

8-2-2018

Concrete Thoughts About Abstract Ideas: Why a Nebulous Exception to Patentability Should Not Swallow Computer Software

Benjamin W. Hattenbach

Rosalyn M. Kautz

Follow this and additional works at: <https://digitalcommons.law.scu.edu/lawreview>



Part of the [Law Commons](#)

Recommended Citation

Benjamin W. Hattenbach and Rosalyn M. Kautz, *Concrete Thoughts About Abstract Ideas: Why a Nebulous Exception to Patentability Should Not Swallow Computer Software*, 58 SANTA CLARA L. REV. 261 (2018).

Available at: <https://digitalcommons.law.scu.edu/lawreview/vol58/iss2/2>

This Article is brought to you for free and open access by the Journals at Santa Clara Law Digital Commons. It has been accepted for inclusion in Santa Clara Law Review by an authorized editor of Santa Clara Law Digital Commons. For more information, please contact sculawlibrarian@gmail.com, pamjadi@scu.edu.

**CONCRETE THOUGHTS ABOUT ABSTRACT IDEAS:
WHY A NEBULOUS EXCEPTION TO PATENTABILITY
SHOULD NOT SWALLOW COMPUTER SOFTWARE**

Benjamin W. Hattenbach* and Rosalyn M. Kautz**

TABLE OF CONTENTS

Introduction.....	262
I. Historical Exceptions To The Patentable Subject Matter	
Doctrine	263
A. Laws Of Nature Are Not Patentable.....	264
B. Mathematical Expressions Of Laws Of Nature Are Not Patentable	265
II. Developing The “Abstract Ideas” Exception.....	267
III. The <i>Alice</i> Decision.....	272
IV. <i>Alice</i> ’s Aftermath.....	274
A. Impact On Software Patents.....	274
B. Confusion And Contradictions.....	278
V. Correcting Course.....	284
A. Reconciling “Abstract Ideas” And “Laws Of Nature”	284
B. Applying The Test.....	287
Conclusion	292

* Benjamin W. Hattenbach is a partner in the Los Angeles office of Irell & Manella LLP, where he serves as a member of the firm's Executive Committee. Mr. Hattenbach's practice focuses on intellectual property litigation and counseling, with particular emphasis on the trial of patent infringement matters.

** Rosalyn M. Kautz is an associate in the Los Angeles office of Cooley LLP, and a former associate of Irell & Manella LLP's litigation and IP litigation practice groups. The opinions expressed are those of the author(s) and do not necessarily reflect the views of the firm, its clients, or any of its or their respective affiliates. This article is for general information purposes and is not intended to be and should not be taken as legal advice.

INTRODUCTION

The United States patent system is supposed to protect “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.”¹ This language, from Section 101 of the Patent Act, was historically interpreted to “include anything under the sun that is made by man.”² Recently, however, lower courts have invalidated software patents relating to everything from organizing digital photographs³ to online restaurant menus.⁴ They have done so on the grounds that the inventions failed to satisfy the requirements of Section 101. Yet photographs, menus, and associated software are all clearly “made by man.” So why aren’t they patentable subject matter?

The reasons are largely grounded in interpretations of the United States Supreme Court’s decision in *Alice*.⁵ The Court used *Alice* as an opportunity to expound on the notion that “abstract ideas” are unpatentable under Section 101.⁶ But regrettably, it did so without providing meaningful guidelines regarding what it takes for an idea to be abstract, and without appreciating the particular difficulties with distinguishing abstract ideas from concrete advances in the realm of software. In response, many lower courts have proceeded to apply much stricter scrutiny to inventions requiring computer implementation, and particularly to inventions embodied within computer programs.

Historical precedent is helpful in understanding where these courts have erred. Longstanding caselaw recognizes that laws of nature, and mathematical expressions thereof, are unpatentable under Section 101.⁷ These exceptions were intended to ensure the key “building blocks” of scientific development remained free for all mankind to use, thus encouraging innovation. But importantly, mathematical expressions were considered unpatentable to the extent they were expressions of a law of nature; they were not considered unpatentable in general, or unpatentable under Section 101 because they constituted abstract ideas. Thus, although computer programs often consist of or contain

1. 35 U.S.C. § 101.

2. *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

3. *See In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016).

4. *See Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229 (Fed. Cir. 2016).

5. *Alice Corp. Pty. v. CLS Bank Int’l*, 134 S. Ct. 2347 (2014).

6. *See id.* at 2354 (2014) (“We have long held that this provision contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable.”) (quoting *Association for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2116 (2013)).

7. *See, e.g., Le Roy v. Tatham*, 55 U.S. 156 (1853), *subsequent proceedings*, *Le Roy v. Tatham*, 63 U.S. 132 (1859); *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 91 (1939).

mathematical formulas, that alone should not be a basis for finding them unpatentable as abstract ideas. Nonetheless, by broadly wielding the “abstract idea” exception to Section 101 to reject computer-implemented inventions, modern courts have expanded Section 101’s exceptions well beyond their original contours. These courts seem to have lost sight of the distinction between mathematical expressions of laws of nature (which are not patentable, to the same extent a law of nature is not patentable) and other mathematical formulas and algorithms that are made by man (such as most computer software programs, which should be just as patentable as other processes made by man).

This article examines the early development of Section 101 jurisprudence, which began with a focus on the “building blocks” of innovation. We then consider how the addition of the “abstract ideas” exception, and in particular the Federal Circuit’s interpretation thereof, has vastly and improperly restricted the scope of patent-eligible subject matter. To restore a balance to Section 101 that will encourage innovation while still protecting the true building blocks of scientific development, we propose that courts should return to the roots of Section 101, rejecting only those patents truly based on laws of nature and mathematical expressions thereof. All other inventions made by man—including computer software—should be allowed as patent-eligible subject matter.

I. HISTORICAL EXCEPTIONS TO THE PATENTABLE SUBJECT MATTER DOCTRINE

The text of Section 101 does not identify any exceptions to patent-eligible subject matter. There are, however, judicially-created exceptions. Although the precise boundaries of these exceptions have been formulated in different ways over the years, *Alice* identified three main categories of exceptions: laws of nature, natural phenomena, and abstract ideas.⁸ In defining these exceptions, *Alice* relied on *Bilski v. Kappos*,⁹ a Supreme Court decision from 2010. *Bilski*, in turn, relied on cases defining exceptions to Section 101 “as a matter of statutory *stare decisis* going back 150 years.”¹⁰ Understanding the historical logic behind these exceptions is essential to understanding where courts have gone wrong in applying the “abstract ideas” exception in the context of software inventions.

8. *Alice Corp. Pty.*, 134 S. Ct. at 2354 (quoting *Molecular Pathology*, 133 S. Ct. 2107, at 2166).

9. *Bilski v. Kappos*, 561 U.S. 593, 594 (2010).

10. *Id.*

A. Laws Of Nature Are Not Patentable

The earliest case cited by *Bilski* in its line of precedent “going back 150 years” was *Le Roy v. Tatham*,¹¹ decided by the Supreme Court in December 1852. In *Le Roy*, the Supreme Court carved out the first exception to Section 101: laws of nature. Based on this exception, the decision rejected a patent claiming a new method for creating lead pipes under heat and pressure, instead of casting the pipes from a mold, as was the industry standard at the time.¹²

The patentees admitted that they did not claim any particular machinery,¹³ but instead claimed the use of existing machinery in combination with a “newly discovered principle, to wit, that lead could be forced, by extreme pressure, when in a set or solid state, to cohere and form a pipe.”¹⁴

The claim specified:

We do not claim as our invention and improvement any of the parts of the above described machinery, independently of their arrangement and combination above set forth.

What we claim as our invention, and desire to secure by letters-patent, is, the combination of the following parts above described, to wit,

the core and bridge, or guide-piece, with the cylinder, the piston, the chamber and the die,

when used to form pipes of metal, under heat and pressure, in the manner set forth,

or in any other manner substantially the same.¹⁵

The lead pipes created pursuant to this patent were “much superior in quality to that made according to the old mode,” and were also “much cheaper,” such that they quickly “wholly superseded” the market.¹⁶ Yet, even though this discovery was clearly new and useful, the Court rejected the patent.

Looking to the claim language, as stated in the application,¹⁷ the court found that the patent did not claim patent-eligible subject matter, as “a principle is not patentable”.¹⁸ The machinery was disclaimed and

11. *Le Roy v. Tatham*, 55 U.S. 156 (1853), *subsequent proceedings*, *Le Roy v. Tatham*, 63 U.S. 132 (1859).

12. *Le Roy v. Tatham*, 55 U.S. at 172 (1853).

13. *Id.* at 176.

14. *Id.* at 171.

15. *See id.* at 176.

16. *Id.* at 178.

17. *Id.* at 176.

18. *Le Roy v. Tatham*, 55 U.S. at 175 (1853).

admittedly not new.¹⁹ The only claimed point of novelty was a newly discovered property of lead—a natural phenomenon. This discovery was that lead, when wrought “under heat and pressure,” would re-unite and “heal as though it had never been divided.”²⁰ The patent claimed the formation of metal pipes using this discovery “in any . . . manner.”²¹

Although this property of lead was newly discovered, it was not itself new. Rather, this property of matter was a fundamental scientific truth that had always existed.²² The Court concluded that such a discovery could not be patented, because in essence it was a law of nature.²³ The Court reasoned that scientific principles and natural phenomena—including other powers in nature like steam and electricity—were “open to all,” and that granting one person the exclusive right to use such principles would discourage others from creating new and useful inventions that harnessed the same fundamental means.²⁴ This would be “against the avowed policy of the patent laws” to encourage innovation.²⁵

In a subsequent proceeding, in equity, on the same patent, the Supreme Court reversed its holding, finding that the patent sufficiently described a new process.²⁶ However, even in this subsequent decisions, the Supreme Court reiterated “that a patent cannot be taken out solely for an abstract philosophical principle—for instance, for any law of nature or any property of matter, apart from any mode of turning it to account.”²⁷ Thus the Court created its first exception to Section 101. Since *Le Roy*, many patent applications claiming natural phenomena or laws of nature have been deemed patent-ineligible.

B. Mathematical Expressions Of Laws Of Nature Are Not Patentable

In 1939, the Supreme Court added a second exception to Section 101: mathematical expressions of laws of nature. In *Mackay Radio & Telegraph Co.*, the Court considered a patent for a V-shaped antenna,

19. *See id.* at 172, 176; *id.* at 183 (Nelson, J., dissenting).

20. *Id.* at 178.

21. *Id.* at 172.

22. *Id.* at 174–75.

23. *See id.*; *see also* *Le Roy v. Tatham*, 63 U.S. at 137 (1859) (a patent will not be granted “for any law of nature or any property of matter, apart from any mode of turning it to account. A mere discovery of such a principle is not an invention, in the patent-law sense of the term.”).

24. *Le Roy v. Tatham*, 55 U.S. at 175 (1853).

25. *Id.*

26. *Le Roy v. Tatham*, 63 U.S. at 141 (1859) (“It is rare that so clear and satisfactory an explanation is given to the machinery which performs the important functions above specified. We are satisfied that the patent is sustainable, and that the complainants are entitled to the relief claimed by them.”).

27. *Id.* at 137.

which used a mathematical relationship between the angle of the two wires, their length, and the length of the radio wave produced “to obtain a highly directional, efficient and simple antenna system.”²⁸

Representative Claim 1 of the patent recited:

A directional antenna comprising
a pair of angularly disposed linear conductors
said conductors being angularly disposed with respect to each other,
each of a length including substantially a plurality of half wave
lengths,
means for exciting the radiators in phase opposition
whereby standing waves of opposite instantaneous polarity are
formed thereon
whereby radiant action of the antenna is predominantly along the
direction of the bisector of the angle formed by the conductors, and
another pair of conductors parallel and similar to said first mentioned
pair of conductors and
spaced therefrom an odd number of quarter wave lengths measured
in a direction along the bisector of the angle of the conductors.²⁹

This patent was based on “Abraham’s formula,” which the patent applicant did not invent, and which had been published in a scientific journal thirty years earlier.³⁰ Expanding on its reasoning in *Le Roy*, the Court found that neither laws of nature nor *mathematical expressions of laws of nature* could be patented.³¹ The Court observed that Abraham’s formula expressed a “scientific truth” about the mathematical relationship between an antenna’s angle of direction and the wave length and wire length.³² This mathematical relationship, like the laws of gravity, had always existed in nature, even if mankind had only more recently discovered it.

The Court’s conclusion in *Mackay* was a natural and logical extension of *Le Roy*. Many of the natural phenomena previously identified by the Supreme Court as patent-ineligible—such as steam, gravity, and electricity—can be expressed through mathematical equations.³³ Thus, mathematical expressions of laws of nature should be

28. *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 91 (1939).

29. *See* U.S. Pat. No. 1,974,387, Cl. 1 (issued Sep. 18, 1934).

30. *Mackay Radio*, 306 U.S. at 93.

31. *Id.* at 94.

32. *Id.* at 93–94.

33. For example, the boiling point at which steam is created can be calculated for a given pressure using something known as the Clausius-Clapeyron equation, and Newton’s Universal Law of gravitation states that $F = Gm_1m_2/r^2$, where F is the force due to gravity, between two masses (m_1 and m_2), which are a distance r apart, and G is the gravitational constant.

excluded from Section 101 patent-eligible subject matter, for all the same reasons laws of nature themselves are excluded.

Importantly, however, the *Mackay* Court distinguished between non-patentable laws of nature and mathematical expressions thereof, on one hand, and patentable *novel and useful structures* created *with the aid* of scientific principles, on the other.³⁴ The Court found that the patent at issue in *Mackay* claimed the latter, a novel and useful directional antenna created with the aid of Abraham's formula.³⁵ The Court narrowly construed the claims of the patent, finding that the claims covered protectable subject matter: "a V antenna having an angle double the Abraham angle and wires containing a multiple of half wave lengths."³⁶

Thus, unlike the patent in *Le Roy v. Tatham*, the patent in *Mackay* did not claim all uses of a scientific principle, but instead "practically applie[d] the mathematical formula to configure a particular antenna."³⁷ The point of novelty was not the formula itself, but the new, useful, and *man-made* radio antenna created using that formula—something that had not previously existed in nature.

II. DEVELOPING THE "ABSTRACT IDEAS" EXCEPTION

In 1972, the Supreme Court, for the first time, added "abstract ideas" as a distinct exception to patent-eligible subject matter. Although previous decisions, including *Le Roy v. Tatham*, had mentioned in dicta that "abstract principles" were not patentable, these prior cases defined abstract principles *in terms of* laws of nature, not as a separate category of exceptions.³⁸ In *Gottschalk v. Benson*, however, the Supreme Court faced a challenge unlike any it had seen before—determining whether computer software constituted patentable subject matter.³⁹ The patent at issue in *Benson* was directed to a computer algorithm for "converting binary-coded decimal (BCD) numerals into pure binary numerals."⁴⁰

Similarly, electrical power can be calculated as $P = I \times V = R \times I^2 = V^2/R$, where power P is in watts, the resistance R is in ohms, the voltage V is in volts and the current I is in amperes.

34. *Mackay Radio*, 306 U.S. at 94.

35. *Id.* at 101–02.

36. *Id.* at 95.

37. Interim Guidance on Patent Subject Matter Eligibility, 79 Fed. Reg. 74619, 74629 (Dec. 16, 2014), <https://www.gpo.gov/fdsys/pkg/FR-2014-12-16/pdf/2014-29414.pdf>; see also *Mackay Radio*, 306 U.S. at 102.

38. See, e.g., *Le Roy v. Tatham*, 63 U.S. 132, 137 (1859) ("[A] patent cannot be taken out solely for an abstract philosophical principle—for instance, for any law of nature or any property of matter, apart from any mode of turning it to account.") (emphasis added).

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

40. *Id.* at 64.

Claim 8 of the patent, which is representative, recited:

The method of converting signals from binary coded decimal form into binary which comprises the steps of

- (1) storing the binary coded decimal signals in a reentrant shift register,
- (2) shifting the signals to the right by at least three places, until there is a binary '1' in the second position of said register,
- (3) masking out said binary '1' in said second position of said register,
- (4) adding a binary '1' to the first position of said register,
- (5) shifting the signals to the left by two positions,
- (6) adding a '1' to said first position, and
- (7) shifting the signals to the right by at least three positions in preparation for a succeeding binary '1' in the second position of said register.⁴¹

The Court held that this algorithm was not a protectable "process" under Section 101 of the patent act.⁴² Significantly, it also articulated, for the first time, the broad principle that "abstract intellectual concepts are not patentable."⁴³

The *Benson* analysis began predictably enough, quoting *Mackay* for the proposition that "a scientific truth, or the mathematical expression of it, is not patentable invention."⁴⁴ The Court proceeded, however, to expand on this proposition. Instead of relying on existing Section 101 precedent, the Court cited *Rubber-Tip Pencil Co. v. Howard*,⁴⁵ claiming that each of the Section 101 exceptions discussed above arose from "the longstanding rule that 'an idea of itself is not patentable.'"⁴⁶ *Rubber-Tip* had rejected a patent on the grounds that the claimed idea was not *novel*—an issue arising under Section 102—not on the grounds that the idea was not *patent-eligible* under Section 101.⁴⁷ *Benson* nonetheless

41. *Id.* at 73–74.

42. *Id.* at 73.

43. *Id.* at 67.

44. *Id.*

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

46. *Gottschalk*, 409 U.S. at 67 (1972) (quoting *Rubber-Tip Pencil*, 87 U.S. at 507).

47. See *Rubber-Tip Pencil*, 87 U.S. at 507 ("The idea of this patentee was a good one, but his device to give it effect, though useful, was *not new*. Consequently, he took nothing by his patent.") (emphasis added).

Benson's reliance on non-Section 101 cases to support a Section 101 rejection is primary reason for subsequent courts' confusion about the proper scope of a Section 101 analysis. *Rubber Tip* was a novelty case, yet is cited in many seminal Section 101 decisions. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014); *Diamond v. Diehr*, 450 U.S. 175, 185 (1981); *Parker v. Flook*, 437 U.S. 584, 598–99 (1978) (Stewart, C.J., dissenting). Thus,

imported *Rubber Tip*'s novelty arguments into the patent-eligible-subject-matter context, using it to create a new “abstract ideas” exception and connecting laws of nature, mathematical expressions, and abstract ideas together on the grounds that all are “the basic tools of scientific and technological work.”⁴⁸ The Court reasoned that the “practical effect” of allowing the proposed patent would be to patent the entire “idea” of converting BCD numerals into pure binary.⁴⁹ Finding that allowing such a patent “would wholly pre-empt the mathematical formula” and prevent its use by others for scientific innovation, the Court rejected the patent.⁵⁰

Six years later, the Supreme Court applied *Benson* in *Parker v. Flook*,⁵¹ another Section 101 case involving a computer algorithm. *Flook* rejected a patent for an algorithm to calculate an “alarm limit”:— a number that determined the correct curing time for rubber and signals the time when the synthetic rubber molding press should open.⁵² Claim 1 of the patent, which the Court found to be representative, described the method as follows:

1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of

$$B_0 + K$$

wherein B_0 is the current alarm base and K is a predetermined alarm offset which comprises:

(1) Determining the present value of said process variable, said present value being defined as PVL;

many courts reject claims as patent-ineligible because they describe an idea that has long been used in society. But this should lead to a Section 102, not Section 101 rejection.

Similarly, *Benson* and numerous subsequent decisions have relied on *O'Reilly v. Morse*, 56 U.S. 62 (1853), to support Section 101 rejections. *See, e.g., Alice Corp. Pty.*, 134 S. Ct. at 2354; *Bilski v. Kappos*, 561 U.S. 593, 649 (2010); *Diamond v. Diehr*, 450 U.S. at 204 n.22; *Flook*, 437 U.S. at 592; *Benson*, 409 U.S. at 68. In *Morse*, the Supreme Court rejected a broad claim covering any use of electromagnetism for printing letters at a distance. *See Morse*, 56 U.S. at 112–21. But the claim in *Morse* was rejected on enablement and description grounds, not patent-eligible subject matter grounds. *See id.* at 113, 121 (“[T]he patent is illegal . . . because he claims more than he has sufficiently described.”). However, based on *Morse*, courts have conflated “broad” claims with “abstract claims,” and thus found them patent-ineligible. But a proper reading of *Morse* would require most “broad” claims to be held patent-eligible, but inadequately descriptive.

48. *Benson*, 409 U.S. at 67.

49. *Id.* at 71–72.

50. *Id.* at 72.

51. *Flook*, 437 U.S. at 585.

52. *Id.*

(2) Determining a new alarm base B_1 , using the following equation:

$$B_1 = B_0(1.0 - F) + PVL(F)$$

where F is a predetermined number greater than zero and less than 1.0;

(3) Determining an updated alarm limit which is defined as $B_1 + K$; and thereafter

(4) Adjusting said alarm limit to said updated alarm limit value.⁵³

The patent examiner had rejected this claim because, like the claims in *Le Roy* and *Benson*, the mathematical formula was the only point of novelty, and therefore the patented method “would in practical effect be a patent on the formula or mathematics itself.”⁵⁴ The Supreme Court affirmed, noting that even if the mathematical formula had been novel, useful, and discovered by the inventor,⁵⁵ it was nevertheless not patent-eligible subject matter because a formula was “not the kind of ‘discover[y]’ that the [patent] statute was enacted to protect.”⁵⁶ After stating that “[t]he process itself—not merely the mathematical algorithm—must be new and useful,” and finding that the claimed process was neither new nor useful, the Court rejected the patent.⁵⁷

Only a few years later, however, the Supreme Court appeared to reverse course completely. In *Diamond v. Diehr*,⁵⁸ the Court addressed a patent very similar to one in *Flook*, which was again directed to a process for curing synthetic rubber using a mathematical formula and programmed digital computer. Representative Claim 1 of the *Diehr* patent provided:

1. A method of operating a rubber-molding press for precision molded compounds with the aid of a digital computer, comprising:
providing said computer with a data base for said press including at least,
natural logarithm conversion data (\ln),
the activation energy constant (C) unique to each batch of said compound being molded, and
a constant (x) dependent upon the geometry of the particular mold of the press,
initiating an interval timer in said computer upon the closure of the press for monitoring the elapsed time of said closure,

53. *Id.* at 596–97.

54. *Id.* at 587.

55. *See id.* at 588.

56. *Id.* at 593.

57. *Parker v. Flook*, 437 U.S. 584, 591 (1978).

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

constantly determining the temperature (Z) of the mold at a location closely adjacent to the mold cavity in the press during molding, constantly providing the computer with the temperature (Z), repetitively calculating in the computer, at frequent intervals during each cure, the Arrhenius equation for reaction time during the cure, which is

$$\ln v = CZ + x$$

where v is the total required cure time,

repetitively comparing in the computer at said frequent intervals during the cure each said calculation of the total required cure time calculated with the Arrhenius equation and said elapsed time, and opening the press automatically when a said comparison indicates equivalence.⁵⁹

Contrary to its decision in *Flook*, the Supreme Court concluded that the *Diehr* patent claimed patent-eligible subject matter. The decision acknowledged *Le Roy*, *Mackay*, *Benson*, and *Flook*, and noted that not every discovery constitutes patentable subject matter.⁶⁰ But it also cautioned that courts should not find a claim drawn to nonstatutory subject matter “simply because it uses a mathematical formula, computer program, or digital computer.”⁶¹ Relying on *Mackay*, the Court found that the patent at issue did not claim a mathematical formula, but instead claimed “a process of curing synthetic rubber” that “employ[ed] a well-known mathematical equation . . . in conjunction with all of the other steps in the[] claimed process.”⁶² Because the claim was not drawn to a mathematical formula, but to an industrial process for the molding of rubber products, the claim satisfied the requirements of Section 101.⁶³

After *Diehr*, the Supreme Court nearly remained silent on the issue of Section 101 as it related to computer algorithms for nearly thirty years. But in 2010 it finally addressed the topic again. In *Bilski v. Kappos*, the Court rejected a patent application directed to a series of steps for managing risk amongst buyers and sellers of commodities. The Court found that the “key claims” were claims 1 and 4, and noted that, while Claim 1 described a series of steps instructing how to hedge risk, Claim 4 put the concept articulated in claim 1 into a simple mathematical formula.⁶⁴ Claim 1 consisted of the following steps:

59. *Id.* at 179 n.5.

60. *See id.* at 185, 188.

61. *Id.* at 187.

62. *Id.*

63. *Id.* at 192–93.

64. *Bilski v. Kappos*, 561 U.S. 593, 599 (2010).

- (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 consumers;
- (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.⁶⁵

The *Bilski* Court declined to establish any bright-line rules that business methods or software algorithms were *per se* patent-ineligible, and instead chose to follow prior decisions on unpatentability.⁶⁶ The Court “resolve[ed] th[e] case narrowly on the basis of th[e] Court’s decisions in *Benson*, *Flook*, and *Diehr*,” and held that the claims were not patentable processes because they were “attempts to patent abstract ideas.”⁶⁷ Interestingly, the *Bilski* decision expressly linked mathematical expressions and abstract ideas, noting that “[t]he concept of hedging, described in claim 1 and reduced to a mathematical formula in claim 4, is an unpatentable abstract idea, just like the algorithms at issue in *Benson* and *Flook*.”⁶⁸

III. THE ALICE DECISION

In 2012, the Supreme Court created new guidelines for determining whether an invention constituted patent-eligible subject matter. In *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*,⁶⁹ the Court addressed a patent apparently claiming a law of nature.⁷⁰ To determine whether the claims added sufficient subject matter beyond the law of nature to render them patent-eligible, the Court established a two-step framework. First, a court must determine whether the claims at issue are directed to a patent-ineligible concept, such as a law of nature.⁷¹ If the answer is yes, then the Court should determine whether there is any “inventive concept” that transforms the nature of the claims, individually

65. *Id.*

66. *Id.* at 608.

67. *Id.* at 609.

68. *Id.* at 611–12.

69. *Mayo Collaborative Serv’s. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012).

70. *See id.* at 1296 (patent claimed relationships between concentrations of certain metabolites in the blood and the likelihood that a dosage of a thiopurine drug will prove ineffective).

71. *See id.* at 1297.

and as an ordered combination, into a patent-eligible application.⁷²

In 2014, the Supreme Court decided *Alice Corp. Pty. v. CLS Bank Int'l*, extending application of the *Mayo* two-step test from “law of nature cases” to *all* Section 101 cases.⁷³ *Alice* involved claims for “a computer-implemented scheme for mitigating ‘settlement risk’ (*i.e.*, the risk that only one party to a financial transaction will pay what it owes) by using a third-party intermediary.”⁷⁴ A representative claim in *Alice* read:

33. A method of exchanging obligations as between parties, each party holding a credit record and a debit record with an exchange institution, the credit records and debit records for exchange of predetermined obligations, the method comprising the steps of:

(a) creating a shadow credit record and a shadow debit record for each stakeholder party to be held independently by a supervisory institution from the exchange institutions;

(b) obtaining from each exchange institution a start-of-day balance for each shadow credit record and shadow debit record;

(c) for every transaction resulting in an exchange obligation, the supervisory institution adjusting each respective party’s shadow credit record or shadow debit record, allowing only these transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order, and

(d) at the end-of-day, the supervisory institution instructing on[e] of the exchange institutions to exchange credits or debits to the credit record and debit record of the respective parties in accordance with the adjustments of the said permitted transactions, the credits and debits being irrevocable, time invariant obligations placed on the exchange institutions.⁷⁵

Performing the *Mayo* analysis, the Court first found that the claims were drawn to the abstract idea of “intermediated settlement.”⁷⁶ The *Alice* court acknowledged that it was, perhaps, stepping far afield from traditional Section 101 jurisprudence, noting that, “[a]lthough hedging is a longstanding commercial practice, it is a method of organizing human activity, not a truth about the natural world that has always existed.”⁷⁷ Nevertheless, because “intermediated settlement” was no

72. *Id.* at 1299.

73. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2353 (2014).

74. *Id.* at 2351–52.

75. *Id.* at 2352 n.2.

76. *Id.* at 2357.

77. *Id.* at 2356 (internal citations and quotation marks omitted).

less abstract than the risk hedging in *Bilksi* or decimal binary conversion in *Benson*, the Court found itself bound by precedent to hold that the claims were directed to a patent-ineligible concept beyond Section 101's scope.⁷⁸

At the second step, the Court found that the addition of computer implementation was not a sufficient "inventive concept" to rescue the claims from being abstract.⁷⁹ Because the applicant's system and media claims added "nothing of substance" to the underlying abstract idea of intermediated settlement, the Court found all of the patent claims ineligible under Section 101.⁸⁰

IV. ALICE'S AFTERMATH

A. Impact On Software Patents

Alice was apparently seen as a "minor case" by the Supreme Court⁸¹—and significantly, was not intended to be a software case. During oral argument, the Supreme Court was told—and accepted the representation that—"[Alice] ha[s] no software . . . they've never written software."⁸² The claims in *Alice* were described as "a business method that just happen[ed] to be implemented in software."⁸³ The Court was also told its decision would not impact software patents.⁸⁴

As it turns out, *Alice* had a significant impact on software patents. Since *Alice*, the Federal Circuit has routinely rejected software patents on the grounds that they are patent-ineligible "abstract ideas."⁸⁵ From 2014 to 2017, the Federal Circuit decided nearly sixty cases involving computer-implemented inventions,⁸⁶ finding only seven of them patent-

78. *Id.* at 2350, 2356.

79. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2357 (2014).

80. *Id.* at 2360.

81. Robert R. Sachs, *Two Years After Alice: A Survey of the Impact of a "Minor Case," Part 1*, BILSKI BLOG (June 16, 2016), <http://www.bilskiblog.com/blog/2016/06/two-years-after-alice-a-survey-of-the-impact-of-a-minor-case.html> (citing a tweet by Gatlin McArthur, @GatlinMcArthur, TWITTER (Aug. 15, 2015 3:05 PM), <https://goo.gl/QymRX9>, which claims an unnamed Supreme Court justice stated in conversation that the Court was not aware of the impact of *Alice*, that it was a "minor case," and was "not intended to be game changing.").

82. *Id.* (quoting *Alice Corp. Pty. v. CLS Bank Int'l*, No. 13-298 Oral Argument Transcript ("Alice Oral Argument"), (Mar. 31, 2014), p. 30).

83. *Id.*

84. *Id.*

85. See Jasper L. Tran, *Software Patents: A One-Year Review of Alice v. CLS Bank*, 97 J. PAT. & TRADEMARK OFF. SOC'Y 532, 534 (2015); Robert D. Swanson, *Section 101 and Computer-Implemented Inventions*, 16 STAN. TECH. L. REV. 161, 163 n.9 (2012).

86. For the sake of brevity and relevance, this discussion does not consider or include all cases decided by the Federal Circuit since *Alice*, in particular excludes cases relating to natural

eligible,⁸⁷ and citing *Alice* to reject the remaining majority on Section 101 grounds.

A few statistics underscore *Alice*'s impact:

- After *Alice*, the number of patent grants dropped for the first time in seven years,⁸⁸ with a “dramatic” impact on both software and business method patents.⁸⁹
- In the first six months after *Alice*, the number of newly filed patents cases dropped by forty percent in 2014 as compared to 2013.⁹⁰
- Between 2010 and 2014, between seventeen and fifty percent of rejections in the PTO's “E-Commerce” technology group, which evaluates software patents, were Section 101 rejections.⁹¹ Post-*Alice*, however, between fifty-two percent and one hundred percent of E-commerce group rejections were based on Section 101.⁹²
- In the first two years following *Alice*, there were four times as many district court decisions (247) on Section 101 issues as in the four years preceding *Alice* (fifty-seven district court decisions from 2010 to 2014).⁹³

The high rates of rejection for computer-implemented inventions, based on confusing and seemingly arbitrary determinations of what counts as an “abstract idea,” discourage innovation, particularly in the software industry.⁹⁴ Yet the exceptions to Section 101 were designed to

phenomena and cases where a patent was found invalid under something other than the “abstract idea” exception. *See, e.g.*, *AllVoice Developments US, LLC v. Microsoft Corp.*, 612 F. App'x 1009 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 697 (2015) (finding voice recognition software patent-ineligible for failing to recite either a process or a tangible, physical object, so it was not it one of the four Section 101 categories).

87. *See* *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014); *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016); *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016); *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016); *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288 (Fed. Cir. 2016); *Trading Techs. Int'l, Inc. v. CQG, INC.*, 675 F. App'x 1001 (Fed. Cir. 2017); *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253 (Fed. Cir. 2017); *Thales Visionix Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017).

88. Kevin Penton, *Patent Grants Dropped for First Time In 7 Years, Report Says*, LAW360 (May 17, 2016), <http://www.law360.com/ip/articles/797381>.

89. Sachs, *Two Years After Alice*, *supra* note 81.

90. Tran, *Software Patents*, *supra* note 85 at 539.

91. Robert R. Sachs, *The One Year Anniversary: The Aftermath Of #Alicestorm*, BILSKI BLOG (Jun. 20, 2015), <http://www.bilskiblog.com/blog/2015/06/the-one-year-anniversary-the-aftermath-of-alicestorm.html>.

92. *Id.*

93. Sachs, *Two Years After Alice*, *supra* note 81.

94. *Cf.* Jennifer Girod & Katherine Drabiak, *A Proposal for Comprehensive Biobank Research Laws to Promote Translational Medicine in Indiana*, 5 IND. HEALTH L. REV. 217,

encourage innovation by protecting the “building blocks of human ingenuity.”⁹⁵

Both *Alice* and *Mayo* recognized that lower courts must “tread carefully in construing this exclusionary principle lest it swallow all of patent law,” because “[a]t some level, ‘all inventions . . . embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.’”⁹⁶

Yet the Federal Circuit and lower courts have used the “abstract idea” exception to do exactly that. Unable to pin down a satisfactory definition of an “abstract idea,” courts have instead relied on dicta and created a number of glosses describing what is or is not patentable-eligible subject matter. But these shortcuts have led to predictably flawed conclusions. Courts looking to *Bilski*, for example, have attempted to cite it for the proposition that economic practices are abstract ideas, because these business methods have existed for as long, or at least nearly as long, as laws of nature.⁹⁷ But the *Bilski* Court explicitly rejected such a bright-line rule.⁹⁸ Moreover, whether something has been around for a long time is a question of novelty—the

223 (2008) (“Vague and inconsistent federal regulation of . . . research likely has a chilling effect on researchers and investors . . .”); Natasha N. Aljalian, *The Role of Patent Scope in Biopharmaceutical Patents*, 11 B.U. J. SCI. & TECH. L. 1, n.31 (2005) (“Predictability, both for patent owners and inventors, is paramount.”); Richard L. Robbins, *Subtests of “Nonobviousness:” A Nontechnical Approach to Patent Validity*, 112 U. PA. L. REV. 1169, 1171 n.16 (1964) (“[A]n unpredictable standard could still have a deterrent effect on innovation, for investors are faced with many more alternatives to research than are inventors.”).

95. *Alice Corp. Pty. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Mayo Collaborative Serv’s v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1301 (2012)).

96. *Alice Corp. Pty.*, 134 S. Ct. at 2354 (quoting *Mayo*, 132 S. Ct., at 1293–94).

97. See, e.g., *Smartflash LLC v. Apple Inc.*, 680 F. App’x. 977, 982 (Fed. Cir. 2017) (citing *Bilski* for the proposition that any “fundamental economic practice long prevalent in our system of commerce” is an abstract idea); *Alice*, 134 S. Ct. at 2356–57 (acknowledging that, although intermediated settlement is “not a truth about the natural world that has always existed,” it was nevertheless “long prevalent” in human activity and no less abstract than the “risk hedging” in *Bilski*); cf. *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014) (rejecting claims for data collection, recognition, and storage because “humans have always performed these functions”).

Recently, the Federal Circuit has expanded its exceptions Section 101 even further, excluding not only longstanding *economic* practices but *any* longstanding “fundamental practice” from patent-eligible subject matter. See, e.g., *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363, 1369 (Fed. Cir. 2015) (rejecting claims for information tailoring as “a fundamental . . . practice long prevalent in our system . . .”) (alternations in original).

98. See *Bilski v. Kappos*, 561 U.S. 593, 605–09 (2010). (“A categorical rule denying patent protection for “inventions in areas not contemplated by Congress . . . would frustrate the purposes of the patent law.” . . . [R]ather than adopting categorical rules that might have wide-ranging and unforeseen impacts, the Court resolves this case narrowly on the basis of this Court’s decisions in *Benson*, *Flook*, and *Diehr*.”) (internal citations omitted).

domain of Section 102—not patentable subject matter under Section 101.

Mathematical expressions, once their own distinct category of potential exceptions to Section 101, have also been subsumed into the ever-expanding reach of the “abstract ideas” exception.⁹⁹ Computer programs—which often rely on algorithms or mathematical expressions—have in turn been dragged down alongside mathematical expressions, and are now more often than not rejected as “abstract.” The “abstract ideas” exception has even expanded to cover software programs that are entirely unrelated to mathematical expressions or laws of nature. Since *Alice* the Federal Circuit has, for example, rejected patents on software for automatically migrating an individual’s preferred computer settings to a new computer system in the course of an upgrade,¹⁰⁰ organizing digital photographs uploaded from a cell phone,¹⁰¹ and determining pixel colors to more accurately show light, shadows, or translucent textures in an electronic image, such as images used by Pixar in its digitally animated movies.¹⁰² Even claims for online restaurant menus,¹⁰³ digital Bingo games,¹⁰⁴ and internet advertisement systems¹⁰⁵ have been rejected, although these inventions can hardly be considered “building blocks of human ingenuity” or “basic tools” of scientific and technological innovation. These modern inventions must be contrasted with earlier Section 101 cases, which rejected claims covering electromagnetism,¹⁰⁶ strains of bacteria,¹⁰⁷ and the mathematical relationship between binary and decimal binary

99. See, e.g., *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1313 (Fed. Cir. 2016). (“Mathematical formulas are a type of abstract idea.”); *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014) (“Mathematical algorithms, including those executed on a generic computer, are abstract ideas.”); Interim Guidance on Patent Subject Matter Eligibility, 79 Fed. Reg. 74619, 74622 (Dec. 16, 2014), <https://www.gpo.gov/fdsys/pkg/FR-2014-12-16/pdf/2014-29414.pdf> (“[M]athematical formulas are considered to be an exception as they express a scientific truth, but have been labelled by the courts as both abstract ideas and laws of nature.”).

100. See *Tranxition, Inc. v. Lenovo (United States) Inc.*, 664 F. App’x 968, 969 (Fed. Cir. 2016).

101. See *In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 609 (Fed. Cir. 2016).

102. See *Coffelt v. NVIDIA Corp.*, No. CV1600457SJOKKX, 2016 WL 7507763, at *1 (C.D. Cal. June 21, 2016), *aff’d*, 680 F. App’x 1010 (Fed. Cir. 2017), *cert. denied*, 137 S. Ct. 2143 (2017).

103. See *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229 (Fed. Cir. 2016).

104. See *Planet Bingo, LLC v. VKGS LLC*, 576 F. App’x 1005 (Fed. Cir. 2014).

105. See *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 712 (Fed. Cir. 2014).

106. See *O’Reilly v. Morse*, 56 U.S. 62 (1854). Although *Morse* should be read as an enablement and description case, not a Section 101 case, see discussion *supra* note 41, it is cited so often by courts as a Section 101 case that it would be remiss not to mention it here.

107. See *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948).

numbers¹⁰⁸—all of which are much more necessary tools for scientific innovation.

The Federal Circuit has also resorted to dangerously broad generalizations, such as that any “process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible.”¹⁰⁹ Glosses such as this have the potential to rule out large numbers of new and useful computer-implemented inventions. For example, data compression is arguably nothing more than a process of manipulating existing information (for example, a high-definition video file) using a mathematical algorithm (the compression algorithm) to generate additional information (a smaller video file). This is an important area of computer improvement, yet current Federal Circuit glosses could exclude valuable developments in the field from patent protection.

Similarly, the Federal Circuit has repeatedly stated since *Alice* that “collecting information, analyzing it, and displaying certain results of the collection and analysis” is an abstract idea.¹¹⁰ Yet digital cameras, televisions, and even cell phone towers arguably do nothing more than collect information, analyze it, and display certain results. Many inventions that have already been found patent-eligible—including the lip-synching software recently found to be patent-eligible by the Federal Circuit in *McRO*¹¹¹—could just as easily have been found patent-ineligible on the grounds that they can be characterized as taking existing information, applying a mathematical algorithm, and creating additional information. The current uncertainty between patent-eligible and patent-ineligible subject matter has serious repercussions, including inefficiency and reduced incentives to innovate. Courts should not allow the boundaries of Section 101 to become so nebulous that they could eliminate most patent protection in the software space.

B. Confusion And Contradictions

Beyond its regrettable effect on software patents in particular, *Alice* created widespread confusion and uncertainty regarding the boundaries

108. See *Gottschalk v. Benson*, 409 U.S. 63, 64 (1972).

109. *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014).

110. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016); see also, e.g., *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1349 (Fed. Cir. 2015); *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363 (Fed. Cir. 2015); *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014); *Digitech*, 758 F.3d at 1351; *Ultramercial*, 772 F.3d at 715.

111. See *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1307 (Fed. Cir. 2016).

beyond which a patent claim becomes directed to an abstract idea.¹¹² The PTO released two memoranda in 2014 attempting to provide guidance on implementing *Alice*,¹¹³ but these memoranda noted that abstract ideas are most often identified “by way of example, including fundamental economic practices, certain methods of organizing human activities, an idea ‘of itself,’ and mathematical relationships/ formulas,”¹¹⁴ demonstrating the struggle to provide meaningful limitations to the abstract ideas exception.

Courts continue to struggle with this exception. The Federal Circuit noted in 2016 that there is no “single, succinct, usable definition or test” for what constitutes an abstract idea.¹¹⁵ In other words, abstract ideas have become akin to obscenity: courts simply have to know it when they see it.¹¹⁶ In other contexts the courts have regularly found such tests, which can be “inconsistently and unpredictably applied,” to be “unacceptable.”¹¹⁷

112. See, e.g., *Clear with Computers, LLC v. Altec Indus., Inc.*, No. 6:14-CV-79, 2015 WL 993392, at *4 (E.D. Tex. Mar. 3, 2015), *aff'd*, 636 F. App'x 1015 (Fed. Cir. 2016) (“[T]he contours are often unclear between those inventions that are directed to an abstract idea and those that are not.”); *Cloud Satchel, LLC v. Amazon.com, Inc.*, 76 F. Supp. 3d 553, 560 (D. Del. 2014), *aff'd sub nom.* *Cloud Satchel, LLC v. Barnes & Noble, Inc.*, 626 F. App'x 1010 (Fed. Cir. 2015) (“[T]he requirements of § 101 as applied to this area of technology have been a moving target, from the complete rejection of patentability for computer programs to the much broader enunciation of the test . . . [that] a computer-implemented invention was considered patent-eligible so long as it produced a useful, concrete and tangible result.”) (internal citations and quotation marks omitted).

113. See Memorandum from Andrew H. Hirschfield, Deputy Comm'r of the U.S. Pat. & Trademark Off. to Patent Examiners (Jun. 25, 2014), https://www.uspto.gov/sites/default/files/patents/announce/alice_pec_25jun2014.pdf; Interim Guidance on Patent Subject Matter Eligibility, 79 Fed. Reg. 74619, 74619 (Dec. 16, 2014), <https://www.gpo.gov/fdsys/pkg/FR-2014-12-16/pdf/2014-29414.pdf>.

114. Interim Guidance on Patent Subject Matter Eligibility, 79 Fed. Reg. 74619, 74622 (Dec. 16, 2014), <https://www.gpo.gov/fdsys/pkg/FR-2014-12-16/pdf/2014-29414.pdf>.

115. *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1294 (Fed. Cir. 2016); see also, e.g., *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1150–51 (Fed. Cir. 2016), *cert. denied sub nom.*, *Synopsys, Inc. v. Mentor Graphics Corp.*, No. 16–1288, 2017 WL 1539155 (U.S. Oct. 2, 2017) (“We recognize that defining the precise abstract idea of a patent claims in many cases is far from a “straightforward” exercise . . . [and] the contours of what constitutes an inventive concept are far from precise.”); *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1331 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 2510 (2016) (“The third exception—abstract ideas—is more of a problem, a problem inherent in the search for a definition of an ‘abstract idea’ that is not itself abstract.”).

116. Cf. *Jacobellis v. State of Ohio*, 378 U.S. 184, 197 (1964) (Stewart, J., concurring).

117. See *Brainers & Bridges v. Weingeroff Enter., Inc.*, No. 85 C 493, 1986 WL 8388, at *7–8 (N.D. Ill. July 22, 1986) (holding “episode” test amounted to “I know it when I see it” approach, and finding “such a vague and unpredictable test unacceptable”); see also *In re Scheer*, 819 F.3d 1206, 1210 (9th Cir. 2016) (noting “I know it when I see it approach” leads to “predictably unpredictable results”); *NetworkIP, LLC v. F.C.C.*, 548 F.3d 116, 127 (D.C. Cir. 2008) (warning that “we-know-it-when-we-see-it” poses “the danger of arbitrariness” and

In the absence of a clear definition, the Federal Circuit has relied on everything from common-law analogies¹¹⁸ to bright-line rules¹¹⁹ to decide whether a claimed invention is directed to a patent-ineligible abstract idea. Some cases consider whether the claims recite “well-understood, routine conventional activit[ies]” using “generic-computer functions,”¹²⁰ while others have found that even generic features, when viewed as an ordered combination, can create a patent-eligible invention.¹²¹ Some decisions rely only on claim language,¹²² while others allow a claim analysis to be informed by the specification.¹²³ Still others continue to look to the “machine-or-transformation test” as a “useful clue,”¹²⁴ while others now disfavor it.¹²⁵ And some courts focus

abuse of discretion).

118. *Amdocs*, 841 F.3d at 1295 (using “the classic common law methodology” of “examin[ing] earlier cases in which a similar or parallel descriptive nature can be seen—what prior cases were about, and which way they were decided”); see also, e.g., *Versata*, 793 F.3d at 1334 (analogizing claims to other “similar claims [found] to be ineligible”).

119. See, e.g., *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014) (noting that test for patent-eligibility of computer software is whether claims are “necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks”); *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016) (test for patent-eligibility of computer software is whether claims are “directed to an improvement to computer functionality”).

120. *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363 (Fed. Cir. 2015); see also *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1356 (Fed. Cir. 2016) (“[T]he essentially result-focused, functional character of claim language has been a frequent feature of claims held ineligible under § 101, especially in the area of using generic computer and network technology to carry out economic transactions.”); *LendingTree, LLC v. Zillow, Inc.*, 656 F. App’x 991, 996 (Fed. Cir. 2016) (“At best, the claim describes the automation of a fundamental economic concept . . . through the use of generic-computer functions. It is well settled, though, that automating conventional activities using generic technology does not amount to an inventive concept.”) (internal citations and quotation marks omitted).

121. See, e.g., *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1345 (Fed. Cir. 2016); cf. *Diamond v. Diehr*, 450 U.S. 175, 188 (1981) (“[A] new combination of steps in a process may be patentable even though all the constituents of the combination were well known and in common use before the combination was made.”).

122. See, e.g., *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1349 (Fed. Cir. 2014) (“Digitech’s position is not supported by the claim language.”); *Synopsys*, 839 F.3d at 1149 (“While Synopsys may be correct that the inventions of the Gregory Patents were intended to be used in conjunction with computer-based design tools, the Asserted Claims are not confined to that conception. The § 101 inquiry must focus on the language of the Asserted Claims themselves.”).

123. See, e.g., *Amdocs*, 841 F.3d at 1299 (“In addition to taking into consideration the approved claim constructions, we examine the claims in light of the written description.”) (citing *Enfish*, 822 F.3d at 1335 (applying step one involves considering the claims “in light of the specification”)); *In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 611–15 (Fed. Cir. 2016) (examining the claims in light of the written description under steps one and two).

124. See, e.g., *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 716 (Fed. Cir. 2014).

125. See, e.g., *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App’x 914, 919 (Fed. Cir. 2015), cert. denied, 136 S. Ct. 2390 (2016) (“[P]ost-*Mayo/Alice*, [the machine-or-transformation test] is no longer sufficient to render a claim patent-eligible.”).

on whether there are concrete means to achieve a distinct end,¹²⁶ while others have explicitly rejected the “means/ends” approach.¹²⁷

The sheer multitude of competing tests and contradictory dicta has predictably led to inconsistent decision-making.

In *Enfish*, for example, the Federal Circuit found that a “logical model for a computer database” was patent-eligible because it was “designed to improve the way a computer stores and retrieves data in memory.”¹²⁸ Representative Claim 17 of the patent at issue provided:

A data storage and retrieval system for a computer memory, comprising:
means for configuring said memory according to a logical table, said logical table including:
a plurality of logical rows, each said logical row including an object identification number (OID) to identify each said logical row, each said logical row corresponding to a record of information;
a plurality of logical columns intersecting said plurality of logical rows to define a plurality of logical cells, each said logical column including an OID to identify each said logical column; and
means for indexing data stored in said table.¹²⁹

The decision prefaced its holding by stating:

We do not read *Alice* to broadly hold that all improvements in computer-related technology are inherently abstract and, therefore, must be considered at step two. Indeed, some improvements in computer-related technology when appropriately claimed are undoubtedly not abstract, such as a chip architecture, an LED display, and the like. Nor do we think that claims directed to software, as opposed to hardware, are inherently abstract and therefore only properly analyzed at the second step of the *Alice* analysis. Software can make non-abstract improvements to computer technology just as hardware improvements can, and

126. *Affinity Labs of Texas, LLC v. Amazon.com Inc.*, 838 F.3d 1266, 1269–71 (Fed. Cir. 2016), *cert. denied*, 137 S. Ct. 1596 (2017) (rejecting claims that described a desired function, but not a specific means for performing that function, and noting that purely functional claims have been frequently held ineligible under Section 101); *see also Elec. Power Grp.*, 830 F.3d at 1356 (noting “an important common-sense distinction between ends sought and particular means of achieving them, between desired results (functions) and particular ways of achieving (performing) them” and that the “result-focused, functional character” of the claims rendered them patent-ineligible).

127. *See Amdocs*, 841 F.3d at 1295 (“The dissent focuses on the difference between ‘means’ and ‘ends.’ . . . We commend the dissent for seeking a creative way of incorporating aspects of well-known doctrine in the search for what is an ‘abstract idea,’ but that is not now the law, either in statute or in court decision [sic].”).

128. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016).

129. *Id.* at 1336.

sometimes the improvements can be accomplished through either route. We thus see no reason to conclude that all claims directed to improvements in computer-related technology, including those directed to software, are abstract and necessarily analyzed at the second step of *Alice*, nor do we believe that *Alice* so directs.¹³⁰

The decision found that “the plain focus of the claims is on an improvement to computer functionality itself, not on economic or other tasks for which a computer is used in its ordinary capacity.” Thus, the claims were not directed to an abstract idea within the meaning of *Alice*.¹³¹ The court disagreed with the district court’s characterization of the claims as directed to the abstract idea of “organizing information using tabular formats,” finding that “the claims are not simply directed to any form of storing tabular data, but instead are specifically directed to a self-referential table for a computer database.”¹³² It also noted that claims and specification revealed benefits over conventional databases, such as increased flexibility, faster search times, and smaller memory requirements.¹³³ Because the claims were not directed to an abstract idea under step one of the *Alice* analysis, the court declined to proceed to step two of that analysis.¹³⁴

By contrast, the Federal Circuit’s decision in *TLI* found that an improved method of “classifying and storing digital images in organized manner” was directed to the abstract idea of “classifying an image and storing the image based on its classification.”¹³⁵ A representative claim in *TLI* provided:

17. A method for recording and administering digital images, comprising the steps of:
recording images using a digital pick up unit in a telephone unit,
storing the images recorded by the digital pick up unit in a digital form as digital images,
transmitting data including at least the digital images and classification information to a server, wherein said classification information is prescribable by a user of the telephone unit for allocation to the digital images,
receiving the data by the server,
extracting classification information which characterizes the digital images from the received data, and

130. *Id.* at 1335.

131. *Id.* at 1336.

132. *Id.* at 1337.

133. *Id.*

134. *Enfish*, 822 F.3d at 1339.

135. *See In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016).

storing the digital images in the server, said step of storing taking into consideration the classification information.¹³⁶

The court found that the claims were “not directed to a specific improvement to computer functionality. Rather, they are directed to the use of conventional or generic technology in a nascent but well-known environment, without any claim that the invention reflects an inventive solution to any problem presented by combining the two.”¹³⁷ The court further found that the claims did not disclose any “inventive concept,” because the components recited in the claims were merely generic, such as a “telephone unit” and a “server.”¹³⁸ The court rejected the patent as directed to patent-ineligible subject matter and concluded that “steps that generically spell out . . . apply it on a telephone network . . . cannot confer patent eligibility.”¹³⁹

The Court in *Alice* warned that a determination of patent eligibility should not “depend simply on the draftsman’s art,”¹⁴⁰ yet this appears to be exactly the result of many post-*Alice* decisions. If a competent draftsman—or skillful attorney—can convince a court that the claims are directed improving computer functionality, the claim is found patent-eligible; if an opposing party can convince the court that the claims lack an inventive concept, the claims are rejected as patent ineligible.

Enfish and *TLI*, for instance, both involved claims directed to the same “abstract idea”: improved storage and management of digital objects. And *Enfish*’s claimed “means for indexing data” stored in the self-referential table are conceptually indistinguishable from *TLI*’s “storing the digital images in the server . . . taking into consideration the classification information.”¹⁴¹ The inventions in both *Enfish* and *TLI* could be implemented using generic components, such as a computer or mobile phone uploaded with the correct software. Both patents were directed to solving the same technological problem: efficient data storage. Just as the patent in *Enfish* allowed for “faster searching of data,” “more effective storage of data,” and “more flexibility” in configuring the data than traditional models,¹⁴² the invention in *TLI* sought to “provid[e] for recording, administration and archiving of digital images simply, fast and in such way that the information therefore

136. *Id.* at 610.

137. *Id.* at 612.

138. *Id.* at 613.

139. *Id.* at 615.

140. *Alice Corp. Pty. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2350 (2014) (quoting *Parker v. Flook*, 437 U.S. 584, 590 (1978)).

141. *Compare Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1336 (Fed. Cir. 2016), *with In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 610 (Fed. Cir. 2016).

142. *Enfish*, 822 F.3d at 1333.

may be easily tracked.”¹⁴³ And just as the organizational structure in *Enfish* was designed to reduce the “extensive modeling and configuration” required by prior art databases,¹⁴⁴ the organizational structure in TLI was designed to reduce “the problems of locating the data of an image data file[, which] increase as the number of images to be archived increases.”¹⁴⁵

But instead of applying Section 101 consistently, one court’s improvement to computer functionality is another court’s abstract idea, leading to seemingly arbitrary results.

V. CORRECTING COURSE

Countless commentators have agreed that post-*Alice* Section 101 jurisprudence is unworkable. So how can courts get back on track? The solution is to look behind *Alice* to *Le Roy*, *Mackay*, *Benson*, *Flook*, *Diehr*, and *Bilski*, and to return Section 101 to its roots.

A. Reconciling “Abstract Ideas” And “Laws Of Nature”

At first glance, it may not seem that *Benson*, *Flook*, and *Bilski* are of much assistance in crafting a workable definition of “abstract ideas.” These cases seem to stand for the proposition that an abstract idea can be anything from an industrial process to a computer program to a business method—a wide range of inventions, all made by man. Moreover, these cases hardly seem less contradictory than the cases following *Alice*. *Flook* and *Diehr*, in particular, have been criticized for appearing to reach diametrically opposed results on seemingly identical subject matter. Yet the Supreme Court has not overruled either *Flook* or *Diehr*, and lower courts continue to rely on both cases as good law. So how can these seemingly disparate cases be reconciled?

The answer lies in the claims. Patent law looks to a patent’s claims, not its specification, to determine the scope of the patent.¹⁴⁶ The specifications in *Benson*, *Flook*, and *Bilski* may have all been directed broadly to computer programs, industrial processes, or business methods, but when the claims themselves are read closely, a common thread appears: all of the claims were directed to math. More precisely, each of the patents in *Benson*, *Flook*, and *Bilski* claimed a mathematical expression of a law of nature.

143. In re TLI Commc’ns LLC Patent Litig., 823 F.3d 607, 610 (Fed. Cir. 2016).

144. *Enfish*, 822 F.3d at 1333.

145. In re TLI Commc’ns LLC Patent Litig., 823 F.3d 607, 609–10 (Fed. Cir. 2016).

146. See In re Innovatio IP Ventures, LLC Patent Litig., 956 F. Supp. 2d 925, 936 (N.D. Ill. 2013); *Milcor Steel Co. v. George A. Fuller Co.*, 316 U.S. 143, 145–46 (1942).

Benson presents the clearest case study. In fact, *Benson* could have been decided without creating the “abstract ideas” exception at all. The Supreme Court could have rejected the claims because the mathematical conversion between a BCD number and its pure binary counterpart is the same kind of “scientific truth, or the mathematical expression of it,” as the unpatentable mathematical relationship observed by the Court in *Mackay*.¹⁴⁷ Alternatively, having found that the proposed algorithm used the same “ordinary arithmetic steps a human would use” only in a different order, “[could] also be performed without a computer,” and “c[ould] be carried out in existing computers long in use, no new machinery being necessary,”¹⁴⁸ the Court could have found that such basic arithmetic was obvious or lacked novelty under Sections 102 and 103.¹⁴⁹ Regardless of the Court’s stated reasons, *Benson* was correctly decided, not because computer algorithms are “abstract ideas,” but because the mathematical relationship between pure binary and decimal binary is a fundamental scientific principle, and the algorithm the *Benson* patent claimed was merely a mathematical expression of that law of nature.

Flook initially appears more complex, but examining the claims at issue, its rationale similarly becomes apparent. The claims in *Flook* were directed to calculating a specific number, called an alarm limit.¹⁵⁰ A method for calculating a specific number is also known as a mathematical formula. Thus, *Flook*, like *Benson*, could have been decided without invoking abstract ideas at all, instead relying on the “laws of nature” exclusion. Indeed, the Supreme Court noted in a footnote that the petitioner’s algorithm revealed an underlying “scientific principle” that always existed, just as “Newton’s formulation of the law of universal gravitation . . . according to the equation $F=mm'/d^2$. . . always existed—even before Newton announced his celebrated law.”¹⁵¹ The *Flook* patent claimed nothing more than a process for obtaining a particular number by inputting particular values into a particular mathematical equation. That a mathematical formula will reliably yield a specified numerical output given a specified numerical input is a quintessential patent-ineligible scientific principle.

Even the claims in *Bilski* were directed to a mathematical

147. See *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94 (1939).

148. See *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972).

149. See *Parker v. Flook*, 437 U.S. 584, 592 n.14 (1978) (“Sections 102 and 103 establish certain conditions, such as novelty and nonobviousness, to patentability.”).

150. *Id.* at 585 (“An ‘alarm limit’ is a number.”); *Diamond v. Diehr*, 450 U.S. 175, 186 (1981).

151. *Flook*, 437 U.S. at 593 n.15.

expression of a law of nature, despite the Court's description of the claims as directed to "the abstract idea of hedging risk."¹⁵² The first critical observation regarding the claims in *Bilski* is that, although Claim 1 was primarily discussed in the Supreme Court's decision, the Court also noted that Claim 4 put the concept articulated in Claim 1 *into a simple mathematical formula*.¹⁵³ This mathematical formula used "historical costs and weather variables" along with "economic and statistical formulas, to analyze these data and to estimate the likelihood of certain outcomes."¹⁵⁴ Claim 4 of the *Bilski* patent application recited:

The method of claim 3 wherein the fixed price for the consumer transaction is determined by the relationship:

$$\text{Fixed Bill Price} = F_i + [(C_i + T_i + LD_i) \times (\alpha + \beta E(W_i))]$$

wherein,

F_i = fixed costs in period i ;

C_i = variable costs in period i ;

T_i = variable long distance transportation costs in period i ;

LD_i = variable local delivery costs in period i ;

$E(W_i)$ = estimated location-specific weather indicator in period i ;
and α and β are constants.¹⁵⁵

Reviewing this claim, *Bilski* was plainly decided correctly. *Bilski*, like *Flook*, merely claimed a mathematical expression of a law of nature—namely that, given particular inputs to the equation " $F_i + [(C_i + T_i + LD_i) \times (\alpha + \beta E(W_i))]$ " a particular output would result. *Bilski*'s method of balancing risk within a series of consumer transactions¹⁵⁶ was in reality a method of balancing a mathematical equation. Thus, *Bilski* does not stand for the proposition that business methods and long-standing economic practices are "abstract ideas;" it means that business methods and other long-standing economic practices that are, in essence, mathematical expressions of laws of nature are patent-ineligible.

Understanding *Benson*, *Flook*, and *Bilski* also provides an easier

152. *Bilski v. Kappos*, 561 U.S. 593, 612 (2010).

153. *See id.* at 611 ("The concept of hedging, described in claim 1 and reduced to a mathematical formula in claim 4, is an unpatentable abstract idea, just like the algorithms at issue in *Benson* and *Flook*.").

154. *Id.* at 615.

155. *See* U.S. Patent Application No. 08/833,892 (filed Apr. 10, 1997), http://www.uspto.gov/go/com/sol/2007-1130bilski_joint_appendix.pdf.

156. *See Bilski*, 561 U.S. at 599.

method for explaining the Court's contrary decision in *Diehr*. Although the claims in both *Flook* and *Diehr* included repeatedly recalculating a number based on a given formula, the claims in *Diehr* had one small but crucial distinction—upon determining that the number output by the formula was equivalent to a desired result, *the press opened automatically*. Thus, the claims in *Diehr* were not directed only to calculating a number, as the claims in *Flook* were, but to achieving an *man-made result*—opening a press door—upon *input* of that number.

This distinction may seem technologically minor, but it is crucial to Section 101 jurisprudence. *Diehr* distinguishes between patents that only claim a mathematical expression of a law of nature, on one hand, and patents that use mathematical expressions that either do not reflect a law of nature or that accomplish some man-made result, on the other. This same distinction was the crux of *Mackay*: the distinction between patenting the Abraham's formula itself, and patenting a novel and useful structure—a directional radio antenna—created with the *aid* of the Abraham's formula.

B. Applying The Test

By returning to a clear delineation between (a) patent-ineligible laws of nature and mathematical expressions thereof, and (b) patent-eligible novel and useful inventions made by man, courts can reject patents for technological advances that would truly monopolize a tool a scientific innovation while still encouraging innovation in the computer and software industries.

Under this approach, courts should reject only those patents claiming laws of nature or mathematical expressions thereof—such as those in *Benson*, *Flook*, and *Bilski*—and allow all other claims through the Section 101 “gateway” as patent-eligible subject matter. If a claim is directed to something that is man-made, the product of human ingenuity, it should pass the Section 101 test. It should not matter if what is “man-made” is a formula or an algorithm, as long as the formula or algorithm is not a representation of nature or a fundamental scientific principle.

Courts will, of course, need to be careful to distinguish between “claims containing math” and claims encompassing a mathematical expression *of a law of nature*. Otherwise, just as all inventions, at some level, “embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas,”¹⁵⁷ nearly all computer-implemented inventions, and in fact nearly everything in the universe can, at some

157. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014).

level, be expressed with math.¹⁵⁸ Yet, just as not all computer algorithms using math are abstract, not all mathematical expressions are mathematical expressions of laws of nature.¹⁵⁹

Consistent with our recommended approach, in at least two recent cases the Federal Circuit has reached conclusions recognizing that software, even though based on a mathematical expression, can nevertheless be patent-eligible subject matter.

In *McRO*,¹⁶⁰ for example, the Federal Circuit held that that claims reciting "a specific asserted improvement in computer animation" for lip-synching (matching an animated character's lips and facial expression to its associated speech) were not directed to an unpatentable abstract idea.¹⁶¹ Whereas prior art methods were done manually by artists and were a highly subjective process, the claimed invention in *McRO* automated the process by using "specific, limited mathematical rules"¹⁶² to determine "morph weight sets as a function of the timing of phoneme sub-sequences."¹⁶³

Reversing the district court, the Federal Circuit found that the claimed invention was not directed to an abstract idea.¹⁶⁴ The court further noted that, although the claimed invention used a mathematical algorithm, the claims nevertheless were patent-eligible because they did not merely invoke generic processes and machinery, and instead focused on a specific asserted improvement in computer animation, provided automatic use of rules of particular type that a human animator likely would not have utilized, and the claimed techniques did not preempt approaches that used rules of different structure or different techniques.¹⁶⁵ *McRO* also warned that "courts 'must be careful to avoid oversimplifying the claims' by looking at them generally and failing to account for the specific requirements of the claims," and noted that the

158. Cf. Max Tegmark, *Everything in the Universe Is Made of Math – Including You*, DISCOVER (Nov. 4, 2013), <http://discovermagazine.com/2013/dec/13-math-made-flesh>; Max Tegmark, *Do We Live Inside a Mathematical Equation?*, SCIENCE (Feb. 16, 2013), <http://www.sciencemag.org/news/2013/02/do-we-live-inside-mathematical-equation>.

159. See *In re Meyer*, 688 F.2d 789, 794–95 (C.C.P.A. 1982) ("Scientific principles, such as the relationship between mass and energy, and laws of nature, such as the acceleration of gravity, namely, $a = 32\text{ft./sec.}^2$, can be represented in mathematical format. However, some mathematical algorithms and formulae do not represent scientific principles or laws of nature; they represent ideas or mental processes and are simply logical vehicles for communicating possible solutions to complex problems.").

160. *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016).

161. *Id.* at 1314.

162. *Id.*

163. *Id.* at 1313.

164. *Id.* at 1313, 1316.

165. *Id.* at 1313–16.

patent did not merely “automate a task previously performed by humans.”¹⁶⁶

Similarly, in *Thales*,¹⁶⁷ the Federal Circuit found that an improved inertial tracking system for tracking the motion of an object relative to a moving reference frame was not directed to an abstract idea, and thus constituted patent-eligible subject matter.¹⁶⁸ The patent at issue was directed to inertial sensors, such as accelerometers and gyroscopes, which measure the specific forces associated with changes in a sensor’s position and orientation relative to a known starting position, and are used in a wide variety of applications, including aircraft navigation and virtual reality simulations.¹⁶⁹ Prior art conventional solutions were flawed, however, and produced inconsistent position information when a moving platform accelerated or turned.¹⁷⁰ The *Thales* invention, instead of using the conventional approach, required the platform (*e.g.*, vehicle) inertial sensors to directly measure the gravitational field in the platform frame, and the object (*e.g.*, helmet) inertial sensors to then calculate position information relative to the frame of the moving platform. This system increased tracking accuracy, reduced the amount of hardware required, and allowed for simpler installation.¹⁷¹

The Federal Circuit found that these claims were not directed to the abstract idea of using “mathematical equations for determining the relative position of a moving object to a moving reference frame,” as the lower court found, but instead were directed to “systems and methods that use inertial sensors in a non-conventional manner to reduce errors in measuring the relative position and orientation of a moving object on a moving reference frame.”¹⁷² The court clarified that just because “a mathematical equation is required to complete the claimed method and system does not doom the claims to abstraction.”¹⁷³ The court acknowledged that, “[w]hile the claims utilize mathematical equations to determine the orientation of the object relative to the moving reference frame,” the equations were “a consequence of the arrangement of the sensors and the unconventional choice of reference frame in order to calculate position and orientation,” and the patent did not attempt to claim the equations themselves.¹⁷⁴

166. *McRO*, 837 F.3d at 1313–14.

167. *Thales Visionix Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017).

168. *Id.* at 1349.

169. *Id.* at 1344–45.

170. *Id.* at 1345.

171. *Id.*

172. *Thales Visionix Inc. v. United States* 850 F.3d 1343, 1348–1349 (Fed. Cir. 2017).

173. *Id.* at 1349.

174. *Id.* at 1348–49.

McRO and *Thales* were sensibly decided because neither of these inventions claimed laws of nature or mathematical expressions thereof. Whether animated lip-synching and improved inertial tracking are “abstract ideas” is irrelevant. Although *McRO*’s lip-synching technology relied on a mathematical relationship between an animated character’s facial expression and the sound the character was making, this function is not a law of nature. The mathematical relationship used in *McRO* is not some fundamental truth; it did not exist in nature prior to the discovery or invention of animation. Similarly, although *Thales* used pre-existing math and laws of physics to more accurately track the motion of two objects moving together, the particular algorithms defined an artificially created relationship between a man-made vehicle and a man-made helmet using man-made sensors, not a mathematical expression of a law of nature. Thus, like the inventions in *McKay* and *Diehr*, the patents in *McRO* and *Thales* claimed novel and useful inventions *made by man*, created with the aid of laws of nature and the mathematical expressions thereof.

Other recent cases, we submit, were not decided in a manner consistent with longstanding precedent. *TLI*, discussed in section 0 above, for example, would likely have reached a different result if the standards set forth in *Enfish* had been applied. The Federal Circuit’s 2017 decision in *RecogniCorp, LLC v. Nintendo Co.*¹⁷⁵ provides a further case study. In *RecogniCorp*, the Federal Circuit rejected a patent directed to method for creating “a composite facial image using constituent parts” as abstract.¹⁷⁶ In the prior art, composite facial images typically were stored in file formats such as “bitmap,” “gif,” or “jpeg.” But these file formats required significant memory, and compressing the images often resulted in decreased image quality. Digital transmission of these images could be difficult. The claimed invention “sought to solve this problem by encoding the image at one end through a variety of image classes that required less memory and bandwidth, and at the other end decoding the images.”¹⁷⁷ The Federal Circuit, however, found the claims “directed to the abstract idea of encoding and decoding image data,” by assigning image codes to the images through an interface using a mathematical formula, and then reproducing the image based on the codes.¹⁷⁸ The court described the claims as directed to “a method whereby a user starts with data, codes that data using ‘at least one

175. *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1324 (Fed. Cir. 2017).

176. *Id.*

177. *Id.*

178. *Id.* at 1326.

multiplication operation,’ and ends with a new form of data.’¹⁷⁹ The decision concluded that “[a]dding one abstract idea (math) to another abstract idea (encoding and decoding) does not render the claim non-abstract.”¹⁸⁰

Recognicorp illustrates a recurring problem with current Section 101 jurisprudence, which is too quick to write off *all* claims involving mathematical expressions as abstract. The mathematical relationship between one (man-made) image of a person’s face and a similar (man-made) image with a smaller file size is not a law of nature. Nor is an algorithm for transforming one man-made image into another a mathematical expression of a law of nature, even if it involves multiplication. Compressing and transforming images are man-made processes. There are numerous different equations that can be used to compress or transform an image depending on subjective determinations of “image quality,” or more objective determinations of file size and memory use. Two inventors might come up with two entirely different algorithms—both using math—to encode and decode an image, and both inventors might argue that their algorithm does so most efficiently. These man-made processes, used to determine the best way to encode, submit, or transform a man-made image (for varying values of “best”) should, in keeping with historical precedent, be patent-eligible subject matter.¹⁸¹

Yet the Federal Circuit rejected the claims in *RecogniCorp*, and other similar claims in other cases, despite the fact such claims were directed to new and useful methods and processes.¹⁸² The mathematical equations used in many of the claims rejected by the Federal Circuit were expressions of man-made constructs, not expressions of laws of nature. The mathematical relationship between, for example, an image taken by a digital camera, and the image output by a printer or monitor¹⁸³ did not previously exist in nature, and would not exist but for a human beings inventing both cameras and printers. Thus, such claims should satisfy

179. *Id.* at 1327.

180. *Id.*

181. Consider, for example, the number of patents relating to the H.264 video compression codec, <http://www.mpegla.com/main/programs/AVC/Documents/avc-att1.pdf>, and the development of competing compression algorithms, such as Google’s VP9 codec.

182. *See also, e.g.,* *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1350–51 (Fed. Cir. 2014) (rejecting claims directed to creating an improved “device profile” by combining data sets, finding that “[t]he device profile, as claimed, is a collection of intangible color and spatial information,” concluding that claims were directed to the abstract idea of “of organizing information through mathematical correlations”).

183. *See* U.S. Patent No. 6,128,415, at 1:14–31 (issued Oct. 3, 2000) (patent at issue in *Digitech*).

Section 101's definition of patent-eligible subject matter, given the broad intent for Section 101 to cover "anything under the sun that is made by man."¹⁸⁴

CONCLUSION

Section 101 and its exceptions have a storied history dating back nearly two centuries. Together they were crafted to ensure a careful balance between encouraging innovation, on the one hand, and leaving free important "scientific truths" to be used by all mankind, on the other.

The recent rise of the "abstract ideas" exception has turned Section 101 on its head. Courts are now wielding Section 101 as a mechanism to prevent patenting in the computer and software industries, or at best are engendering uncertainty about patentability in those fields, broadly discouraging beneficial investment and innovation. Section 101 was never supposed to have these effects. It was intended as a simple "threshold test"¹⁸⁵ and was purposefully given a broad scope subject to only a few, narrow exceptions.¹⁸⁶

184. This is not to say all software claims found *patent-eligible* by the Federal Circuit should ultimately be found *patentable*. Many software claims should be invalidated at some point. Thus, even if most software claims pass through the Section 101 gateway—as this article proposes they should—a court should still properly reject them if they fail to satisfy the statutory requirements of Section 102 (novelty), Section 103 (nonobviousness), or Section 112 (enablement and description).

For example, claims found "abstract" under the current framework due to lack of specificity should instead be rejected under Section 112. *See, e.g., Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App'x 914, 917–18 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 2390 (2016) ("Much of Vehicle Intelligence's briefing centers on the use of an 'expert system' that improves over the prior art But neither the claims at issue nor the specification provide any details as to how this 'expert system' works.").

Similarly, claims found "abstract" because they implemented routine and well-known methods on a computer would fail under Section 103. *See, e.g., Planet Bingo, LLC v. VKGS LLC*, 576 F. App'x 1005, 1009 (Fed. Cir. 2014) (rejecting claims that recited only "generic functions of . . . verifying a chosen set of bingo numbers against a winning set of bingo numbers" using a computer).

Finally, most "business method" patents currently rejected as abstract would instead fail under Section 102. *See, e.g., Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044, 1054 (Fed. Cir. 2017) (rejecting claims directed to computer-aided methods and systems for providing financing, finding that financing a purchase is a "fundamental economic practice long prevalent in our system of commerce"). *Cf. U.S. Credit Sys. Co. v. Am. Credit Indem. Co.*, 53 F. 818, 819 (C.C.D.N.Y. 1893), *aff'd*, 59 F. 139 (2d Cir. 1893) ("But plans of indemnity against losses or parts of losses from casualty or misfortune by contracts of insurance or indemnity in various forms were in common use before, and not, in any sense, novel. Besides this, the terms of contracts rest in the agreements of those making them, and coming to such agreements is not a new art.").

185. *See Bilski v. Kappos*, 561 U.S. 593, 602 (2010).

186. *See Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980) ("In choosing such expansive terms [for Section 101] . . . modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be given wide scope.").

The solution proposed by this article, if followed, would provide courts, litigants, and the Patent Office a path back to a far more predictable and efficient regime. And importantly, this solution can be implemented through judicial interpretation, without the need for legislation or reversal of the *Alice* decision. Lower courts must simply follow the Supreme Court's historical guidance, rather than the more recent throng of overbroad glosses on what constitutes an "abstract idea." Claims directed to software and other computer-implemented inventions, the bulk of which are unrelated to business methods of the sort considered in *Alice*, can continue to be evaluated in light of *Benson*, *Flook*, and *Bilski*, and in keeping with *Diehr's* recognition that claims are not drawn to nonstatutory subject matter simply because they use a mathematical formula, computer program, or computer.¹⁸⁷

By returning the exceptions to patent-eligible subject matter to their roots—namely, by once again limiting them to laws of nature and mathematical expressions thereof—patent law will preserve the building blocks of scientific and technological development while still encouraging innovation in the digital age.

187. *Diamond v. Diehr*, 450 U.S. 175, 187 (1981).