

“ONE IF BY LAND, TWO IF BY SEA”: THE FEDERAL CIRCUIT’S OVERSIMPLIFICATION OF COMPUTER- IMPLEMENTED MATHEMATICAL ALGORITHMS

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Abstract

*The modern, connected world relies on advanced computer-implemented mathematical algorithms to manage the storage and movement of digital data. Whether these algorithms, including those related to error correction, compression, and encryption, should be patent eligible is on the razor’s edge of the questions surrounding patent eligibility today. While, generally, the generic computer implementation of abstract ideas is not patent eligible, when an abstract idea is claimed that provides a “technological improvement,” the answer is less clear. The Federal Circuit recently held in *RecogniCorp* that claims directed to image encoding were patent ineligible as being directed to an abstract idea without an inventive concept. This decision is hard to reconcile with past case law, especially considering that the image encoding itself provides a technological improvement to the computer implementing it by increasing the computer’s efficiency. This Article argues that the *RecogniCorp* decision was misguided and that the claimed image encoding should have been deemed patent eligible based on the technological improvement to the computer’s efficiency. Even more damning, though, is the Federal Circuit’s blanket statements as to the lack of patent eligibility for claims directed to any computer-implemented mathematical algorithm, whatever technological improvement that algorithm may provide. Considering the importance of data processing in modern technology, the effects of such a restriction would be dire. This Article stresses the critical need for a second look at the *RecogniCorp* decision to ensure the patent eligibility of computer-implemented mathematical algorithms that provide technological improvements.*

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INTRODUCTION

Conventional computer systems utilize abstract mathematical algorithms to optimize the underlying data processing. Whether the technological improvements provided by these algorithms can provide for patent eligibility is not clear. In 2014, the Supreme Court in *Alice* laid out the test for applying 35 U.S.C. § 101 to computer-implemented abstract ideas.¹ If a claim is directed to a computer-implemented abstract idea that provides a technological improvement, the *Alice* test holds and recent Federal Circuit decisions have held that the claim should be patent eligible.² However, in *RecogniCorp*, the Federal Circuit held that claims directed to image encoding were not patent eligible as being directed to an abstract idea (the encoding of data) with no inventive concept.³ The Federal Circuit completely disregarded the understood increase

1. See *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355–57 (2014) (explaining the two-step framework for distinguishing patents claiming abstract ideas “from those that claim patent eligible application of those concepts”).

2. See *id.* (noting that claims that “merely require generic computer implementation, fail to transform the abstract idea into a patent-eligible invention.”); *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1259–60 (Fed. Cir. 2017) (explaining that providing technological improvements on an abstract idea can make a claim patent-eligible).

3. See *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1324, 1327–28 (Fed. Cir. 2017) (holding that a claim regarding encoding and decoding image data was not patent eligible, because it was directed to an abstract idea and featured no inventive concepts).

in computer efficiency that resulted from the claimed image encoding; thereby, the court should have found the claims to be patent eligible.⁴

The potential consequences of this decision, however, move far beyond the narrow field of image encoding due to the broad language the Federal Circuit used in shutting down all computer-implemented mathematical algorithms from providing inventive concepts.⁵ Advancements in computer-implemented mathematical algorithms are essential to many industries, including the telecommunications standards used by practically everyone every day to transmit and receive data.⁶ Taking away the patent eligibility of these advancements could have a profound effect on the desire of technology companies to research these improvements altogether.⁷ The *RecogniCorp* decision needs to be given a second look to provide for the patent eligibility of otherwise abstract computer-implemented mathematical algorithms that provide technological improvements, whether or not the claims in *RecogniCorp* themselves are found to be patent eligible.

This Article critically assesses the patent eligibility of computer-implemented mathematical algorithms. Part I provides an overview of the case law related to the *RecogniCorp* decision, including more broadly applicable Supreme Court decisions and recent Federal Circuit decisions specific to the area of computer-implemented abstract ideas. Part II compares and contrasts the case law related to the *RecogniCorp* decision and the decision itself, arguing that the case was decided incorrectly. Part III analyzes the potential concerns of the broader application of the *RecogniCorp* decision across a larger swathe of technologies. Part IV provides possible judicial interpretations that could correct the *RecogniCorp* decision and an analysis of how current legislative proposals could have a similar effect.

I. OVERVIEW OF PATENT ELIGIBILITY

A. *The Road to Alice*

From the Patent Act of 1952, 35 U.S.C. § 101 provides the statutory framework for patent eligibility.⁸ 35 U.S.C. § 101 states:

4. See *id.* at 1327–28 (arguing that neither the algorithm nor any of the patents other alleged invention concepts made the claim patent eligible).

5. See *id.* at 1328 (“Nothing ‘transforms’ the abstract idea of encoding and decoding into patent eligible subject matter. Nor does the presence of a mathematical formula dictate otherwise.”).

6. See U.S. Patent No. 9,787,326 (filed May 19, 2015) (describing the nature of the transmitting apparatus and its encoding features); U.S. Patent No. 9,621,191 (filed Feb. 5, 2015) (describing the transmitting and encoding capacity of the technology); U.S. Patent No. 9,094,043 (filed Feb. 1, 2012) (describing the manner in which the technology improves resistance to errors while processing data from codes); U.S. Patent No. 8,958,375 (filed Feb. 11, 2011) (describing the manner in which the claimed techniques generate and transmit repair codes); see also *Which Are the Most Valuable Patents of Qualcomm’s Patent Portfolio?*, GREYB SERVICES: IP ANALYTICS (June 16, 2016) [hereinafter GREYB SERVICES], <https://www.greyb.com/starpatents-in-qualcomm-patent-portfolio> (claiming that CDMA (Code Division Multiple Access) was key to Qualcomm’s success and the “development of telecommunication standards”).

7. See generally GREYB SERVICES, *supra* note 6 (noting the monetization potential of patents carries with it great business incentives like “diamonds buried in the mines”).

8. 35 U.S.C. § 101 (2018).

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.⁹

While the use of “any” in this statute is seemingly all encompassing, the Supreme Court has long held that abstract ideas, laws of nature, and natural phenomena are exceptions to patent eligibility in order to prevent preemption of what they entail, as “they are the basic tools of scientific and technological work.”¹⁰ How these exceptions can be integrated into patent-eligible claims has developed over time.¹¹

In the 1970s the Supreme Court issued the *Benson* and *Flook* decisions which struck down the patent eligibility of claims directed to computer-implemented mathematical formulae as being generically implemented long-established laws of nature.¹² In *Benson*, the Supreme Court held that a mathematical algorithm for converting between decimal and binary numbers was patent ineligible because the algorithm presented, while only relevant to the functioning of a computer, was a law of nature and, thereby, not subject to patent protection.¹³ The Court held that a computer program, a mathematical formula without “substantial practical application except in connection with digital computer,” was not a patentable process.¹⁴ Similarly, in *Flook*, a mathematical algorithm using a set of variables to update an alarm limit was claimed and found to be patent ineligible.¹⁵ Specifically, the Court stated that “if a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.”¹⁶

The *Benson* and *Flook* decisions were seemingly contrasted in 1981 when in *Diamond v. Diehr*, the Supreme Court opened the gates for the patentability of computer-implemented abstract ideas.¹⁷ In *Diehr*, claims involving a known mathematical formula (the Arrhenius equation) were found to be abstract.¹⁸ However, the claims did “not seek to pre-empt the use of that equation” because it was applied to a specific computer-implemented physical transformation of curing synthetic rubber and, thereby, was found to be patent eligible.¹⁹ The Supreme Court applied the machine-or-transformation test in determining patent

9. *Id.*

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

11. *See Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2354–55 (2014) (recounting the history of exceptions to patent eligibility and the manner in which such exceptions could be transformed into patent eligible claims).

12. *See Parker v. Flook*, 437 U.S. 584, 594–95 (1978) (arguing that improvements in making mathematical calculations are not within the bounds of 35 U.S.C. § 101); *Benson*, 409 U.S. at 71–73 (arguing that there is no evidence that Congress or the President’s Commission on the Patent System intended to protect algorithms that assist in mathematical calculations).

13. *Benson*, 409 U.S. at 67–68.

14. *Id.*

15. *Parker*, 437 U.S. at 595.

16. *Id.* (quoting *In re Richman*, 563 F.2d 1026, 1030 (C.C.P.A. 1977)).

17. *See* 450 U.S. 175, 187 (1981) (“Our earlier opinions lend support to our present conclusion that a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer.”).

18. *Id.* at 187–88.

19. *Id.* at 187.

eligibility where a determination is made if the claims are tied to a particular machine or are part of a physical transformation.²⁰ The *Flook*, *Benson*, and *Diehr* trilogy was hard for many to reconcile, as each of these cases applies an innovative algorithm to a conventional process, but only one of the cases was found to be patent eligible.²¹ Thereby, the decisions of the *Benson* and *Flook* cases juxtaposed with *Diehr* left the patent world “wondering in the wilderness” for almost forty years, with the question of the patent eligibility of abstract ideas not clearly answered.²² This period of wondering and lack of firm Supreme Court guidance led to the widespread patent eligibility of computer-implemented abstract ideas.²³

The Supreme Court revisited the patent eligibility issue in 2010 with the *Bilski* decision, where claims directed to financial hedging were seen to encompass an abstract mathematical formula and found to be ineligible for patent protection.²⁴ While the Federal Circuit had applied the machine-or-transformation test in determining the patent ineligibility of the *Bilski* claims, the Supreme Court decided that this test should not be exclusive.²⁵ The Court warned that the exclusive use of the machine-or-transformation test “would create uncertainty as to the patentability of software, advanced diagnostic medicine techniques, and inventions based on linear programming, data compression, and the manipulation of digital signals[;]”²⁶ the Court decided that these inventions of the information age, while not held in the decision to be categorically patent eligible, should not be stonewalled from patent eligibility by the sole application of the machine-or-transformation test.²⁷

Working towards a clearer test for patent eligibility (as the *Bilski* decision only found the machine-or-transformation test to not be the sole test, but provided no additional or alternative test), in 2012 and 2014 the Supreme Court’s *Mayo* and *Alice* decisions revealed a two-part test to be used when determining patent eligibility.²⁸ The *Mayo* decision related to claims directed to laws of nature, and the *Alice* decision confirmed that the same two-part test applies to computer-implemented abstract ideas.²⁹ The *Alice* test looks to (1) whether the claim is directed to a patent-ineligible abstract idea and, if it is,

20. *Id.* at 182–85.

21. See Rebecca S. Eisenberg, *Prometheus Rebound: Diagnostics, Nature, and Mathematical Algorithms*, 122 YALE L.J. ONLINE 341, 343–46 (2013) (discussing different explanations given to differentiate the facts of *Flook*, *Benson*, and *Diehr*, to make sense of why they resulted in different holdings).

22. See Peter S. Menell, *Forty Years of Wondering in the Wilderness and no Closer to the Promised Land: Bilski’s Superficial Textualism and the Missed Opportunity to Return Patent Law to its Technology Mooring*, 63 STAN. L. REV. 1289, 1290–91, 1304–05 (2011) (arguing that the Supreme Court’s precedents in patent law caused confusion in the patent community at large and the United States Courts of Appeals in particular).

23. *Id.*

24. *Bilski v. Kappos*, 561 U.S. 593, 612–13 (2010).

25. See *id.* at 604 (finding that recent authority “shows that [the machine-or-transformation test] was not intended to be an exhaustive or exclusive test”).

26. *Id.* at 605.

27. *Id.* at 605–06.

28. See *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014) (discussing the two-part framework); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 77–78 (2012) (discussing the two-part test used in determining patent eligibility).

29. See *Alice Corp.*, 134 S. Ct. at 2355–57 (applying the two-part test to computer-implemented abstract ideas); *Mayo Collaborative*, 566 U.S. at 70 (reviewing the patentability of laws of nature).

(2) whether the claim contains additional elements that provide an inventive concept.³⁰ The patent claims analyzed in *Alice* related to mitigating settlement risk in financial transactions by using a computer system as a third-party intermediary.³¹ Under step one of the *Alice* test, the *Alice* claims were found to be directed to the computer implementation of the abstract idea of mitigating settlement risk.³² Under step two of the test, the Court found that “wholly generic computer implementation is not generally the sort of ‘additional featur[e]’ that provides any ‘practical assurance that the process is more than a drafting effort designed to monopolize the [abstract idea] itself.’”³³ The *Alice* Court declared that merely connecting an abstract idea (mitigating settlement risk) with any sort of generic computer implementation cannot be seen to provide significantly more under the second step of the test; that only when the abstract idea improves the computer’s functioning or provides some other technological improvement can a claim be patent eligible.³⁴ Mitigating settlement risk was merely performed by a generic computer, but did not change or improve how the computer operates.³⁵ Similarly, the *Mayo* Court decided that the generic application of innovative algorithms that describe basic natural principles, however significant they may be, could not be considered as providing an inventive concept.³⁶ Claiming the direct application of Einstein’s law of energy to a linear accelerator or the direct application of Archimedes’ law of floatation to building a boat were provided as examples of situations that do not provide an inventive concept because claims of this type would broadly monopolize or preempt the mathematical equation describing the natural law itself.³⁷

In summary, the Supreme Court laid out the two-part *Alice* test to draw the line between the patent-ineligible generic computer implementation of an abstract idea and something more, where an inventive concept is found when a claim provides a technological improvement that goes beyond the abstract idea itself.³⁸ Since the 2014 *Alice* decision, the Supreme Court has not provided additional guidance on patent eligibility.³⁹ Thereby, the Federal Circuit has been left with the difficult task of filling the void.⁴⁰

B. *The Federal Circuit’s Post-Alice 35 U.S.C. § 101 Interpretation*

Following the *Alice* decision, the Federal Circuit has provided precedential decisions that act as clarifying guideposts describing how the first and second

30. See *Alice Corp.*, 134 S. Ct. at 2355–57 (introducing the commonly known ‘*Alice* test’).

31. *Id.* at 2352.

32. See *id.* at 2354–57 (discussing step one of the ‘*Alice* test’).

33. *Id.* at 2358 (quoting *Mayo Collaborative*, 566 U.S. at 77).

34. *Id.* at 2357 (stating the decision of the *Alice* Court).

35. See *Alice Corp.*, 134 S. Ct. at 2358–59 (discussing the mitigation of settlement risk).

36. See *Mayo Collaborative*, 566 U.S. at 72–73 (describing the application of innovative algorithms).

37. See *id.* at 77–78 (providing examples that do not provide an inventive concept).

38. See *Alice Corp.*, 134 S. Ct. at 2355–57 (discussing the two-part test in *Alice*).

39. See Anthony S. Volpe & Harry Vartanian, ‘*Alice*’ and the Search for Patent Eligible Software, LEGAL INTELLIGENCER (May 1, 2018, 2:05 PM), <https://www.law.com/thelegalintelligencer/2018/05/01/alice-and-the-search-for-patent-eligible-software-patents> (reviewing the guidance provided on patent eligibility).

40. *Id.*

steps of the *Alice* test should be interpreted and applied.⁴¹ Regarding *Alice* step one, the Federal Circuit has found that certain computer-related inventions that provide improvements to the systems they describe are not directed to abstract ideas and, thereby, are patent eligible.⁴² In *Enfish*, claims regarding a new way to structure computer memory were found to not be abstract because they provided “a specific implementation of a solution to a problem in the software arts.”⁴³ In making this determination, the court distinguished the *Enfish* claims as specifically improving computer functionality with the past ineligible claims of *Benson* where the computer was merely used as a tool to perform the claimed abstract mathematical algorithm.⁴⁴ Similar to *Enfish* and also providing improvements to a computer memory system, in 2017 the Federal Circuit in *Visual Memory* found that claims directed to an improved computer memory system that increases computer functionality by determining how data is stored based on “programmable operational characteristics” were not abstract.⁴⁵ The court cautiously distinguished the “programmable operational characteristics” from simple abstract data organization by arguing that the determination of abstract ideas should not be overextended, as “all inventions at some level embody, use, reflect, rest upon, or apply laws of nature . . . or abstract ideas.”⁴⁶ Moreover, in *McRO* the Federal Circuit found claims directed to improved computer-based lip synchronization to not be abstract, warning 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.”⁴⁷ The *McRO* claims provided an improvement to a computer-implemented system as opposed to a computer system itself (the computer memory) as in *Enfish* and *Visual Memory*.⁴⁸ Likewise in *Finjan*, that Federal Circuit found that an improvement to a computer-based system (identifying and protecting against malware) encompassed a non-abstract improvement in computer functionality rendering the claims patent-eligible.⁴⁹ The *Enfish*, *Visual Memory*, *McRO*, and *Finjan* claims, while computer implemented, passed step one of the *Alice* test by claiming specific solutions to computer-related problems.⁵⁰

On the other hand, when analyzing claims directly describing data manipulation, the Federal Circuit handily identifies abstract ideas.⁵¹ For example, using a mathematical algorithm to organize data (*Digitech*), collecting and analyzing data (*Electric Power Group*), the encoding and decoding of image

41. *See id.* (discussing the guidelines provided after *Alice*).

42. *See id.* (reviewing Federal Circuit decisions regarding patent eligibility and abstract ideas).

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

44. *See id.* at 1336, 1338–39 (comparing the claims in *Enfish* to the claims in *Benson*).

45. *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1259 (Fed. Cir. 2017).

46. *Id.* at 1262 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012)).

47. *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299, 1313 (Fed. Cir. 2016) (quoting *In re TLI Communications LLC Patent Litigation*, 823 F.3d 607, 611 (Fed. Cir. 2016)).

48. *See id.* at 1313 (discussing the claim as an improvement to a computer-implemented system); *Visual Memory*, 867 F.3d at 1262 (reviewing the claim brought forth in the case); *Enfish*, 822 F.3d at 1339 (reviewing the claims brought forth in the case).

49. *Finjan, Inc. v. Blue Coat Sys.*, 879 F.3d 1299, 1305–06 (Fed. Cir. 2018).

50. *Id.*; *Visual Memory*, 867 F.3d at 1262; *McRO*, 837 F.3d at 1316; *Enfish*, 822 F.3d at 1339.

51. *See, e.g.*, *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1350–51 (Fed. Cir. 2014) (identifying a mathematical algorithm as an abstract idea).

data (*RecogniCorp*), and “selecting certain information, analyzing it using mathematical techniques, and reporting or displaying the results of the analysis” (*SAP America*) were found by the Federal Circuit to be abstract ideas.⁵² When claims recite computational data manipulation, the Federal Circuit identifies that as an abstract idea under step one of the *Alice* test.⁵³

Moving into the second step of the *Alice* test, abstract ideas implemented by generic computer hardware have been found to contain inventive concepts when a technological improvement is identified.⁵⁴ In *Bascom*, the Federal Circuit determined that claims using conventional computer components arranged in an unconventional manner contained an inventive concept;⁵⁵ chiefly, allowing for internet content filtering (the identified abstract idea), which was previously only customizable when performed by an individual computer, was determined to be customizable for all users over the cloud.⁵⁶ The court highlighted how the arrangement of the otherwise generic components (moving the content filter to the cloud/internet) provided “a technical improvement of prior art ways of filtering such content.”⁵⁷ Akin to *Bascom*, in *Amdocs*, while a claimed distribution of data flow in a storage network was found to be abstract, the way in which this abstract idea “served to improve the performance of the system itself” provided the inventive concept.⁵⁸ Additionally, in *DDR Holdings*, claims that retained internet traffic by generating composite webpages for advertisements (the identified abstract idea) were found to satisfy *Alice* step two because “the claimed solution [for retaining internet traffic] is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks.”⁵⁹

Additionally, the February 2018 tandem *Berkheimer* and *Aatrix* decisions have made waves in the *Alice* step-two procedure.⁶⁰ These decisions clarified that in the *Alice* step-two analysis “whether a claim element or combination is

52. *SAP Am., Inc. v. InvestPic, LLC*, 890 F.3d 1016, 1021 (Fed. Cir. 2018); *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1327 (Fed. Cir. 2017); *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016); *Digitech Image Techs.*, 758 F.3d at 1350–51.

53. *See, e.g., Digitech Image Techs.*, 758 F.3d at 1351 (determining “a process that employs mathematic algorithms to manipulate existing information to generate additional information is not patent eligible”).

54. *See Amdocs (Isr.) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1317 (Fed. Cir. 2016) (describing the instances where an inventive concept is found); *BASCOM Glob. Internet Servs., v. AT&T Mobility LLC*, 827 F.3d 1341, 1348 (Fed. Cir. 2016) (citing *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2359 (2014)) (“[U]nder step two of the *Alice* analysis, it might become clear that the specific improvements in the recited computer technology go beyond ‘well-understood, routine, conventional activit[ies]’ and render the invention patent-eligible.”).

55. *BASCOM Glob. Internet Servs.*, 827 F.3d at 1352 (“We find nothing on this record that refutes [BASCOM’s allegations] as a matter of law or justifies dismissal under Rule 12(b)(6).”).

56. *See id.* at 1343–45, 1352 (“BASCOM has adequately alleged that the claims pass step two of *Alice*’s two-part framework” regarding individually customizable filtering).

57. *Id.* at 1350.

58. *Amdocs*, 841 F.3d at 1302.

59. *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014).

60. *See Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368–69 (Fed. Cir. 2018) (holding that the district court made an error regarding whether *Berkheimer*’s technology is “well-understood, routine, and conventional”); *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1127 (Fed. Cir. 2018) (noting that under the two-step test, allowing *Aatrix* to file an amended complaint would not be futile since they alleged facts demonstrating inventive concepts regarding their technology).

well-understood, routine, and conventional, is a question of fact.”⁶¹ In *Berkheimer*, claims involving digital asset management were found to be directed to the abstract idea of “parsing, comparing, storing, and/or editing data[,]” which obviously is data processing.⁶² The Federal Circuit remanded the district court’s summary judgment ruling that the claims were patent ineligible, finding that there was a genuine issue of material fact as to whether the claims contained an inventive concept.⁶³ Therein, the Federal Circuit recognized arguments made in the claims’ specification that the data processing involved would increase computer efficiency and functionality, which thereby raises an issue of fact that effects the 35 U.S.C. § 101 analysis of conventionality.⁶⁴ However, *Berkheimer* was limited to the context that factual determinations need to be used, rather than an actual ruling on the eventual patent eligibility.⁶⁵ Moreover, the context of the *Berkheimer* ruling cannot be easily extended to the claimed implementation of abstract mathematical algorithms.⁶⁶ This is showcased in the Federal Circuit’s juxtaposition of the *Intellectual Ventures I* with *Berkheimer*—implicitly ruling that factual determinations are still separated from the implementation of abstract math⁶⁷—that even if math were to provide an arguable improvement, it is still the abstract math providing that improvement, as opposed to a potentially nonconventional claim element as with the *Berkheimer* claims.⁶⁸

However, in the Federal Circuit, far more claims have failed the second step of the *Alice* test than have passed; post-*Alice*, 91% of 35 U.S.C. § 101 decisions made by the Federal Circuit have rendered the claims patent ineligible.⁶⁹ Patent ineligible data processing was expounded in *Electric Power Group*, where claims directed purely to the abstract collection and analysis of information for an electric power grid were found to not contain an inventive concept because only a generic computer was required for their implementation, as opposed to “technical means for performing the functions that are arguably an advance over conventional computer and network technology.”⁷⁰ Moreover, in *Digitech*, claims directed to a method of using mathematical correlations to combine two data sets were found to be “an ineligible abstract process of gathering and combining data that does not require input from a physical device.”⁷¹ The Federal Circuit added that the claims at issue did not even

61. *Berkheimer*, 881 F.3d at 1368.

62. *Id.* at 1366 (Fed. Cir. 2018) (declaring claims 5–7 describe abstract ideas of parsing, comparing, storing, and editing).

63. *Id.* at 1370–71.

64. *See id.* at 1371 (recognizing that *Berkheimer*’s claims “recite a specific method of archiving that, according to the specification, provides benefits that improve computer functionality”).

65. *See id.* at 1370 (“We do not decide today that claims 4–7 are patent eligible under § 101.”).

66. *See Berkheimer*, 881 F.3d at 1367–68 (discussing *Intellectual Ventures I*).

67. *Compare id.* (discussing the role of factual determinations) with *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1316 (Fed. Cir. 2016) (discussing the claims before the court).

68. *See Berkheimer*, 881 F.3d at 1367–69 (discussing the conventionality of the claims before the court).

69. Jeffrey A. Lefstin & Peter S. Menell & David O. Taylor, *Final Report of the Berkeley Center for Law & Technology Section 101 Workshop: Addressing Patent Eligibility Challenges*, BERKELEY TECH. L.J. (forthcoming 2018) (manuscript at 23).

70. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1351 (Fed. Cir. 2016).

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

explicitly tie in the use of an image processor as part of the claimed data combinations and that, because of that breadth, the claims were even more “abstract and sweeping.”⁷² Similarly related to abstract data manipulation, in *SAP Am.* abstract mathematical operations performed on data to optimize financial data, while innovative in the field of finance, were found to be patent ineligible as encompassing purely abstract ideas, however innovative they may be; “a new abstract idea is still an abstract idea.”⁷³

While difficult to generalize, the Federal Circuit’s decisions post-*Alice* seem to find claims directed to the specific computer implementations of data manipulating or processing operations as patent ineligible, while claimed implementations of systems for performing data processing operations can pass step one or two of *Alice*.⁷⁴ For example, in the *Enfish* and *Bascom* decisions the Federal Circuit found claims directed to technologically improved computer systems (computer memory structuring and internet content filtering) as being patent eligible, while in *Digitech* a mathematical combination of data sets was directly claimed and found to be patent ineligible;⁷⁵ therein, a specific data-manipulating operation claimed in *Digitech* was found to be ineligible and not provide an inventive concept outside of the abstract idea itself in order to pass *Alice* step-two.⁷⁶

C. The *RecogniCorp* Decision

The Federal Circuit in April 2017 unveiled the *RecogniCorp* decision, finding that image encoding is an abstract idea, and that the conventional computer implementation of that abstract idea does not amount to an inventive concept.⁷⁷ The *RecogniCorp* decision involved multiple claims, and the following claim (claim 1) was found by the court to be representative of those which were presented:

A method for creating a composite image, comprising: displaying facial feature images on a first area of a first display via a first device associated with the first display, wherein the facial feature images are associated with facial feature element codes; selecting a facial feature image from the first area of the first display via a user interface associated with the first device, wherein the first device incorporates the selected facial feature image into a composite image on a second area of the first display, wherein the composite image is associated with a composite facial image code having at least a facial feature element code and wherein the composite facial image code is derived by performing at least one multiplication operation on a facial code

72. *Id.* at 1351 (quoting *Gottschalk v. Benson*, 409 U.S. 63, 68 (1972)).

73. *SAP Am., Inc. v. InvestPic, LLC*, 890 F.3d 1016, 1018 (Fed. Cir. 2018) (quoting *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1151 (Fed. Cir. 2016)).

74. *See, e.g., Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016) (finding that claims directed to a specific implementation of a solution to a problem in software is not abstract).

75. *BASCOM Glob. Internet Servs., v. AT&T Mobility LLC*, 827 F.3d 1341, 1352 (Fed. Cir. 2016); *Enfish*, 822 F.3d at 1339; *Digitech Image Techs.*, 758 F.3d at 1351.

76. *Digitech Image Techs.*, 758 F.3d at 1350.

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

using one or more code factors as input parameters to the multiplication operation; and reproducing the composite image on a second display based on the composite facial image code.⁷⁸

An analogous claim 36 was also considered where the use of a computer was specifically recited.⁷⁹ In the lead-up to the Federal Circuit decision during a reexamination proceeding, the portion of the claim stating “wherein the composite image is associated with a composite facial image code having at least a facial feature element code and wherein the composite facial image code is derived by performing at least one multiplication operation on a facial code using one or more code factors as input parameters to the multiplication operation” was found to be non-obvious with regard to the prior art.⁸⁰ *RecogniCorp* then asserted their patented claims against Nintendo in the District Court for the Western District of Washington wherein a motion for judgment on the pleadings that *RecogniCorp*’s claims were patent ineligible under 35 U.S.C. § 101 was granted.⁸¹ The district court agreed with Nintendo that the claimed “method and apparatus for building a composite facial image using constituent parts” was directed to an abstract idea and did not contain an inventive concept, thereby failing the *Alice* test for patent eligibility.⁸² On appeal, the Federal Circuit affirmed the district court’s decision.⁸³ In the background of their decision, the Federal Circuit understood the claimed image encoding as making image transmission less difficult by providing an alternative to typical file formats used that either “required significant memory” or, if compressed to solve this significant memory requirement problem, “resulted in decreased image quality.”⁸⁴ The Federal Circuit presented that the patent “sought to solve this problem by encoding the image at one end through a variety of image classes that required less memory and bandwidth.”⁸⁵

Under step one of the *Alice* test, the Federal Circuit found that the claimed method of data encoding was “standard” and “an abstract concept long utilized to transmit information.”⁸⁶ In identifying the abstract idea, the Federal Circuit, comparing the claims to those from *Digitech*, broadly stated that “a process that started with data, added an algorithm, and ended with a new form of data was directed to an abstract idea.”⁸⁷ Contrasting the claims with those in *Enfish*, the *RecogniCorp* claims were not found to “claim a software method that improves the functioning of a computer” and, instead, “claims a ‘process that qualifies as an ‘abstract idea’ for which computers are invoked merely as a tool.’”⁸⁸

78. *Id.*

79. *Id.* at 1328.

80. *Id.* at 1324, 1325.

81. *Id.* at 1324–25.

82. *Id.* at 1324, 1325.

83. *RecogniCorp*, 855 F.3d at 1328.

84. *Id.* at 1324.

85. *Id.*

86. *Id.* at 1326.

87. *Id.* at 1327.

88. *Id.* (quoting *Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327, 1336 (Fed. Cir. 2016)).

Under step two of the *Alice* test, the claims were not found to contain an inventive concept beyond the abstract image encoding claimed.⁸⁹ While in *Digitech* a device (the image processor) was not explicitly tied to the performance of the method claimed, in *RecogniCorp*, even when claim 36 explicitly recited computer implementation, the Federal Circuit concluded, as was similarly presented in previous cases, that “tak[ing] an abstract idea and apply[ing] it with a computer” does nothing to add towards the argument of patent eligibility.⁹⁰ Furthermore, the Federal Circuit in determining that the claims lacked an inventive concept did not discuss the understood increase in computer efficiency that results from the implementation of the abstract image encoding; the court found that the claimed “multiplication” (mathematical formula) involved in the claimed image encoding was abstract, and that merely reciting the computer implementation of the abstract idea does not allege “a particularized application” of the encoding.⁹¹

II. WHY RECOGNICORP WAS DECIDED INCORRECTLY

The Federal Circuit over generalized the claims in *RecogniCorp* in ruling them as patent ineligible. Under the first step of the *Alice* test, while a non-abstract interpretation could arguably be made, the Federal Circuit’s interpretation of the claims as being directed to an abstract idea was reasonable.⁹² However, under the second step of the *Alice* test, the claims should not have been found to lack an inventive concept.⁹³ While if the claims were written with more “nuts and bolts” the answer would have been clearer, the claims as currently written should be considered to have an inventive concept.

A. *Alice* Step-One Analysis

Abstract mathematical formulae are exempted from patent eligibility to avoid the preemption of their use across all fields of technology.⁹⁴ Determinations of whether an abstract idea is claimed can be made by looking to whether the claims reflect a mathematical operation being used, whether it be with respect to data organization or some other mathematical algorithm.⁹⁵ The Federal Circuit in interpreting the *RecogniCorp* claims erred in finding that the claims reflect “standard encoding and decoding, an abstract concept long

89. *Id.* at 1328.

90. *RecogniCorp*, 855 F.3d at 1328.

91. *Id.*

92. *See infra* Part II.A (discussing how the Federal Circuit’s interpretation of the claims was reasonable).

93. *See infra* Part II.B (discussing how the claims should not have been found to lack an inventive concept).

94. *See* *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) (quoting *Mackay Radio Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94 (1939)) (making an inference from the statement “while a scientific truth, or the mathematical expression of it, is not a patentable invention, a . . . useful structure created with the aid of knowledge of scientific truth may be”).

95. *See* *Diamond v. Diehr*, 450 U.S. 175, 187 (1981) (identifying ways an abstract idea may be claimed); *Parker v. Flook*, 437 U.S. 584, 595 (1978) (discussing the mathematical formula behind the claim); *Digitech Image Techs. v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) (analyzing the mathematical operation behind the claim).

utilized to transmit information.”⁹⁶ If the method of encoding claimed were merely “standard,” then the claims would likely (mistakes are made in all arenas of patent prosecution) not have been allowed under 35 U.S.C. § 103 for being non-obvious during the claims’ reexamination hearing.⁹⁷ The post-*RecogniCorp Berkheimer* decision further complicates this line of reasoning in stating that issues of fact (such as prior art used in a 35 U.S.C. § 103 determination) must be dealt with in making decisions regarding conventionality of claim elements;⁹⁸ however, the abstract encoding process of *RecogniCorp*, while overcoming the prior art, does not follow the same line of reasoning as the *Berkheimer* decision, as the abstractness determination is with regard to *Alice* step-one while the *Berkheimer* decision deals with step-two issues of conventionality.⁹⁹ Whether issues of fact apply to decisions regarding the abstract nature of computer-implemented mathematical operations was not dealt with in the *Berkheimer* decision and is still seen as a separate issue.¹⁰⁰ Considering this recent development in fact-based analysis, in the *RecogniCorp* decision, the Federal Circuit diminished the claims’ technical complexity by making comparisons of image encoding to “ordering food at a fast food restaurant via a numbering system, and Paul Revere’s ‘one if by land, two if by sea’ signaling system.”¹⁰¹ A comparison of numbers being directly correlated with food orders and travel plans with image encoding that maximizes the efficiency of the memory being used to store the image is quite a stretch.¹⁰² With all this in mind, thereafter, the Federal Circuit broadly stated that any mathematical operation that begins with data and ends with “a new form of data” is abstract, thereby reasoning that the image encoding and its claimed multiplication operation are abstract.¹⁰³

The Federal Circuit’s comparisons to past cases, while not as egregious as the comparisons to Paul Revere, were also slightly overextended. The court contrasted the non-abstract software that improved a computer’s functioning in *Enfish* with the *RecogniCorp* claims.¹⁰⁴ While the claim language in *RecogniCorp* could be more specific to the computer-based aspects of the encoding and “multiplication operation” being performed, the blunt language used by the court to cherry pick any mathematical operation as inherently providing an abstract idea for the claim seems to go too far.¹⁰⁵ Considering the increases in computer efficiency that result from these multiplication operations, the court could have correlated the *Enfish* decision in that the claimed multiplication is a step of a software (encoding) operation that “improves the

96. *RecogniCorp*, 855 F.3d at 1326.

97. *See id.* (noting how standard coding and encoding schemes are abstract).

98. *Berkheimer v. HP Inc.*, 890 F.3d 1369, 1379–80 (Fed. Cir. 2018).

99. *Id.* at 1374; *RecogniCorp*, 855 F.3d at 1326.

100. *Berkheimer*, 890 F.3d at 1370.

101. *See RecogniCorp*, 855 F.3d at 1326 (discussing the abstract concepts of encoding and decoding information).

102. *Id.*

103. *See id.* at 1327 (explaining the process in which data passes through an algorithm and produces a new form of data or information).

104. *See id.* (elaborating on the distinction between a method that improves computer functioning and a process that invokes a computer as a tool).

105. *Id.*

function of a computer.”¹⁰⁶ Furthermore, post-*RecogniCorp*, the *Visual Memory* decision, similar to *Enfish*, found improvements to the functioning of computer memory systems to be non-abstract.¹⁰⁷ The claims of *Enfish* and *Visual Memory* provide broader operational changes to the functioning of the memory, while *RecogniCorp* can be seen as directed to a mathematical operation (although also increasing memory operation efficiency).¹⁰⁸ The Federal Circuit has warned not to oversimplify claims when identifying abstract ideas,¹⁰⁹ but here it seems to do exactly that; the encoding operation is considered as any other mathematical (or fast food ordering) multiplication operation instead of as a specific solution to the problem of optimizing computer efficiency.¹¹⁰

With all that in mind, a new rule could be carved out to separate this sort of advanced mathematical encoding operation that improves the computer implementing it from other mathematically-based abstract ideas (as to not oversimplify the encoding operation and as further explained later in this Article), an abstract idea can reasonably be identified in the *RecogniCorp* claims as they are currently written.¹¹¹ When a multiplication operation is so plainly recited in claim 1, the simple analogy to the claims of *Diehr* and *Digitech*, where similar algorithmic operations were claimed to be performed, is hard not to make.¹¹²

B. Alice Step-Two Analysis

Accepting that the claimed image encoding comprises an abstract idea and considering the understood technological improvement that the image encoding provides by increasing the efficiency of the computer implementing it, the Federal Circuit’s analysis regarding the application of the second step of the *Alice* test should be thorough.¹¹³ However, the Federal Circuit did not provide a thorough analysis; in a single page the court explained why the claimed image encoding operation did not include an inventive concept.¹¹⁴ As with the oversimplification of the encoding operation in the first step of their *Alice*

106. See *id.* (distinguishing the claim from *Enfish*).

107. See *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1259–60 (Fed. Cir. 2017) (explaining the technological improvement of an enhanced computer memory system).

108. See *id.* at 1259 (discussing the memory system); *RecogniCorp*, 855 F.3d at 1326 (focusing on a mathematical operation); *Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335–36 (Fed. Cir. 2016) (discussing the memory system of the claim).

109. See *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1313 (Fed. Cir. 2016) (discussing the failure to account for specific requirements of claims by oversimplifying claims).

110. *Visual Memory*, 867 F.3d at 1259 (discussing the memory system); *RecogniCorp*, 855 F.3d at 1326 (focusing on a mathematical operation); *Enfish*, 822 F.3d at 1335–36 (Fed. Cir. 2016) (discussing the memory system of the claim).

111. See *RecogniCorp*, 855 F.3d at 1327 (finding claim 1 is directed to the abstract idea of encoding and decoding image data).

112. See *id.* at 1324 (referring to the recitation of claim 1, wherein the “multiplication operation” is performed).

113. See generally *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2357–58 (2014) (describing the process of examining the elements of a claim to determine whether it contains an inventive concept).

114. See *RecogniCorp*, 855 F.3d at 1327–28 (explaining how the method in claim 1 reflected a standard encoding and decoding process, which the court described as an abstract concept long utilized to transmit information).

analysis, the Federal Circuit continued to simplify the claimed image encoding with regard to step two.¹¹⁵ The court argued that “claim 1 [claim 36, which explicitly required a computer for implementation, was also presented] does not even require a computer; the invention can be practiced verbally or with a telephone.”¹¹⁶ However, the “composite facial image code” as claimed, in light of the specification, can only reasonably be associated with a computer for implementation; the Federal Circuit’s decision’s background even verifies that the encoding operation from an inventive standpoint is directed to the problem of computer-based image data storage.¹¹⁷

Continuing with these comparisons to more basic processes, the Federal Circuit undermined and, with that, failed to recognize altogether the technological improvement that the image encoding provides to the computer in their *Alice* step-two analysis of the claims (these benefits were only mentioned in the background section).¹¹⁸ The Federal Circuit erred in failing to recognize the significance of the encoding as providing a technological improvement to the otherwise generic computer needed to implement it.¹¹⁹ While the Supreme Court in *Benson* and *Flook* expressed an early concern for the patent eligibility of generic computer implementations of mathematics, the *Benson* claims were directed to an algorithm for the binary to decimal data conversion of data, which while obviously only applicable to digital computers, provides no reasonably arguable technological improvement to the computer implementing the mathematical conversion itself.¹²⁰ In clear contrast, in *RecogniCorp*, the image encoding’s abstract mathematical operation provides a benefit to the computer implementing it; the claimed encoding maximizes the efficiency of the computer by allowing more information to be stored with less bits.¹²¹ Similarly, unlike in *Alice* and *SAP America* (post-*RecogniCorp*) where the abstract ideas were related to finance and provided no improvement to the performance of the generic computer claimed to be implementing it, the primary reason for performing the claimed image encoding in *RecogniCorp* is to simplify the computational operation involved.¹²² Specifically, unlike in *SAP America* where a data manipulating mathematical operation, however innovative in the field of finance, provided an improvement in only the abstract idea itself, the claims at

115. See *id.* at 1326–28 (noting the lack of an inventive concept because merely adding a mathematical equation to an encoding and decoding process retains the abstract concept).

116. *Id.*

117. See *id.* at 1324 (explaining the claim in the patent).

118. See *id.* at 1328 (noting the encoding and decoding process simply changes the data into other forms).

119. See *id.* at 1324 (providing history regarding the process of encoding prior to the invention being claimed).

120. See *Parker v. Flook*, 437 U.S. 584, 595 (1978) (discussing the application of mathematical formulas); *Gottschalk v. Benson*, 409 U.S. 63, 71–72 (1972) (noting the problems associated with the patentability of a mathematical formula).

121. See *RecogniCorp*, 855 F.3d at 1324 (explaining how an image is encoded at “one end through a variety of image classes that required less memory and bandwidth”).

122. See *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2350–51 (2014) (describing the patent ineligible concept of intermediated settlement); *RecogniCorp*, 855 F.3d at 1324 (explaining the importance of the claimed image encoding).

issue in *RecogniCorp* clearly provide an efficiency increase in the underlying technology.¹²³

The Federal Circuit recently reiterated an oversimplifying interpretation of the claims in *RecogniCorp* in the *Smart Systems Innovations* decision, where claims directed to a mass transit prepayment system were directly correlated with the claims in *RecogniCorp* as both being “not directed to a combined order of specific rules that improve any technological process, but rather invoke computers in the collection and arrangement of data,” finding that “[c]laims with such character do not escape the abstract idea exception under *Alice* step one.”¹²⁴ However, while in *Smart Systems Innovations* abstract financial transactions limited to a mass transit payment systems can reasonably be considered as a conventional implementation of an abstract idea without a technological improvement to the payment system being used, in *RecogniCorp*, the abstract image encoding algorithms should not be analyzed in the same way when the algorithms being used improve the efficiency of the otherwise generic computer itself.¹²⁵

As a matter of providing a comprehensive analysis, the influential *Berkheimer* and *Aatrix* decisions “leave untouched the numerous cases from this court which have held claims ineligible because the only alleged ‘inventive concept’ is the abstract idea.”¹²⁶ Similar to the arguments made in *Berkheimer* that the data processing would increase computer efficiency, in *RecogniCorp* the claimed image encoding increases computer efficiency, but the increase in computer efficiency (and therein the inventive concept) was a result of the abstract image encoding itself.¹²⁷ Therefore, while significant and notable, the *Berkheimer* decision would likely not affect the earlier *RecogniCorp* ruling because the basis for the technological improvement in the *RecogniCorp* claims is the abstract mathematical operation itself—not the implementation of the abstract idea in an unconventional manner and the unconventionality of claim elements.¹²⁸ While a factual determination that the abstract image encoding claimed in *RecogniCorp* is inventive and provides an improvement to computer efficiency should be important, the clarification in the law from *Berkheimer* since the *RecogniCorp* decision is not seen to have extended to *Alice* step-one; an abstract idea itself still cannot provide an inventive concept.¹²⁹

The Eastern District of Texas in *Realtime Data* (post-*RecogniCorp*) has found arguments of more efficient data processing through data compression as providing an inventive concept persuasive, thereby ruling what would seem

123. See *SAP Am., Inc. v. Investpic, LLC*, 890 F.3d 1016, 1018 (Fed. Cir. 2018) (describing the subject as “nothing but a series of mathematical calculations . . . and the presentation of the results”).

124. *Smart Sys. Innovations, LLC v. Chi. Transit Auth.*, 873 F.3d 1364, 1372–73 (Fed. Cir. 2017).

125. See *RecogniCorp*, 855 F.3d at 1324 (explaining the claim in the patent); *Smart Sys. Innovations*, 873 F.3d at 1374 (discussing how the claims were an abstract idea of collecting financial data using generic computer components).

126. *Berkheimer v. HP Inc.*, 890 F.3d 1369, 1374 (Fed. Cir. 2018).

127. *RecogniCorp*, 855 F.3d at 1327–28.

128. *Id.*

129. *Berkheimer*, 890 F.3d at 1374.

contrary to the language expressed in *RecogniCorp*.¹³⁰ In *Realtime Data*, the district court reasoned that the analyzed claim “improves typical data compression by compressing the data stream through content dependent and independent data recognition, as well as a plethora of encoders to achieve its maximum compression,” contrasting this with *RecogniCorp* where “the claim reflected mere encoding and decoding.”¹³¹ However, if the improvement in *Realtime Data* is how the data compression is performed to achieve maximum compression, this would seemingly be an abstract data manipulating process providing an inventive concept to how it provides more efficient data processing; this would appear contrary to the *RecogniCorp* decision where improved efficiency that resulted from abstract image encoding was overlooked.¹³² The court in *Realtime Data* appears to have focused on how the claims analyzed are more substantial, but it is hard to not recognize that data compression is “[a] process that started with data, added an algorithm, and ended with a new form of data,” and thereby seemingly according to *RecogniCorp*, “was directed to an abstract idea.”¹³³ Possibly the district court is pressing the other way, in an attempt to show that improved data manipulating techniques that increase computer efficiency should not be stonewalled from patent eligibility.¹³⁴

In the modern world of mass production, of course the hardware underlying a lot of the amazing discoveries effectuated in computer software will be generic, but isn’t increasing the efficiency of that hardware as a result of improved abstract encoding a clear technological improvement? And if the hardware is operating in an innovative, more efficient way, while it may be the same on a physical level, is it not no longer completely conventional? In *Bascom* and *Amdocs*, the Federal Circuit was able to see past the use of conventional hardware in the implementation of an abstract idea when conventional hardware was being used in a way that improves the existing technology to solve a problem.¹³⁵ That same logic can and should have been applied here; that the existing, conventional computer hardware that would be required to implement the image encoding of *RecogniCorp* is being improved by the encoding’s intrinsic increase in the computer’s operational efficiency.¹³⁶ Therefore, in the *RecogniCorp* decision, the Federal Circuit should have identified an inventive concept and the claims should have been deemed patent eligible.

130. See *Realtime Data, LLC v. Carbonite, Inc.*, No. 6:17-cv-00121, 2017 WL 4693969, at *5 (E.D. Tex. Sept. 20, 2017) (explaining that improving existing technological processes is inventive and, thus, eligible to be patented).

131. *Id.*

132. See *RecogniCorp*, 855 F.3d at 1328 (holding the claims are an abstract idea); *Realtime Data*, 2017 WL 4693969, at *4–5 (discussing that the claim is “directed to non-abstract improvements”).

133. *RecogniCorp*, 855 F.3d at 1327.

134. See *Realtime Data*, 2017 WL 4693969, at *4 (discussing whether a patent improves the functionality of a computer as the first step under *Alice*).

135. See *Amdocs (Isr.) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1302 (Fed. Cir. 2016) (noting that the patent in dispute solves a technological problem even though it involves conventional components); *BASCOM Glob. Internet Servs., v. AT&T Mobility LLC*, 827 F.3d 1341, 1350, 1352 (Fed. Cir. 2016) (noting that conventional components of the claims “did not make those claims any less abstract”).

136. See *RecogniCorp*, 855 F.3d at 1324 (discussing the patent at issue requires less memory for digitally transmitting images).

C. What the Future Holds

While literature proliferates related to the general need to amend 35 U.S.C. § 101,¹³⁷ academia lacks criticism particular to the *RecogniCorp* decision. Nonetheless, other parties think that *RecogniCorp* was decided incorrectly.¹³⁸ After the April 2017 ruling, the appellant petitioned for rehearing *en banc* and two briefs were filed amicus curiae in support of that petition.¹³⁹ An amicus curiae brief submitted by Burman Mathis argues that the *RecogniCorp* decision's problem is in the Federal Circuit's *Alice* step-one analysis because, in their opinion, the claimed invention is limited to computers and, thereby, does not preempt the claim's application across all fields of technology.¹⁴⁰ While this is a substantial argument, from a purely preemption standpoint the Federal Circuit is unlikely to budge on their step-one analysis considering the current broad language of the claims.¹⁴¹ Claim 1, while indirectly specific to computers, does not specifically state what and how the hardware is used in the process (the image encoder, data transmitters, memory) and is reasonably seen as being too broad.¹⁴² Furthermore, in the past, even when a claimed technology is specific to computers, this has been insufficient to get past a preemption argument.¹⁴³ Additionally, claim 36, while including a computer for implementation, also does not include more detail describing its use or improvements with respect to the encoding or multiplication operation.¹⁴⁴

The bigger issue (and the issue through which the court is more likely to budge) is the Federal Circuit's *Alice* step-two analysis where the image encoding claimed was oversimplified with a complete lack of discussion with regard to the technological improvements provided.¹⁴⁵ The other amicus curiae brief, filed by Paul Gilbert Cole, recites similar concerns; that if the benefits provided to computers implementing the encoding of the *RecogniCorp* claims was considered, "then the claimed ordered combination should have been held to be transformative within *Alice* step two."¹⁴⁶ However, instead of emphasizing that the Federal Circuit's error was in the oversimplifying *Alice* step-two analysis,

137. See generally Lefstin, Menell & Taylor, *supra* note 69, at 7–11 (discussing jurisprudence with patent eligibility and the need to clarify patent eligibility).

138. See Benjamin W. Hattenbach et al., *Concrete Thoughts About Abstract Ideas: Why a Nebulous Exception to Patentability Should Not Swallow Computer Software*, 58 SANTA CLARA L. REV. 261, 290–92 (2018) (using *RecogniCorp* to demonstrate a problem in jurisprudence when applying § 101 to abstract ideas).

139. Brief of Amicus Curiae Paul Gilbert Cole in Support of Appellant's Petition for Rehearing En Banc, *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322 (Fed. Cir. 2017) (No. 16-1499), 2017 WL 2709650 [hereinafter Cole Brief]; Brief for Amicus Curiae in Support of Appellant's Request for Rehearing and Rehearing En Banc, *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322 (Fed. Cir. 2017) (No. 16-1499), 2017 WL 2709649 [hereinafter Mathis Brief].

140. Mathis Brief, *supra* note 139, at *7–10.

141. See *Berkheimer v. HP Inc.*, 890 F.3d 1369, 1376 (Fed. Cir. 2018) (Lourie, J., concurring) (noting that the current holding is acceptable until higher intervention on patent eligibility issues).

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

143. See *Gottschalk v. Benson*, 409 U.S. 63, 71–72 (1972) ("It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case [I]f the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.").

144. See *RecogniCorp*, 855 F.3d at 1327–28 (discussing the extent of claim 36).

145. See *id.* at 1326–28 (failing to consider the technological improvement due to the patent at issue).

146. Cole Brief, *supra* note 139, at *8.

Cole’s brief focuses on the obviousness test under 35 U.S.C. § 103.¹⁴⁷ Cole argues that because the claimed encoding’s multiplication operation was found to be non-obvious, the court should have taken this into account in their decision under 35 U.S.C. § 101; that the claims clearly provide a non-obvious benefit and, therein, an inventive concept.¹⁴⁸ The Federal Circuit denied the appellant’s request for rehearing *en banc* and, thereafter, a petition for a writ of certiorari to the Supreme Court was denied.¹⁴⁹ While these further appeals were not heard, only time will tell if other decisions are made to change the course of the *RecogniCorp* decision.

III. A BROADER FEAR: THE APPLICATION OF THE *RECOGNICORP* DECISION

A. *The Federal Circuit’s Language and Analysis in RecogniCorp Goes Too Far to Undermine the Technological Significance of Modern Data Processing*

The claims of *RecogniCorp* aside, the bigger issue resulting from the *RecogniCorp* decision is how the Federal Circuit oversimplified computer data processing as a whole and made blanket statements that affect future rulings on patent eligibility. The Federal Circuit in their *Alice* step-two analysis stated that “claim 1 is directed to the abstract idea of encoding and decoding. The addition of a mathematical equation that simply changes the data into other forms of data cannot save it.”¹⁵⁰ With this astounding statement, is the Federal Circuit plainly denying that a mathematical algorithm can provide a technological improvement to a computer system? The court failed to even mention the claimed encoding’s technological improvement of increasing computer efficiency in this analysis.¹⁵¹ Mathis’s amicus brief expressed similar concerns with respect to the *Alice* step-one analysis; that encoding should not be categorically considered as an abstract idea.¹⁵² While a rule change could be had, the current law does not agree with this statement because, at its core, encoding is the application of a mathematical algorithm.¹⁵³ However, whether centered around the Federal Circuit’s step-one or step-two analysis, the policy concern that any form of computer data processing could be prevented from patent eligibility is the same: “[u]nder the erroneous legal analysis and holding of the present [*RecogniCorp*] decision, any television or computer display designed and produced in the last decade that relies on digital data conversion, data manipulation and data filtering, which is all of them, is at risk of losing patent protection.”¹⁵⁴ With the *RecogniCorp*

147. *Id.* at *6–8.

148. *Id.* at *7–8.

149. *RecogniCorp, LLC v. Nintendo Co.*, 138 S. Ct. 672 (2018).

150. *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1328 (Fed. Cir. 2017).

151. *Id.*

152. See Mathis Brief, *supra* note 139, at *2 (arguing that the Federal Circuit’s *Alice* step-one analysis went too far to classify all encoding as abstract).

153. *Intellectual Ventures I LLC v. Capital One Fin. Corp.*, 850 F.3d 1332, 1340–41 (Fed. Cir. 2017).

154. See Mathis Brief, *supra* note 139, at *2 (explaining that there are “a large variety of at-risk technologies that give rise to multi-billion industries such as ‘MP3 players, DVD and Blu-ray players, digital cameras [etc.]’”).

ruling being precedential, until other case law says otherwise, are all Patent Examiners and District Courts to consider all claims directed to computer-implemented mathematical algorithms as abstract and unable to have an inventive concept in any technological improvements to a computer's functioning that are provided (compression, error correction, etc.)?

Since the Federal Circuit has indirectly held (because the encoding's technological improvement was not even considered in the court's *Alice* test analysis) that an increase in conventional computer efficiency as a result of the implementation of an innovative abstract mathematical algorithm should not be considered as a technological improvement, the question becomes whether the court had an underlying reason for arguing in this way, as to oversimplify the claimed image encoding and disregard its benefits.¹⁵⁵ Perhaps the Federal Circuit interpreted the *RecogniCorp* claims in the lens of the court's previous decisions, lining the claimed multiplication operation up with the basic math of past exceptions to patent eligibility.¹⁵⁶ A concern for this oversimplifying analysis is seen in Judge Linn's dissent to the *Smart Systems Innovations* ruling, arguing that "[c]laims directed not merely to basic building blocks of scientific or technological activity but instead to innovative solutions to real problems that result from human activity and are not capable of performance solely in the human mind should be fully eligible for patent protection and not lightly discarded."¹⁵⁷ Judge Linn's concern echoes the previous concern of the Supreme Court in *Bilski* and *Alice* from preempting all abstract ideas from patent eligibility.¹⁵⁸ While not directed to the *RecogniCorp* case, Judge Linn's concern is directly applicable, pointing to that mathematical algorithms solving computer efficiency problems where the algorithms are not capable of being performed "solely in the human mind" should not be "lightly discarded."¹⁵⁹ However, this is exactly what the Federal Circuit did in *RecogniCorp*—oversimplified and lightly discarded (in the single page of *Alice* step-two analysis) the application of a mathematical algorithm to solve the ongoing problem of computer efficiency.¹⁶⁰ Image data encoding was analogized to Paul Revere's "one if by land, two if by sea" and considered to be perfectly capable of being performed on a telephone; this analysis oversimplifies the complex math that underpins modern computer systems as not only being capable of performance solely in the human mind, but also as not having any reason for not being performed in the human mind, like to solve the specific problem of increasing computer efficiency.¹⁶¹

Perhaps the Federal Circuit's disregard for the complexity of the claims in *RecogniCorp* stemmed from a perception of a lack of detail in the claims and

155. *RecogniCorp*, 855 F.3d at 1328.

156. See *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354–55 (2014) (discussing exceptions); *Bilski v. Kappos*, 561 U.S. 593, 601–02 (2010) (discussing exceptions); *Smart Sys. Innovations, LLC v. Chi. Transit Auth.*, 873 F.3d 1364, 1372–73 (Fed. Cir. 2017) (analyzing Supreme Court founded exceptions).

157. *Smart Sys. Innovations*, 873 F.3d at 1379 (Linn, J., dissenting).

158. *Bilski*, 561 U.S. at 658.

159. *Smart Sys. Innovations*, 873 F.3d at 1379.

160. *RecogniCorp*, 855 F.3d at 1327–28.

161. *Id.* at 1326, 1328.

application itself. Concerns abound that patent applications being filed are too broad and lack the “nuts and bolts” necessary to provide a fair monopoly on what is claimed.¹⁶² This concern has partly developed as a result of weak claims getting through the Patent Office and non-practicing entities asserting infringement actions based on these broad claims.¹⁶³ But even if the claims of *RecogniCorp* are fairly considered to need a more substantive explanation of how the computer is being used or improved, the language of the Federal Circuit’s ruling goes far past the perceived need of stronger claims, widely preempting operation-level data processing claims until the Federal Circuit, the Supreme Court, or Congress is to more clearly rule otherwise.¹⁶⁴

B. Commercial Applicability of *RecogniCorp*

If the future application of the *RecogniCorp* decision were to widely prevent the patent eligibility of claims related to computer data processing, the commercial ramifications would be across economically significant industries.¹⁶⁵ Along with other technologies, innovative computer-implemented mathematical algorithms are essential to advanced digital-data communication standards that dictate how data is transmitted to our televisions, computers, and cellphones every day.¹⁶⁶ While it is often hard to quantify the monetary value of patents, patents essential to these modern communication standards can be licensed as Standard Essential Patents (SEPs).¹⁶⁷ Therein, the patent holders are provided a licensing fee for products sold that use these standards.¹⁶⁸ For example, Ericsson and Qualcomm will charge about \$5 and \$16.25, respectively, per cellphone sold to license their SEPs related to the upcoming 5G LTE standard; cellphone sales are enormous and these fees will certainly add up.¹⁶⁹ Additionally, Qualcomm owns 6,000 patents related to wireless communications standards, including the LTE standards (3G, 4G, 5G, etc.) that are used for modern cellular networks; Qualcomm’s 16,000 patent portfolio (including those 6,000 wireless communications patents) is valued at 85 billion dollars.¹⁷⁰ Furthermore, among all technology companies, most SEPs are related to data communication schemes, particularly in the patent classifications of “Wireless Communication Networks” and the “Transmission of Digital

162. See Neel U. Sukhatme, “Loser Pays” in *Patent Examination*, 54 HOUS. L. REV. 165, 170–72 (2016) (discussing weak patents and the reasons why this problem has arisen).

163. *Id.* at 167–68.

164. *RecogniCorp*, 855 F.3d at 1324, 1326, 1328.

165. Paul R. Gugliuzza & Mark A. Lemley, *Can a Court Change the Law by Saying Nothing?*, 71 VAND. L. REV. 765, 769 (2018).

166. Bobbie Johnson, *Go Figure...*, THE GUARDIAN (Feb. 22, 2009), <https://www.theguardian.com/science/2009/feb/23/algorithms-internet-google-amazon-itunes>.

167. Peter Quies, *Valuing Standard Essential Patents: An Examination of Announced FRAND Royalty Rates for LTE*, MICRONOMICS (Dec. 2012), https://www.americanbar.org/content/dam/aba/publications/litigation_committees/intellectual/012413-valuing-standard-essential-patents-memo.authcheckdam.pdf.

168. Jim McGregor, *Qualcomm Sheds Light on Licensing Policy*, EE TIMES (Nov. 27, 2017), https://www.eetimes.com/author.asp?section_id=36&doc_id=1332657.

169. *Id.*

170. GREYB SERVICES, *supra* note 6.

Information.”¹⁷¹ Many of these valuable patents are put at risk by the broad language of *RecogniCorp* that disregards the ability of an advanced computer-implemented mathematical algorithm from providing an inventive concept to a patent claim.¹⁷²

More specifically, patents directed to digital transmission systems often recite methods of manipulating digital data where the innovation lies in the mathematical relationships claimed. For example, Sony and Samsung have been issued a series of similar patents where the claims are directed to specific matrices used for manipulating (by interleaving or error encoding) data for the DVB-T2 transmission standard (a standard used to send data to televisions).¹⁷³ Just as the image encoding of *RecogniCorp* increases computer efficiency, these matrices are seen to increase the transmission system’s efficiency by increasing the amount of data that can be transmitted successfully.¹⁷⁴ Therein, Sony’s recently issued patent 9,094,043 claims matrices to be used in a data encoding system (the matrices are used in a multiplication operation for data encoding).¹⁷⁵ These claims clearly recite mathematical relationships without significantly more beyond those relationships, as the encoding is performed by conventional computer hardware.¹⁷⁶ These types of claims, if interpreted in light of *RecogniCorp*, could be seen as patent ineligible due to the only technological improvement being the result of the mathematical algorithms applied.¹⁷⁷

Furthermore, patents that do not specifically claim matrices and/or equations used for computer-implemented mathematical algorithms could also be construed as patent ineligible under *RecogniCorp*.¹⁷⁸ Qualcomm-owned patent 8,958,375, related to telecommunications standards including LTE, has been analyzed as one of the most valuable patents in Qualcomm’s patent portfolio.¹⁷⁹ This patent claims:

A method, in a transmitter, of framing an upper layer packet Service Data Unit (ULP SDU), comprising: adding a Symbol Auxilliary Field (SAF) to at least one source symbol to indicate the boundaries of the ULP SDU and the length of potential padding needed to symbol align the ULP SDU; and encapsulating a portion of the ULP SDU along with at least one RS to form a PAL PDU, where the RS is generated by encoding at least one of the SSs augmented with the SAF.¹⁸⁰

While a specific matrix isn’t claimed as in the Sony and Samsung patents discussed previously, Patent 8,958,375 claims a method of manipulating data for

171. See generally Justus Baron & Tim Pohlmann, *Mapping Standards to Patents Using Declarations of Standard-Essential Patents*, 27 J. ECON. & MGMT. STRATEGY 504 (2018) (discussing SEPs).

172. *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1327–28 (Fed. Cir. 2017).

173. U.S. Patent No. 9,787,326 (issued Oct. 10, 2017); U.S. Patent No. 9,621,191 (issued Apr. 11, 2017); U.S. Patent No. 9,094,043 (issued July 28, 2015).

174. ‘326 Patent; ‘191 Patent; ‘043 Patent.

175. See ‘043 Patent (showing the patent covers matrices to be used in a data encoding system).

176. *Id.*

177. See *RecogniCorp*, 855 F.3d at 1328 (stating that “[t]he addition of a mathematical equation that simply changes the data into other forms of data cannot save it.”).

178. *Id.*

179. ‘375 Patent; GREYB SERVICES, *supra* note 6.

180. ‘375 Patent.

transmission where in the “adding” step more numbers are added to input data and in the “encapsulating” step the data is further manipulated to produce a data unit for output; in essence, numbers are input and new numbers are output.¹⁸¹ Patent 8,958,375’s claim could be held ineligible in light of *RecogniCorp*, as “the addition of a mathematical equation that simply changes the data into other forms of data cannot save it.”¹⁸² Therefore, if the holdings of *RecogniCorp*, where the Federal Circuit found that an inventive concept cannot be had in a computer-implemented mathematical algorithm, were widely applied, these Sony, Samsung, and Qualcomm patents could be annulled.¹⁸³ This is a big problem; if *RecogniCorp* is to be broadly applied to all data processing patents, there could be a lot of value that quickly disappears in the patent portfolios of top technology companies.¹⁸⁴

IV. WHAT CAN BE DONE

A. *In the Courts*

Given that the Federal Circuit and Supreme Court have decided to not further consider the *RecogniCorp* decision, the judiciary could change the law set out in *RecogniCorp* in future decisions. Two changes are proposed to the law surrounding patent eligibility that could solve the *RecogniCorp* problem; one affecting step one of the *Alice* test’s analysis, and the other, step two.

1. *Separating Advanced Computer-Implemented Mathematics from Basic Abstract Mathematics*

The Supreme Court has readily identified basic mathematical formulae, whether they are directed to natural laws or data processing algorithms, as abstract ideas.¹⁸⁵ Additionally, the Supreme Court has warned against excluding all advanced math, such as data compression, from patentability.¹⁸⁶ However, the Federal Circuit’s far-reaching determination in *RecogniCorp* that all

181. *Id.*

182. *RecogniCorp*, 855 F.3d at 1328.

183. *Id.* at 1324; see Elliot C. Cook, *RecogniCorp v. Nintendo—Alice Keeps Playing at the Federal Circuit*, FINNEGAN: PROSECUTION FIRST BLOG (May 26, 2017), <https://www.finnegan.com/en/insights/blogs/prosecution-first/recognicorp-v-nintendo-alice-keeps-playing-at-the-federal-circuit.html> (“In view of *RecogniCorp* and the numerous other post-*Alice* Federal Circuit decisions, patent practitioners now have ample precedent to consider in evaluating the patentability of particular inventions and claims. While the answer on patentability may not always be clear, *RecogniCorp* and the Federal Circuit’s other cases do confirm that there are no bright-line rules that render entire technological fields eligible or ineligible for patenting.”).

184. Cook, *supra* note 183.

185. See *Diamond v. Diehr*, 450 U.S. 175, 187 (1981) (seeking patent protection for a process of curing synthetic rubber); *Parker v. Flook*, 437 U.S. 584, 595 (1978) (explaining that even if a solution has a specific purpose, it is not statutory if it is directly essential to a method of calculating, using a mathematical formula); *Gottschalk v. Benson*, 409 U.S. 63, 72–73 (1972) (ruling that the process claimed was so abstract that it was an attempt to patent).

186. See *Bilski v. Kappos*, 561 U.S. 593, 605 (2010) (quoting *Diamond*, 450 U.S. at 195) (“For example, it was once forcefully argued that until recent times, ‘well-established principles of patent law probably would have prevented the issuance of a valid patent on almost any conceivable computer program.’ But this fact does not mean that unforeseen innovations such as computer programs are always unpatentable.”).

encoding operations comprise abstract ideas seems to overstretch the bounds of the Supreme Court's intentions when determining what comprises an abstract idea.¹⁸⁷ Making a comparison between computer data processing and Paul Revere's "one if by land, two if by sea" is clearly a vast oversimplification.¹⁸⁸ Along with that, nor could a simple algorithm for binary to decimal conversion be put in the same league as an image encoding process specifically designed to solve a computer-centric problem—namely, to increase computer efficiency.¹⁸⁹ Just as the Federal Circuit found non-abstract technical solutions to computer problems in *Enfish*, *McRO*, *Visual Memory*, and *Finjan*, the court could reasonably set a limit when mathematically-directed claims should not be considered in *Alice* step one as abstract.¹⁹⁰ The long-held exception to patent eligibility should be limited to separate basic mathematical algorithms from complex algorithms related to computer data processing. What can reasonably be performed by hand, or, as the *RecogniCorp* court argued, "on a telephone," should fall under the abstract idea exceptions to patentability, but advanced computer data processing should be separated as non-abstract.¹⁹¹

Furthermore, discerning certain advanced mathematics as non-abstract does not conflict with Supreme Court precedent.¹⁹² The main idea behind the patent eligibility exceptions is preemption; if a mathematical formula is so advanced as to only be applicable to a certain situation (encoding, compression, etc.), as long as the formula does not describe an advanced natural law, there should not be an issue of preemption of the formula across other technologies.¹⁹³ Therefore, separating mathematical algorithms that can reasonably be performed by hand would solve the problem of advanced computer-implemented mathematical algorithms from being categorically excluded from patentability under step one of the *Alice* test based on overextensions of the law and oversimplifications of the claims.¹⁹⁴ This distinction would solve the problem that Judge Linn had already expressed in his dissent to the *Smart Systems Innovations* ruling that the Federal Circuit's current interpretation of 35 U.S.C. § 101 has gone too far to limit highly technical claims.¹⁹⁵ Allowing mathematics that are clearly too advanced to be considered as preempting natural laws or

187. See *RecogniCorp*, 855 F.3d at 1328 (citing *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2357 (2014)) ("In sum, the claims of the '303 patent lack an inventive concept that transforms the claimed subject matter from an abstract idea into a patent-eligible application.").

188. *Id.* at 1326.

189. See *Gottschalk*, 409 U.S. at 65 (showing an attempted patent claim on a procedure for converting signals from binary-coded decimal form into pure binary form).

190. *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1255 (Fed. Cir. 2017); *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299, 1302 (Fed. Cir. 2016); *Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016).

191. *RecogniCorp*, 855 F.3d at 1326.

192. See *Gottschalk*, 409 U.S. at 67, 93 (analyzing previous Supreme Court precedent surrounding the issue of when advanced mathematics become abstract ideas).

193. *Id.*

194. See *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354–57 (2014) (explaining Step 1 of the *Alice* test).

195. See *Smart Sys. Innovations*, 873 F.3d at 1378 (Linn, J., dissenting) ("Step one cannot be a hunt for the abstract idea underlying the claim, because underlying virtually every claim is an abstract idea. And if the task under step one is to assess whether the claim is directed to no more than an abstract idea, what is left for determination under step two?").

generally applicable mathematical algorithms could be a reasonable interpretation of the current Supreme Court precedent in this area and provide an effective solution to the *RecogniCorp* problem.¹⁹⁶

2. *Allowing a Mathematical Algorithm to Provide the Inventive Concept for Computer-Implemented Abstract Ideas.*

Even if all mathematical algorithms were considered abstract, as the *RecogniCorp* court directed, the *RecogniCorp* problem could be solved if computer-implemented mathematical algorithms that increase the performance of an otherwise generic computer were considered to provide an inventive concept under *Alice* step two.¹⁹⁷ The second step of the *Alice* test prevented the generic computer implementation of an abstract business idea, unrelated to the computer itself, from being considered patent eligible.¹⁹⁸ However, an inventive concept should be found when a technological improvement results from a claimed invention, including a technological improvement to an otherwise generic computer performing an abstract idea.¹⁹⁹ The *Mayo* decision, reiterating the concerns of previous Supreme Court decisions, expressed fears about formulae describing the natural world (like Einstein’s law of energy) from being patented as generally applied.²⁰⁰ However, computer data processing is specific, and cannot be reasonably related to the general application of a natural law.²⁰¹ Therefore, the language of the Federal Circuit’s ruling in *RecogniCorp* went too far to state that a mathematical process “that simply changes data” cannot be saved in the second step of *Alice*.²⁰² When advanced computer-implemented mathematical algorithms are claimed that provide a technological improvement to the underlying computer, the claims should be patent eligible as providing an inventive concept. An otherwise abstract mathematical algorithm should not be completely barred from providing a technological improvement in *Alice* step-two.

B. *Congressional Action*

Besides specific actions taken by the courts, Congress has the power to statutorily change the bounds of patent eligibility to correct the broad language

196. *See id.* at 1379 (explaining that “[c]laims directed not merely to basic building blocks of scientific or technological activity, but instead to innovative solutions to real problems that result from human activity are not capable of performance solely in the human mind should be fully eligible for patent protection and not lightly discarded.”).

197. *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1326 (Fed. Cir. 2017).

198. *Alice Corp.*, 134 S. Ct. at 2357–58.

199. *See Amdocs (Isr.) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1302 (Fed. Cir. 2016) (discussing claims that provide technological improvement).

200. *See Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 77–78 (2012) (“A patent . . . could not simply recite a law of nature and then add the instruction ‘apply the law.’”).

201. Eisenberg, *supra* note 21, at 341–43.

202. *See RecogniCorp*, 855 F.3d at 1328 (“The addition of a mathematical equation that simply changes the data into other forms of data cannot save it.”).

of *RecogniCorp*.²⁰³ Statutory action would presumably be on a much broader level than the previously proposed action in the courts to clarify the test for 35 U.S.C. § 101 patent eligibility.²⁰⁴ Director Iancu of the U.S. Patent and Trademark Office was even seen to encourage Congressional action to clarify the law surrounding patent eligibility while speaking to the Senate Judiciary Committee in April 2018.²⁰⁵ While the prospects of such a bill getting through Congress are unpredictable, several major patent organizations are advocating for changes in the law surrounding patent eligibility.²⁰⁶ The Intellectual Property Owners Association (IPO), American Intellectual Property Law Association (AIPLA), and American Bar Association (ABA) have all made recommendations to Congress regarding how to amend 35 U.S.C. § 101 to increase the range of and more clearly define patent eligibility.²⁰⁷ Specifically, the IPO has proposed to limit the current exceptions to patent eligibility (abstract ideas, laws of nature, and natural phenomena) to only if a person of ordinary skill in the art would find that the claimed invention “exists in nature independently of and prior to any human activity, or exists solely in the human mind.”²⁰⁸ The AIPLA has proposed amending 35 U.S.C. § 101 almost identically to the proposal made by the IPO, emphasizing a need for predictability in the court’s application of 35 U.S.C. § 101.²⁰⁹ Similarly, the ABA in a letter to the USPTO expressed concerns that the Federal Circuit is overextending the *Alice* decision in ruling claims patent ineligible when they are specifically applied, thereby going beyond the Supreme Court’s preemption concern for claims that can be widely applied across all technologies.²¹⁰ An amendment to 35 U.S.C. § 101 in line with the IPO and AIPLA recommendations could leave the image encoding claimed in *RecogniCorp* patent ineligible if the claims were still considered capable of being performed on the telephone, and therein existing essentially solely in the human mind.²¹¹ However, if claims directed to advanced computer-implemented mathematical

203. See Gene Quinn, *Director Iancu Tells Senate: 101 is an Issue “We All Must Address”*, IP WATCHDOG (Apr. 18, 2018), <https://www.ipwatchdog.com/2018/04/18/director-iancu-tells-senate-101-issue-we-must-all-address/id=96012> (describing an effort to change the bounds of patent eligibility in Congress).

204. *Id.*

205. *Id.*

206. See, e.g., AM. INTELL. PROP. LAW ASS’N, AIPLA LEGISLATIVE PROPOSAL AND REPORT ON PATENT ELIGIBLE SUBJECT MATTER (May 2017), [hereinafter LEGISLATIVE PROPOSAL] (on file with American Intellectual Property Law Association) (detailing an organization’s proposal to change legislation surrounding patent eligibility).

207. INTELL. PROP. OWNERS ASS’N, PROPOSED AMENDMENTS TO PATENT ELIGIBLE SUBJECT MATTER UNDER 35 U.S.C. § 101 (Feb. 2017), [hereinafter PROPOSED AMENDMENTS] (on file with Intellectual Property Owners Association); AM. INTELL. PROP. LAW ASS’N, AIPLA LEGISLATIVE PROPOSAL AND REPORT ON PATENT ELIGIBLE SUBJECT MATTER (May 2017) (on file with American Intellectual Property Law Association); E-mail from Donna P. Suchy, Section Chair, Am. Bar Ass’n., to Michelle K. Lee, Director of the U.S. Pat. and Trademark Off. (Mar. 28, 2017) (on file with American Bar Association).

208. PROPOSED AMENDMENTS, *supra* note 207.

209. LEGISLATIVE PROPOSAL, *supra* note 206.

210. E-mail from Donna P. Suchy, Section Chair, Am. Bar Ass’n., to Michelle K. Lee, Director of the U.S. Pat. and Trademark Off. (Mar. 28, 2017) (on file with American Bar Association).

211. LEGISLATIVE PROPOSAL, *supra* note 206; PROPOSED AMENDMENTS, *supra* note 207.

algorithms were properly interpreted as reasonably incapable of performance in the human mind, these claims could be ruled as patent eligible.²¹²

CONCLUSION

Computer-implemented mathematical algorithms should not be systematically excluded from providing the inventive concept under the *Alice* test. “[I]n *Diehr* the Court pointed out that ‘a process is not unpatentable simply because it contains a law of nature or a mathematical algorithm.’²¹³ It added that ‘an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.’²¹⁴ However, the Federal Circuit’s ruling in *RecogniCorp* blankly rejects the patent eligibility of mathematical algorithms implemented by conventional computer systems.²¹⁵ The *RecogniCorp* decision was misguided based on a lack of recognition of the technological improvements provided by the encoding claimed.²¹⁶ In order to fix this problem, advanced computer-implemented mathematics could be separated from basic mathematical algorithms as not being abstract.²¹⁷ Alternatively, abstract mathematical algorithms could be understood to provide technological improvements and, thereby, inventive concepts, to the conventional computers that are implementing them.²¹⁸ The United States depends on the patent system to encourage innovation, and computer data processing underpins modern digital technology. Ensuring patent protection for this technology by ensuring patent eligibility is necessary.

212. *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1326–27 (Fed. Cir. 2017) (discussing the standard for patent eligibility).

213. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012) (quoting *Diamond v. Diehr*, 450 U.S. 175, 187 (1981) (quoting *Parker v. Flook*, 437 U.S. 584, 590 (1978))).

214. *See id.* (quoting *Diamond*, 450 U.S. at 187).

215. *RecogniCorp*, 855 F.3d at 1328.

216. *See id.* (“The claims of the ‘303 patent are directed to encoding and decoding image data, an abstract idea. The claims provide no inventive concept to render them eligible under § 101. We therefore affirm the district court’s grant of Nintendo’s motion for judgment on the pleadings.”).

217. *See id.* at 1326 (explaining the separation of basic and abstract math).

218. *See id.* at 1324 (explaining that abstract mathematical concepts could be understood to benefit conventional computers implementing it).