necessarily unleash a torrent of bad software patents. For instance, Excel could challenge the '184 patent's validity on obviousness grounds. Long

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109. {I will dig up a reference for this point; there must be tons of them.}

110. *See, e.g.*, Gottschalk v. Benson. {and numerous others}

111. Any resemblance to a real company is purely coincidental.

112. Assuming that AT & T would bother asserting its rights, given that Excessive will likely go broke on its own.

113. {On second thought, my old law-school schedule hypo makes the point more clearly; maybe I'll go back.}

114. 35 U.S.C. § 102.

115. 35 U.S.C. § 103.

distance providers offered discounts on subscribers' calls to other subscribers long before AT & T filed its application,[116] suggesting the desirability of knowing whether a call recipient has the "right" PIC. Data structures that permit the addition of new data fields have been standard in the software industry for years.[117] Under the usual standard of obviousness,[118] AT & T's claim seems a sure loser.

As the subject-matter requirement fades to insignificance, pressure on the PTO to properly identify algorithm claims that are obvious or not novel will increase. Unfortunately, most algorithm patents involve computer software, and the PTO's track record for rejecting software-related claims is poor.[119] The reasons include a long history of software development preceding the availability of patents and the free software movement, both of which take substantial amounts of prior art out of the scope of a patent examiner's usual search. Often, litigants or other interested parties[120] are able to produce prior art that was never cited during patent prosecution and that clearly invalidated an issued patent. Unless the situation in the PTO improves, wider allowance of algorithm patents will only lead to more litigation focused on novelty and non-obviousness.

Some improvement may be on the horizon in the form of a bill to reform the PTO,[121] which includes at least two highly relevant provisions.

First, the PTO, while remaining subject to the policy direction of the Secretary of Commerce, would become operationally independent.[122] Most significantly in the present context, this would limit Congress's ability to raid PTO revenues.[123] For some years, the PTO has been taking in more money in fees than Congress has allocated to its expenses; the surplus PTO fees have been diverted to other federal programs.[124] If the PTO

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116. Again, consider MCI's "Friends and Family" promotion. {I know it was around before 1991; AT & T didn't file until 1992, but I still need documentation.}

117. Is this too well-known to require a footnote?

118. The usual standard is "obvious that it would work." *See, e.g.*, Vaeck {cite}.

119. *See* Robert Merges, *As Many as Six Impossible Patents Before Breakfast*, 14 BERKELEY TECH. L.J. 577 (1999). I'd like to concretize this point by going to some of the sources he cites to get hard data.

120. Merges again. As I recall, Greg Aharonian makes a decent living doing just this, but I need to pay a visit to his website before I go citing him.

121. H.R. 1907, "American Inventors Protection Act of 1999" (106th Congress). As of this writing, the bill, having passed the House on a lopsided vote in August, is now in committee in the Senate.

122. H.R. 1907, Title VI, § 611.

123. As I recall, that was supposed to be the deal. The statute as worded is pretty vague, so I probably need to dig into legislative history or something to verify this point.

124. Merges. He backs it up with the PTO's annual report.

retains the use of all its revenues, it can spend more money to hire, train, and retain examiners. It may also be able to expand the scope of its prior art searches. Such steps will enhance examiners' ability to reject bad patents at the outset.

Second, the PTO would be required to publish patent applications 18 months after filing,[125] which would allow the public to intervene before a patent is granted. Existing PTO procedures allow third parties to file protests against pending applications.[126] A protest may call the examiner's attention to prior art that falls outside the scope of PTO searches, thereby preventing the PTO from issuing invalid patents. However, because a protest must be directed against a specific application and because applications are currently held in confidence until the patent issues, interested third parties typically cannot file a timely protest. By informing the public of pending applications, publication could help the PTO expand its prior art searches. Of course, relying on the public will likely result in somewhat uneven searches, but third parties will bear the costs of extensive searches, which they will measure against how important preventing the patent from issuing is to them.

IV. CONCLUSION

AT & T v. Excel Communications renders Section 101 even less useful in challenging the validity of algorithm-related patents. Given that the Federal Circuit appears to regard any useful algorithm as patentable subject matter, validity disputes will increasingly turn on issues of novelty and non-obviousness. Unfortunately, the PTO is ill-prepared to properly analyze software patents, the dominant source of algorithm claims, for novelty and non-obviousness. Absent significant improvement in the PTO's performance, we can expect more bad software patents to issue and more litigation to ensue, challenging software patents on Section 102 and 103 grounds.

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125. H.R. 1907, Title IV, § 402. The only ways to avoid publication are (1) abandon the application, (2) get a secrecy order, (3) file, with the application, a statement to the effect that you will not file in any foreign country. If you do the last and then file a foreign application, you will be published. (Yeah, I know: don't use "you.") Interesting side note here: how often are important patents not filed anywhere else?

126. Chapter 1900 of the MPEP is dedicated to this procedure. I can add more cites on it.