

**THE RELATIVITY OF AN ABSTRACT IDEA:
A PRACTICABLE APPROACH TO ALICE’S
INVENTIVE CONCEPT**

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I. INTRODUCTION

The research and development that drives technology is critical to the United States economy.¹ Chemistry and computer science, for example, play a large role in modern society, touching almost every industry from agriculture to consumer electronics. Those two technological fields in particular continue to advance in unimaginable ways. The progress of chemistry and computer science will have a resounding impact on society as innovation spurs the development of new devices and processes.

In the United States, the patent system is an integral tool constructed solely to promote such innovation.² Ever since President George Washington signed the first U.S. patent,³ patents have rewarded innovation and given a true economic value to research and development.

In the modern U.S. patent system, many specific criteria are required of the patent document. One of those criteria, and a first threshold to obtaining a patent, is the subject matter of eligibility requirement.⁴ Supreme Court precedent has long held that an invention directed at an “abstract idea” is not patentable subject matter.⁵ The purpose of the abstract idea requirement is to prohibit patents on the formulas and theories that comprise the tools of scientific endeavor.⁶

In recent years, however, the unbounded acceleration of scientific progress has challenged the Court’s application of the abstract idea concept. That is because everyday inventors develop ideas that neither our country’s founders, nor even the

1. In 2011, research and development expenditures in the United State totaled \$424.4 billion, just over 2.8% of gross domestic product and just under 30% of an estimated \$1.435 trillion in global research and development expenditures. See NAT’L SCI. BD. NAT’L CTR. FOR SCI. & ENG’G STATISTICS, NAT’L SCI. BD., SCIENCE AND ENGINEERING INDICATORS 4–6 (2014), <http://www.nsf.gov/statistics/seind14/content/digest/nsb1402.pdf>. President Obama proposed spending \$135.4 billion in Federal R&D for 2015. See *The 2015 Budget: Science, Technology, and Innovation for Opportunity and Growth*, WHITE HOUSE OFFICE OF SCI. & TECH. POLICY 1 (Mar. 2014), <https://www.whitehouse.gov/sites/default/files/microsites/ostp/Fy%202015%20R&D.pdf>.

2. See, e.g., Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEGAL STUD. 247, 248 (1994) (explaining that the right to exclude stemming from a patent stimulates research and development).

3. *The Making of Potash and Pearl Ashes*, U.S. Patent No. X000001 (issued July 31, 1790).

4. Section 101 of the Patent Act defines eligible subject matter as any “process, machine, manufacture, or composition of matter, or . . . improvement thereof.” 35 U.S.C. § 101 (2012).

5. See, e.g., *Le Roy v. Tatham*, 55 U.S. 156, 175 (1852) (“A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.”).

6. *Id.*

last generation, could have imagined. Thus, the ensuing uncertainty created by the abstract idea concept creates tension in the patent system and, specifically, threatens to constrain the scope of the method patent.⁷

For example, some practitioners view the Supreme Court's *Mayo* framework as particularly troublesome for software-related inventions because now it seems that a computer program must show a technical improvement or improve the operability of the computer itself.⁸ Yet, it remains unanswered what qualifies as an improvement, to what extent an improvement must be disclosed, and whether the proper forum for such disclosure is in the actual claim language or specification.⁹

Under *Mayo*, an abstract idea is eligible subject matter only if it provides an inventive concept.¹⁰ But this inventive concept standard is shrouded in ambiguity.¹¹ The Supreme Court promulgation of the two-step *Mayo* test in *Alice* makes unpatentable a method implemented on a generic, multipurpose computer.¹² But the Court's decision risks expansion capable of swallowing up the majority of some technical fields, such as software generally or other emerging technologies.¹³ That is, if the boundaries of the inventive concept are not better defined by the Court.

7. A method patent, "one of the most common and basic terms of patent drafting," claims a process, which has "a clear, settled meaning: a set of actions, necessarily taken over time." *Nassau Precision Casting Co. v. Acushnet Co.*, 566 F. App'x 933, 939 (Fed. Cir. 2014) (citations omitted).

8. Natalya Dvorson & Mark C. Davis, *Through the Looking Glass Exploring the Wonderland of Patent Subject Matter Eligibility After Alice Corp. v. Cls Bank International*, 7 NO. 2 LANDSLIDE 8, 10 (2014) (suggesting that the specification of a software-related invention should "discuss that the implementation of the 'abstract idea' (1) provides faster processing capability, (2) improves memory utilization, and/or (3) displays data that has not been previously displayed").

9. *Id.* (noting that in *Alice*, Justice Thomas suggests claims may be eligible subject matter if they merely "purport to improve the functioning of the computer").

10. *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1294 (2012)).

11. An inventive concept is "an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Id.* (alteration in original) (citation omitted).

12. *See id.*

13. *See, e.g., Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714 (Fed. Cir. 2014) (holding unpatentable a method for using advertisements as online currency because the process directs to abstract steps); *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1351, 1355 (Fed. Cir. 2014) (holding unpatentable methods and media to guarantee a party's performance of its online transaction as direct to an abstract idea); *Planet Bingo, LLC v. VKGS LLC*, 576 F. App'x 1005, 1007 (Fed. Cir. 2014) (holding unpatentable a method for a computerized bingo game because the claims were direct to abstract ideas that could have been performed by a person on paper).

In *Alice*, the Supreme Court latched onto a conceivably archaic construct of the abstract idea, which sent waves of uncertainty through the inventive community. This uncertainty may deter innovation in technological fields, such as computational chemistry, which show the most promise and greatest potential to impact society in meaningful ways. As the Federal Circuit continues to issue decisions in lieu of *Alice*, it has become obvious that the Court's holding is not exclusively constrained to business methods.¹⁴ In fact, some commentators fear that *Alice* is a prelude to death of the method patent. This paper will outline why the Court's reasoning in *Alice* must be refined, and how to achieve a practicable standard to evaluate an abstract idea.

The potential impact of *Alice* is not apparent when read exclusively on the business methods patent. Rather, *Alice* must be interpreted with an eye to its impact on other technologies, those that the justices did not consider in reaching their decision. Such technologies reveal the flaw in *Alice*.

The chemical arts, for example, were traditionally based on laws of nature and abstract theoretical underpinnings confirmed only by meticulous, iterative experimentation.¹⁵ But today, modern computational chemistry combines experimentation and theoretical modeling to aid scientist in a variety of ways. First, this tool helps chemists understand experimental results.¹⁶ Second, it can predict simple chemical reaction pathways.¹⁷ Finally, computational chemistry enables scientific inquiry when experimentation is either too difficult, such as in determining upper-atmospheric constituents in ozone depletion, or too

14. See, e.g., *eDekka LLC v. 3Balls.com, Inc.*, No. 2:15-CV-541 JRG, 2015 WL 5579840, at *1, *4–5 (E.D. Tex. Sept. 21, 2015) (Gilstrap, J.) (finding software for labeling and storing information that “substantially reduces the time to retrieve information and the amount of information that must be retrieved” unpatentable because “no inventive concept exists to transform the claimed abstract idea into a patent-eligible concept.”).

15. Robert Boyle was chemist in the seventeenth century that contributed to the development and acceptance of an experimental method in chemistry. See TREVOR H. LEVERE, *TRANSFORMING MATTER: A HISTORY OF CHEMISTRY FROM ALCHEMY TO THE BUCKYBALL* 14–15 (2001).

16. See, e.g., Claudio Greco, et al., *Combining experimental and theoretical methods to learn about the reactivity of gas-processing metalloenzymes*, Royal Society of Chemistry, <http://pubs.rsc.org/en/content/articlehtml/2014/ee/c4ee01848f> (explaining that “confronting theoretical results to experimental observations can help uncover the molecular details of the catalytic mechanism of an enzyme”).

17. See *id.*

dangerous, such as the screening of toxic or explosive chemicals.¹⁸

Today, computational chemistry plays a pivotal role in most advances made in chemistry using realistic simulations to predict the results of traditional experiments.¹⁹ For example, complex pharmaceuticals can be engineered without the expense of laboratory trials.²⁰ But these chemical processes, these methods, are based entirely in the abstract—simply an idea.

So, where is the line drawn of the inventive concept? Is the inventive concept born upon actual implementation of the method? This view would make the Court's holding in *Alice* moot, because most business methods could just as easily qualify as inventive concepts simply by their implementation. Alternatively, the inventive concept may be based on the physical transformation of matter.²¹ Yet, the hard drive²² of a general-purpose computer is physically altered when a user runs a software program.²³ On the atomic-level, is the transformation of bytes on a hard drive much different than the transformation of reactants in a chemical process?

Application of the Supreme Court's vague two-step *Mayo* test can be challenging, especially in highly complex and cross-disciplinary fields like computational chemistry. Therefore, finding the answers to these questions in the near future is essential to preserve the patent system and continue to promote scientific progress. But to recognize the shortfalls of the two-step

18. See CHRISTOPHER J. CRAMER, ESSENTIALS OF COMPUTATIONAL CHEMISTRY THEORIES AND MODELS 11–12 (2d ed. 2004), http://sci.uokufa.edu.iq/ar/teaching/zynaba/Essentials_of_Computational_Chemistry.pdf.

19. See Press Release, The Royal Swedish Academy of Sciences, The Nobel Prize in Chemistry 2013 (Oct. 9, 2013) (on file with author) (recognizing Martin Karplus, Michael Levitt and Arieh Warshel for their contributions establishing computational chemistry in the 1970s).

20. See, e.g., TINDLE, ET AL., CONTEMPORARY ADVANCEMENTS IN INFORMATION TECHNOLOGY DEVELOPMENT IN DYNAMIC ENVIRONMENTS 92, (Mehd Khosrow-Pour ed., 2014) (Ch. 6 *Further Development of an Application Framework for Computational Chemistry (AFCC) Applied to New Drug Discovery*).

21. Cf. *Diamond v. Diehr*, 450 U.S. 175, 184–85 (1981) (explaining that a computer implemented method for a feedback loop temperature controller in the production of vulcanized rubber was valid because it involved the transformation of material).

22. A hard drive, or hard disk, is defined as, “[a] magnetic disk consisting of a rigid substrate coated or plated—usually on both sides—with a magnetic material.” *Hard Disk*, OXFORD DICTIONARY OF COMPUTING (6th ed. 2008).

23. Stephen J. Rogowski, *Hard Disk*, in CONCISE ENCYCLOPEDIA OF COMPUTER SCIENCE 357 (Edwin D. Reilly ed., 2004) (explaining that a hard drive may contain several platters that are divided into tracks, which are further subdivided into sectors, with data written on a myriad sectors, not necessarily consecutively, by altering the magnetic orientation of bytes comprising the sectors).

Mayo test it is necessary to examine the development of the abstract idea judicial exception to eligible subject matter.

This paper will first describe the narrowing of patentable subject matter over time with respect to the “abstract idea” judicial exception. Second, through application of the current eligible subject matter standard to the chemical arts, the paper will illuminate the unsound foundation upon which the current state of the law rests. The paper will conclude with a recommendation for treatment of patent subject matter eligibility that will both uphold the constitutional basis of the patent system and survive the development of technologies well into the future.

II. DEVELOPMENT OF THE “ABSTRACT IDEA” JUDICIAL EXCEPTION TO PATENT ELIGIBLE SUBJECT MATTER

A. *The Constitutional and Statutory Foundation of Patent Eligible Subject Matter*

The framework required to analyze the abstract idea judicial exception to eligible subject matter was built upon our Constitution.²⁴ Article I, Section 8 provides that,

The Congress shall have power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries; . . . [and] To make all Laws which shall be necessary and proper for carrying into Execution the foregoing powers²⁵

In our modern economy-driven society, § 101 of the Patent Act gives form to the Framers’ words. It defines the bounds of patent eligible subject matter as “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof” and gives the right to “obtain a patent therefor, subject to the conditions and requirements of” the Patent Act.²⁶

In its current form, § 101 defines four patentable subject matters: a process, a machine, a manufacture, and a composition

24. The abstract idea is a judicial exception to the constitutionally based presumption that “anything under the sun” may qualify as patent eligible subject under § 101 of the Patent Act. *But see* *Bilski v. Kappos*, 561 U.S. 593, 642 (2010) (Stevens, J., Ginsburg, J., Breyer, J., Sotomoyor, J., concurring) (“We have never understood that piece of legislative history to mean that any series of steps is a patentable process.”).

25. U.S. CONST. art. I § 8.

26. 35 U.S.C. § 101 (2012).

of matter.²⁷ In 1946, Congress amended the Patent Act to include the “process” as patentable subject matter.²⁸ The intent was to provide clarity by replacing the term “art” with a more accurate noun, “process.”²⁹ Also, there was a need to distinguish “art” as used in § 101 from its use in other parts of the statute.³⁰ Congress reasoned that the term “art” in reference to patentable subject matter, as interpreted by the courts, is synonymous with a “process or method.”³¹ Moreover, the legislature reiterated this view in § 100(b), which defines “process” as a “process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.”³²

Overtime, the interpretation of § 101 led to three categorical judicial exceptions to eligible subject matter.³³ Those categories include inventions relating to laws of nature, natural phenomena, and abstract ideas.³⁴ The purpose of these judicial exceptions is to prevent monopoly control over the necessary tools of scientific progress.³⁵ “One way in which patent law seeks to sail between these opposing and risky shoals is through rules that bring certain types of invention and discovery within the scope of patentability while excluding others.”³⁶

The third exception, abstract ideas, is important when considering the eligibility of method patents because it is unclear where the demarcation line lies between the abstract and the

27. See, e.g., *Zonolite Co. v. United States*, 149 F. Supp. 953, 955–56 (Ct. Cl. 1957) (discussing various prior tests to determine patentability, including “inventive genius, flash of thought, intuitive genius, flash of genius, unusual and surprising consequences, and the like”) (citations omitted).

28. Patent Act of 1952, H.R.J. Res. 7794, 82d Cong. (1952).

29. See S. REP. NO. 82–1979 (1952), as reprinted in 1952 U.S.C.C.A.N. 2394, 2398–99 (explaining that art with respect to eligible subject matter “is interpreted by the courts to be practically synonymous with process or method”).

30. *Id.*

31. *Id.*

32. 35 U.S.C. § 100(b) (2012).

33. Also, section 33(a) of the America Invents Act expressly prohibits the patenting of a “claim directed to or encompassing a human organism.” Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 33, 125 Stat. 284, 340 (2011) (codified as amending 35 U.S.C. § 101). “Congress has excluded claims directed to or encompassing a human organism from patentability.” MPEP 2105 (9th ed. Rev. 7, Nov. 2015).

34. *Diamond v. Charkrabarty*, 447 U.S. 303, 304 (1980). See also *Bilski*, 561 U.S. at 601–02 (“these exceptions are not required by the statutory text, [but] they are consistent with the notion that a patentable process must be ‘new and useful’”).

35. *Lab. Corp. of America v. Metabolite Labs., Inc.*, 548 U.S. 124, 125 (2006) (Breyer, J., dissenting) (“[S]ometimes *too much* patent protection can impede rather than ‘promote the Progress of Science and useful Arts’ Patent law seeks to avoid the dangers of overprotection just as surely as it seeks to avoid the diminished incentive to invent that underprotection can threaten.”) (emphasis in original).

36. *Id.*

patentable.³⁷ The abstract idea requirement is woven into the foundation of patent law, yet the court has scarcely employed a satisfying definition of this to bar patentability.³⁸ Generally, the requirement was seen more as a formality than as a hurdle.³⁹ This is because other sections of the Patent Act were utilized to prohibit granting an overly broad patent on claims encompassing too much of an abstract idea, such that they might jeopardize future development in a technological niche.⁴⁰

B. *Early Cases Defining the “Abstract Idea” Judicial Exception for Method Claims*

The progression of the abstract idea bar began to develop in the early 1970s with increasing use of computers and development of new computer technologies.⁴¹ A trilogy of cases helped define the modern construct of the “abstract idea” judicial exception, which persisted for nearly thirty years.⁴²

1. *Benson* established that general computer algorithms are unpatentable abstract ideas.

The first case in the trilogy, *Gottschalk v. Benson*, set loose bounds for the patentability of abstract ideas.⁴³ That case involved an algorithm to convert binary code from a general-purpose digital form into a pure binary form.⁴⁴ There, the court stated that “[t]ransformation and reduction of an article ‘to a different state or thing’ is the *clue* to patentability of a process claim that does not include particular machines.”⁴⁵ The Court held that the patent was invalid under § 101 because the lack of a substantial practical application, except in connection with a

37. *Compare* *Diamond v. Diehr*, 450 U.S. 175, 185 (1981), *with* *Ass’n for Molecular Pathology v. Myriad*, 133 S. Ct. 2107, 2116 (2013).

38. Alan L. Durham, *The Paradox of “Abstract Ideas,”* 2011 UTAH L. REV. 797, 797.

39. The abstract ideas judicial bar exemplified the established principle that “[a]n idea of itself is not patentable, but a new device by which it may be made practically useful is.” *See* *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874). *See also* *Le Roy v. Tatham*, 55 U.S. 156, 175 (1852) (“A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.”).

40. “Virtually all of the important historical patentable subject matter cases may be explained by applying each of the other requirements for patentability.” Michael Risch, *Everything Is Patentable*, 75 TENN. L. REV. 591, 598 (2008).

41. *See, e.g.,* *Gottschalk v. Benson*, 409 U.S. 63 (1972).

42. *Id.*; *Parker v. Flook*, 437 U.S. 584 (1978); *Diamond v. Diehr*, 450 U.S. 175 (1981).

43. *Gottschalk*, 409 U.S. 63.

44. *Id.* at 65–66.

45. *Id.* at 70 (emphasis added) (defining the precursor to what is now commonly referred to as the machine-or-transformation test).

computer, would wholly preempt use of the mathematical formula.⁴⁶ But the court warned against “freez[ing] process patents to old technologies, leaving no room for the revelations of the new, onrushing technology.”⁴⁷

2. *Flook* eliminated a possible loophole for abstract ideas that are limited to particular industries.

The second case, *Parker v. Flook*, involved a method to adjust a system alarm limit using a novel mathematical formula.⁴⁸ Here, the Court found that simply limiting an abstract idea to a particular application or adding post-solution activity was insufficient to overcome the threshold of patentable subject matter.⁴⁹ Thus, the method patent did not meet the § 101 requirement.⁵⁰ Importantly, the Court generated the “inventive concept” in *Flook*, an idea that was revived in later cases.⁵¹

3. *Diehr* clarified that an abstract idea tied to a particular machine or transformation of matter is patentable.

The final case in the trilogy was *Diamond v. Diehr*, where the Court provided one data point where an abstract method is patentable.⁵² In *Diehr*, the Court found valid a method for curing synthetic rubber using a computer to continuously monitor the temperature of the reaction vessel and adjust curing duration to optimize the process.⁵³ Though the method only provided application of a law of nature and mathematical formula to a known process, it was deemed eligible subject matter under § 101 because the method provided a sufficient inventive concept (i.e., the physical transformation from uncured to cured rubber).⁵⁴

46. *Id.* at 71–72.

47. *Id.* at 71.

48. *Parker v. Flook*, 437 U.S. 584, 585 (1978) (explaining that an alarm limit is a number used, for example, during catalytic conversion processes to produce an alarm signal when process variables such as temperature or pressure exceed the predetermined alarm limit value).

49. *Id.* at 585, 594–95 (explaining that the claim was drawn to the formula itself because there was no claim as to selecting a margin of safety, weighting the variable, or means to trigger or adjust the alarm system).

50. *Id.* at 549.

51. *Id.* (“Even though a phenomenon of nature or mathematical formula may be well known, an inventive application of the principle may be patented. Conversely, the discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application.”).

52. *Diehr*, 450 U.S. at 192–93 (“we do not view respondents’ claims as an attempt to patent a mathematical formula, but rather to be drawn to an industrial process for the molding of rubber products”).

53. *Id.*

54. *Id.*

The holding in *Diehr* solidified *Flook's* Machine-or-Transformation test, which states that a method is patentable only if (1) the method is tied to a particular machine or apparatus, or (2) the method transforms a particular article into a different state or thing.⁵⁵ The Court in *Diehr*, however, did not answer the question of whether intangible transformations would be sufficient to meet eligible subject matter.

C. *Recent Cases Defining the "Abstract Idea" Judicial Exception for Method Claims and Cultivating the Two-Step Mayo Test*

The approach from *Diehr* survived thirty years. Then, in 2010, the Supreme Court issued the first of three vague opinions in an attempt to refine the abstract idea bar, while leaving its holdings malleable enough to encompass existing precedent.⁵⁶ These three cases aimed to address the "abstractness of the 'abstract ideas' test," which led to "great uncertainty and to the devaluing of inventions of practical utility and economic potential."⁵⁷

1. *Bilski* makes general, computer-implemented business methods unpatentable.

In *Bilski*, the patent at issue involved the method for predicting the risk of a commodity trade in the energy market using shadow transactions.⁵⁸ The examiner initially rejected the patent because the invention was not implemented on a specific apparatus and was not directed to the technological arts since the invention merely solved a mathematical problem without any limitation to a practical application.⁵⁹ The Patent Trial and Appeal Board upheld the examiner's rejection.⁶⁰

55. *Diehr*, 450 U.S. at 191–92. See also *Bilski*, 561 U.S. at 602–03.

56. See *id.*; *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012); *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014).

57. *CLS Bank Int'l v. Alice Corp. Pty.*, 685 F.3d 1341, 1348–49 (Fed. Cir. 2012), *reh'g en banc granted, opinion vacated*, 484 F. App'x 559 (Fed. Cir. 2012), *aff'd*, 717 F.3d 1269 (Fed. Cir. 2013), *aff'd*, 134 S. Ct. 2347 (2014).

58. *Bilski*, 561 U.S. at 599.

59. *Ex Parte Bilski*, No. 2002-2257, 2006 WL 5738364, at *2, *11, *18 (B.P.A.I. Sept. 26, 2006) (elaborating that non-physical financial risk is not patentable subject matter, unlike the mixing of two elements that is "clearly a statutory transformation" even if no apparatus is disclosed). See also *Bilski*, 561 U.S. at 599–600 (explaining that the examiner's rejection was based on the lack of a specific apparatus or limitation to a practical application).

60. *Id.* (explaining the Patent Trial and Appeal Board's rejection as based on lack of tangible transformation and claims directed to an abstract idea).

On appeal, the Federal Circuit distinguished application of the mathematical expression in *Bilski* from that in *Diehr* because in *Diehr* the inventors sought only to preempt use of that equation in conjunction with all of the other steps in their process.⁶¹ Therefore, *Bilski* provides that a claim does not draw on an abstract idea if it is significantly limited to a particular use or specific application such that it does not preempt all uses of the underlying principle.⁶²

The Federal Circuit also indicated that recitation of a computer, in limited cases, may be sufficient to tie a process to a particular machine.⁶³ Ultimately, however, the Federal Circuit rejected the invention because it was not tied to the transformation of a physical object or an “electronic signal representative of any physical object.”⁶⁴

On certiorari, the Supreme Court affirmed the ruling of the Federal Circuit,⁶⁵ but unanimously held that the machine-or-transformation test is not dispositive in determining the eligibility of process claims under § 101—it is only a “useful and important clue.”⁶⁶ The Court cautioned that § 101 must meet the unexpected progress of technology because precluding innovation in areas not contemplated by Congress would frustrate the purpose of the patent system.⁶⁷ While the machine-or-transformation test may aid in § 101 determinations for simpler technologies, e.g., those in the mechanical arts, it may not be

61. *In re Bilski*, 545 F.3d 943, 952–53 (Fed. Cir. 2008) *aff'd, but criticized sub nom. Bilski v. Kappos*, 561 U.S. 593 (2010) (“*Diehr* can be understood to suggest that . . . [where] the effect of allowing the claim would be to allow the patentee to pre-empt substantially all uses of that fundamental principle . . . the claim is not drawn to patent-eligible subject matter.”).

62. *In re Bilski*, 545 F.3d at 957.

63. *See id.* at 962 (“We leave to future cases the elaboration of the precise contours of machine implementation, as well as the answers to particular questions, such as whether or when recitation of a computer suffices to tie a process claim to a particular machine.”).

64. *Id.* at 964 (explaining that “the machine-or-transformation test is the only applicable test . . . when evaluating the patent-eligibility of process claims.”).

65. *Bilski*, 561 U.S. at 612 (“The patent application here can be rejected under our precedents on the unpatentability of abstract ideas [in *Bensen*, *Flook* and *Diehr*].”).

66. *Id.* at 603 (“The machine-or-transformation test is not the sole test for deciding whether an invention is a patent-eligible ‘process.’”). *See also id.* at 614 (Stevens, J., Ginsburg, J., Breyer, J., Sotomoyor, J., concurring) (expounding that “the wiser course would have been to hold that petitioners’ method is not a ‘process’ because it describes only a general method of engaging in business transactions—and business methods are not patentable.”).

67. *Id.* at 605. “Section 101 is a ‘dynamic provision designed to encompass new and unforeseen inventions.’ A categorical rule denying patent protection for ‘inventions in areas not contemplated by Congress . . . would frustrate the purposes of the patent law.” *Id.* (citations omitted).

applicable in computer and electronic arts.⁶⁸ In practice, the machine-or-transformation test may lose sight of the “larger object of securing patents for valuable inventions without transgressing the public domain.”⁶⁹ Because of these difficulties, the Court recognized a need to strike a balance between protecting inventors in the Information Age and preventing “monopolies over procedures that others would discover by independent, creative application of general principles.”⁷⁰ After *Bilski*, the business method was again patentable.⁷¹

2. *Mayo* revives the inventive concept and smears uncertainty across the three judicial exceptions.

Mayo was arguably the juncture at which the Supreme Court took a turn for the worse, subtly establishing a two-step framework to analyze the three judicial exceptions.⁷² In *Mayo*, the claims at issue concerned a method for administering a thiopurine drug by measuring the concentration of certain metabolites in a patient’s blood and then adjusting drug dosage to hone in on an optimal level of metabolites.⁷³ In analyzing patentability, the Court assumed dosage/metabolite relation was a law of nature, concentrating on whether the method transformed this unpatentable relation.⁷⁴ Justice Breyer expounded that the Court’s precedent requires the Court to vigilantly protect against broad preemption of laws of nature.⁷⁵ Past cases, Breyer maintained, demonstrate that an otherwise unpatentable method may “contain other elements or a combination of elements, sometimes referred to as an ‘inventive

68. *Id.* at 605–06 (“The machine-or-transformation test may well provide a sufficient basis for evaluating processes similar to those in the Industrial Age But there are reasons to doubt whether the test should be the sole criterion for determining the patentability of inventions in the Information Age[, such as] software, advanced diagnostic medicine techniques, and inventions based on linear programming, data compression, and the manipulation of digital signals.”) (citations omitted).

69. *Id.* at 606 (citing *In re Bilski* 545 F.3d at 1015 (Rader, J., dissenting)).

70. *Id.* at 606 (declining to “take a position on where that balance ought to be struck.”).

71. *Id.* at 609 (“[T]he Patent Act leaves open the possibility that there are at least some processes that can be fairly described as business methods that are within patentable subject matter under § 101.”).

72. See Dennis Crouch, *Punishing Prometheus: The Supreme Court’s Blunders in Mayo v. Prometheus*, PATENTLYO (Mar. 26, 2012), <http://patentlyo.com/patent/2012/03/punishing-prometheus-the-supreme-courts-blunders-in-Mayo-v-prometheus.html>.

73. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1295 (2012).

74. *Id.* at 1297–98, 1302–30 (rejecting the Federal Circuit’s reasoning that administration of the drug transformed the human body or that analyzing the metabolite transformed the patient’s blood).

75. *Id.* at 1294.

concept,' sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law itself."⁷⁶ This laid the unsteady foundation for the Court's two-step *Mayo* test: First, determine if the invention is directed to one of the judicial categories of ineligible subject matter.⁷⁷ If so, the question then becomes the following: Do "the patent claims add *enough* to their statements of the correlations [of laws of nature] to allow the processes they describe to qualify as patent-eligible processes that *apply* natural laws?"⁷⁸

3. *Alice* conjures up the Two-Step *Mayo* Test in an attempt to bring cohesion to the Court's precedent.

In *Alice*, the Court teased out of *Mayo* a two-step test in an attempt to demarcate the obscure bounds of the abstract idea judicial exception.⁷⁹ The invention in *Alice* was directed to a computerized process to mitigate settlement risk.⁸⁰ The method involved creating "shadow" accounts that mirrored actual pending transactions, and then determining if both parties had sufficient resources to satisfy their obligations before executing the real-world transactions.⁸¹ By evaluating risk prior to execution of the actual transaction and only executing "permitted" transactions at the end of the business day, the method mitigated the financial risk associated with a party's inability to fully fill its obligation.⁸² The claims at issue dealt exclusively with utilizing the method, a computer system to carry out the method, and software for performing the method.⁸³

Following cross-motions in light of *Bilski*, the district court held there was no infringement because the claims were directed

76. *Id.* (citations omitted).

77. *See id.* at 1296 ("Prometheus' patents set forth laws of nature—namely, relationships between concentrations of certain metabolites in the blood and the likelihood that a dosage of a thiopurine drug will prove ineffective or cause harm.").

78. *Id.* at 1297 (explaining that a process claim reciting a law of nature is patentable only if it "has additional features that provide practical assurance that the process is more than a drafting effort designed to monopolize the law of nature itself").

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

80. Settlement risk is "the risk that only one party to an agreed-upon financial exchange will satisfy its obligation." *Id.* at 2352.

81. *Id.* at 2352.

82. *Id.* at 2352–53.

83. *Id.* at 2353 (explaining that the method, system, and media claims at issue expressly recite, or implicitly require, using a computer). *But see* *CLS Bank Int'l v. Alice Corp. Pty.*, 717 F.3d 1269, 1307, 1309 (Fed. Cir. 2013) (Rader, C.J., concurring in part and dissenting in part) (explaining that the claims are not directed to a general purpose computer, but "the use of a computer and other hardware specifically programmed to solve a complex problem. . . . Labeling this system claim an 'abstract concept' wrenches all meaning from those words, and turns a narrow exception into one which may swallow the expansive rule (and with it much of the investment and innovation in software).").

to an “abstract concept of employing a neutral intermediary to facilitate simultaneous exchange of obligations in order to minimize risk on any computer.”⁸⁴ The Federal Circuit vacated a divided panel decision,⁸⁵ and, upon rehearing *en banc*, affirmed the decision of the district court.⁸⁶ The plurality utilized *Mayo*’s abstract idea analysis⁸⁷ to conclude that using intermediary shadow accounts to mitigate risk was an abstract idea and that implementing the idea on a general-purpose computer did not transform the concept into something significantly more than the abstract idea.⁸⁸

In its decision, the Supreme Court focused on the issue of preemption; that is, it attempted to strike the balance between granting patents and preventing the preclusion of the necessary tools of scientific inquiry and progress.⁸⁹ With its focus on preemption, the Court endorsed the Federal Circuit’s use of the *Mayo* analysis.⁹⁰ In step one of the *Mayo* analysis, the Court analogized *Alice*’s intermediated settlement to *Bilski*’s risk hedging, noting that an abstract idea need not be a fundamental truth, but that an idea was a fundamental concept, long prevalent in the relevant art.⁹¹

At *Mayo* step two, the Court manipulated the precedent set forth in *Mayo*, *Benson*, *Flook*, and *Diehr* to expound upon the “inventive concept” standard.⁹² From *Mayo*, the Court gathered that “[s]imply appending conventional steps, specified at a high

84. *CLS Bank Int’l v. Alice Corp. Pty.*, 768 F. Supp. 2d 221, 252 (D.D.C. 2011), *rev’d*, 685 F.3d 1341 (Fed. Cir. 2012), *reh’g en banc granted, opinion vacated*, 484 F. App’x 559 (Fed. Cir. 2012), *aff’d*, 717 F.3d 1269 (Fed. Cir. 2013) *aff’d*, 134 S. Ct. 2347 (2014).

85. *CLS Bank Int’l v. Alice Corp. Pty.*, 484 F. App’x 559 (Fed. Cir. 2012).

86. *Alice*, 717 F.3d at 1292 (holding that the claims were not expressly directed to an abstract idea).

87. *Id.* at 1286 (“[A court must first] identif[y] the abstract idea represented in the claim,” and then determine “whether the balance of the claim adds ‘significantly more.’”).

88. *Id.*

89. *See CLS Bank Int’l v. Alice Corp. Pty.*, 134 S. Ct. 2347, 2354–55 (2014).

90. *Id.* at 2355.

First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, “[w]hat else is there in the claims before us?” To answer that question, we consider the elements of each claim both individually and “as an ordered combination” to determine whether the additional elements “transform the nature of the claim” into a patent-eligible application. We have described step two of this analysis as a search for an “inventive concept”—*i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.

Id. (alteration in original) (citations omitted).

91. *Id.* at 2355–57.

92. *Id.* at 2357–59.

level of generality, was not enough to supply an inventive concept.”⁹³ From *Benson*, the court observed that “simply implementing a mathematical principle on a physical machine, namely a computer, [i]s not a patentable application of that principle.”⁹⁴ From *Flook*, the Court noted that simply limiting an invention to a particular technological field could not circumvent the judicial bar against patenting an abstract idea.⁹⁵ In light of *Diehr*, the Court came to the curious proposition that simply improving an existing process by collecting temperature data via conventional industry practice and using a computer to take advantage of that data was a patent eligible concept.⁹⁶ Ultimately, the Court held that each step of the method was the application of “purely conventional” computer function “previously known to the industry.”⁹⁷

III. THE AFTERMATH OF ALICE: CONFUSION AND IMPRACTICABLE RESULTS ENSUE

The precedent above lacks the necessary synergy to establish an operative rubric that defines the “abstract idea” judicial exception across multiple technological fields.⁹⁸ Almost immediately after *Alice* was issued, commentators provided critical remarks concerning the two-step *Mayo* test and the implications of the new standard.⁹⁹

93. *Id.* at 2357 (citations omitted) (internal quotations omitted). *Cf.* Gene Quinn, *Killing Industry: The Supreme Court Blows Mayo v. Prometheus*, IPWATCHDOG (Mar. 20, 2012), <http://www.ipwatchdog.com/2012/03/20/supreme-court-Mayo-v-prometheus/id=22920/> (criticizing the Court for blurring the distinction between statutory requirement of patentable subject matter and novelty).

94. *Alice*, 134 S. Ct. at 2357–58 (alteration in original) (citations omitted).

95. *Id.* at 2358.

96. *Id.* The collection of data without more is not patent eligible subject matter. *See id.*

97. *Id.* at 2359–60 (“In short, each step does no more than require a generic computer to perform generic computer functions. . . . [T]he claims at issue amount to ‘nothing significantly more’ than an instruction to apply the abstract idea of intermediated settlement using some unspecified, generic computer.”).

98. *Cf.* Rob Merges, *Symposium: Go ask Alice — what can you patent after Alice v. CLS Bank?*, SCOTUSBLOG (June 20, 2014, 12:04 PM), <http://www.scotusblog.com/2014/06/symposium-go-ask-Alice-what-can-you-patent-after-Alice-v-cls-bank/> (“[W]e might say . . . after the decision in *Alice* the Court only cares about two things. Yet we still don’t really know what they are.”).

99. *See, e.g., id.* (“[T]he Court’s insistence on carrying forward cases such as *Benson* makes it difficult to figure out just what it means for a claim to cover an abstract idea.”); John Duffy, *Opinion analysis: The uncertain expansion of judge-made exceptions to patentability*, SCOTUSBLOG (June 20, 2014, 12:46 PM), <http://www.scotusblog.com/2014/06/opinion-analysis-the-uncertain-expansion-of-judge-made-exceptions-to-patentability/> (suggesting that *Alice*’s vague holding begs the question why the Court granted certiorari in the first place).

Some practitioners view the *Mayo* framework as particularly troublesome for software-related inventions because it seems that a computer program must show a technical improvement, or improvement in the operability of the computer itself.¹⁰⁰ Yet, several questions remain unanswered such as: What qualifies as such an improvement? To what extent must an improvement be disclosed? Is the proper forum for such disclosure in the actual claim language or specification?¹⁰¹

If the issues with the current standard for subject matter eligibility are not resolved, then developing industries such as computational chemistry may experience a chilling effect as innovation is stifled by the uncertainty in securing patents. Also, patent prosecutors drafting claims will feel the repercussions of *Alice* as they grapple with the two-step *Mayo* test in an attempt to ensure patentability.

A. *Application of Alice to a Chemical Distillation Process that Incorporates an Abstract Idea*

The judicial exception of the abstract idea, in its present form, is workable when applied to traditionally patentable inventions. Take for example the chemical process of distillation. Iterative experimentation of the scientific method is used to generate the fundamental laws of nature and abstract ideas employed by chemical engineers to understand, predict, and construct chemical processes. With respect to fractional distillation,¹⁰² the scientific method is how Merrel R. Fenske developed his equation to predict the number of theoretical plates in a binary distillation column.¹⁰³ Since its first publication in 1932 to the present day, the Fenske equation has allowed

100. Dvorson & Davis, *supra* note 8, at 10 (suggesting that the specification of a software-related invention should “discuss that the implementation of the ‘abstract idea’ (1) provides faster processing capability, (2) improves memory utilization, and/or (3) displays data that has not been previously displayed.”).

101. *Id.* (noting that in *Alice* Justice Thomas suggests claims may be eligible subject matter if they merely “purport to improve the functioning of the computer”).

102. Fractional distillation is the process of separating a mixture into its component parts, or fractions, based on differences in the boiling points of each fraction. LOUIS THEODORE & FRANCESCO RICCI, MASS TRANSFER OPERATIONS FOR THE PRACTICING ENGINEER 119–20 (2010).

103. See M. R. Fenske, *Fractionation of Straight-Run Pennsylvania Gasoline*, 24 INDUS. & ENG’G. CHEM. 482, 482 (1932) (noting the number of theoretical plates is the number of “perfect” trays required to achieve a desired distillate purity).

engineers to design distillation columns to carry out specific processes, leading to scores of patents for distillation processes.¹⁰⁴

For example, the method of distilling alcohol from mash is an age-old process, yet chemical engineers are still improving specific methods.¹⁰⁵ Two distillation columns are commonly employed in production of fuel-grade ethanol.¹⁰⁶ The first column, commonly called the “Beer Column,” is used primarily to separate solids in the mash from the liquid ethanol and water.¹⁰⁷ The second column, called the “Stripper,” separates the ethanol from the water.¹⁰⁸ While the method of applying the Fenske Equation to determine the number of trays used in such distillation undoubtedly violates the prohibition against patenting abstract ideas, the method of distillation itself is patentable subject matter.

In 2010, for example, the United States Patent and Trademark Office issued U.S. Patent No. 7,744,727, a method for distilling grain alcohol.¹⁰⁹ This method employs a porous membrane before distillation to separate out the solids in the mash, much like a coffee filter keeps the grounds from your cup.¹¹⁰

As an example of the application of the *Mayo* framework, take the slightly-modified Claim 1 of the ‘727 patent:

A method of distillation of ethanol from a mash, comprising the steps of:

[constructing a first distillation column and a second distillation column, wherein the number of trays in the first distillation column and the second distillation column are determined using the Fenske Equation;]

feeding the mash into [the] first distillation column;

feeding a distillate of the first distillation column to [the] second distillation column; and

purifying the mash before the mash is fed into the first distillation column, the purifying being performed by a membrane separation process, wherein a permeate of the purifying of the mash is fed into the second

104. See, e.g., Distillation Control, U.S. Patent No 2,069,490 (filed Sept. 13, 1933) (issued Feb. 2, 1937) (listing Merrell R. Fenske as the inventor); Distillation Method, U.S. Patent No. 7,744,727 (filed Apr. 24, 2004) (issued June 29, 2010).

105. See, e.g., ‘490 Patent; ‘727 Patent.

106. Jason R. Kwiatkowski et al., *Modeling the process and costs of fuel ethanol production by the corn dry-grind process*, 23 *Indus. Crops & Prods.* 288, 288, 292 (2006).

107. *Id.* at 292.

108. *Id.*

109. ‘727 Patent col. 2 l. 10–12.

110. See *id.* at col. 2 l. 34–39, col. 3 l. 7–10.

distillation column and a ratio of a retentate of the purifying of the mash to a permeate of the purifying of the mash is between 1:1 and 1:8.

Under the PTO's Interim Guidance on Patent Subject Matter Eligibility, an examiner must apply the "Two-Part Analysis for Judicial Exceptions."¹¹¹ After reviewing the entire specification and giving the claims their broadest reasonable interpretation, the examiner should note that the claim is directed to a process: ethanol distillation.¹¹²

Next, the examiner applies the two-step *Mayo* test.¹¹³ First, the examiner notes that the claim is directed to a law of nature that governs distillation and membrane separation as well as the abstract idea embodied in the Fenske Equation.¹¹⁴ Therefore, search for the inventive concept in step two of *Mayo* is required to identify additional elements that amount to more than the judicial exceptions.¹¹⁵

Here, it appears that Claim 1 falls under several of the "significantly more" examples such as the Machine-or-Transformation test: "Applying the judicial exception with, or by use of, a particular machine;" or "Effecting a transformation or reduction of a particular article to a different state or thing."¹¹⁶ Thus, the method for distillation appears to overcome the abstract idea bar to patentable subject matter.

B. Application of Alice to Processing Information

Information is processed for many purposes, much like the operation of a distillation process described above. Just as mash is fed into a distillation column, information is fed into a computer program. That program then separates or transforms the information into a more useful form, like the separation of ethanol from water and the other products of fermentation. But unlike distillation, the threshold of transformation sufficient to supply an inventive concept is gray when dealing with computer-based information. Take the following examples: the first, a patent eligible method of digital image halftoning,¹¹⁷ and the

111. 2014 Interim Guidance on Patent Subject Matter Eligibility, 79 Fed. Reg. 74,618, 74,621–22 (Dec. 16, 2014) (to be codified at 37 C.F.R. pt. 1).

112. *Id.* at 74,622 (citing MPEP 2103 (9th ed. Rev. 7, Nov. 2015)).

113. *Id.* at 74,621–22.

114. *See generally id.*

115. *Id.* at 74,621, 74,624.

116. *Id.* at 74,624 n.36.

117. *Research Corp. Tech. v. Microsoft Corp.*, 627 F.3d 859, 862–63 (Fed. Cir. 2010). ("Halftoning techniques allow computers to present many shades and color tones with a limited number of pixel colors[,] . . . [which] allows computer displays and printers to

second, a patent ineligible method for using Internet advertising as a form of currency.

In *Research Corp. Technologies, Inc. v. Microsoft Corp.*, the Federal Circuit found a method for the halftoning of gray scale images using abstract ideas to be eligible subject matter.¹¹⁸ Here, the method patents at issue were directed toward processes of receiving an input digital image and comparing, pixel by pixel, the digital image against a blue noise mask using algorithms and formulas to render a halftone image.¹¹⁹ The Federal Circuit held that the “invention presents functional and palpable applications in the field of computer technology” to improve upon the current state of the art.¹²⁰ The court opined that “specific applications or improvements to technologies in the marketplace,” even those applying abstract algorithms and formulas as a significant aspect of the claims, “are not likely to be so abstract that they override the statutory language and framework of the Patent Act.”¹²¹

Conversely, in *Ultramercial, Inc. v. Hulu, LLC*, the Federal Circuit held that a method for using Internet advertising as a form of currency was not patentable subject matter.¹²² The method patent here involved an eleven-step process to receive and make available on a restricted basis copyrighted material, present an interactive ad to an Internet user in exchange for access to the copyrighted material, and track the activity of the user’s interaction with the advertisement.¹²³ During litigation, the case was dismissed by the district court for failure to state statutory subject matter; reversed by the Federal Circuit; certiorari granted, judgment vacated, and remanded by the Supreme Court in light of *Mayo*; reversed again by the Federal Circuit; and again certiorari was granted, judgment vacated, and

render an approximation of an image by using fewer colors or shades of gray than the original image.”).

118. *Id.* at 869.

119. *Id.* at 868–69.

120. *Id.* (noting that the requirement of tangible components such as “high contrast film,’ ‘a film printer,’ ‘a memory,’ and ‘printer and display devices’” confirms the holding).

121. *Id.* at 869. *But see CMG Fin. Servs., Inc. v. Pac. Trust Bank, F.S.B.*, 50 F. Supp. 3d 1306, 1327 (C.D. Cal. 2014).

Although ‘inventions with specific applications or improvements to technologies in the marketplace are not likely to be so abstract that they override the statutory language and framework of the Patent Act,’ in the context of business method patents . . . courts have invalidated patents directed at abstract ideas despite their commercial applications.

Id. (citation omitted) (quoting *Research Corp.*, 627 F.3d at 862–63).

122. *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714–15 (Fed. Cir. 2014).

123. *Id.* at 714–15.

remanded by the Supreme Court in light of *Alice*.¹²⁴ This case history alone shows the uncertainty facing litigants staring down a § 101 argument. Nonetheless, when the case finally settled in the Federal Circuit for a third time, *Alice* provided the framework to defeat the appellate court's reasoning, which previously rested on the same case utilized on the second remand, the *Mayo* two-step test.

This time, at the first step in *Mayo*, the Federal Circuit found that,

This ordered combination of steps recites an abstraction—an idea, having no particular concrete or tangible form. . . . Although certain additional limitations . . . add a degree of particularity, the concept embodied by the majority of the limitations describes only the abstract idea of showing an advertisement before delivering free content.”¹²⁵

At step two of *Mayo*, the court found that “the claims simply instruct the practitioner to implement the abstract idea with routine, conventional activity.”¹²⁶ Judge Lourie opined that the invention lacked an inventive concept because the “majority” of the claims were directed at an abstract idea, “consulting and updating an activity log represent[ed] insignificant data-gathering steps,” actively restricting user access “represent[ed] only pre-resolution activity,” the claims were not directed at a “novel machine or apparatus” but only to a general purpose computer, and the invention failed to transform “physical objects or substances” or representations thereof.¹²⁷

124. *Id.* at 713.

125. *Id.* at 715 (Lourie, J.). *But see* *Ultramercial, Inc. v. Hulu, LLC*, 722 F.3d 1335, 1354 (Fed. Cir. 2013), *cert. granted, judgment vacated sub nom.* *WildTangent, Inc. v. Ultramercial, LLC*, 134 S. Ct. 2870 (2014), (Rader, C.J., writing for the court) (Lourie, J., concurring).

In *Ultramercial*, the Federal Circuit rejected the Supreme Court's suggestion that *Mayo* would change the outcome of the case. Judge Rader concluded that “as a practical application of the general concept of advertising as currency and an improvement to prior art technology, the claimed invention is not ‘so manifestly abstract as to override the statutory language of section 101.’” *Ultramercial*, 722 F.3d at 1354 (quoting *Research Corp.*, 627 F.3d at 869). The Federal Circuit held that the claim was not directed at an abstract idea because the method “seeks to remedy problems with prior art banner advertising,” it “purports to improve existing technology in the marketplace,” and it “require[s] intricate and complex computer programming” such that “it wrenches meaning from the word to label the claimed invention ‘abstract’” by “strip[ping] away these limitations and instead imagin[ing] some ‘core’ of the invention.” *Id.* at 1349.

126. *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014).

127. *Id.* at 715–17 (citations omitted) (internal quotations omitted) (“Any transformation from the use of computers or the transfer of content between computers is merely what computers do and does not change the analysis.”).

C. *Other Implications of the "Abstract Idea" Judicial
Exception as Expressed in Alice*

It is true that § 101 "is the sentinel, charged with the duty of ensuring that our nation's patent laws encourage, rather than impede, scientific progress and technological innovation."¹²⁸ Congress intended, however, a wide birth for subject matter eligibility, stating in committee reports that "[a] person may have 'invented' a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 *unless* the conditions of the title are fulfilled."¹²⁹ Therefore, the legislative history supports the proposition that the other conditions of the title, not section 101, are intended to constrain the scope of patents.¹³⁰

The Federal Circuit's decision in *Ultramercial* demonstrates how the abstract idea judicial bar can be easily misapplied to patentable subject matter, especially innovation directed at the intangible. Software programming is a prime example of an intangible invention. Often software patents are described as failing § 101 because it is an abstract idea, or is not coupled with a particular novel machine or transformation.¹³¹ However, "programming creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software."¹³² Indeed, a programmed computer running a specific compilation of software that performs a unique function is as definite and distinctive as your fingerprint.¹³³ To bar innovation utilizing computer technology, one of the most powerful tools on this earth would be to foreclose a tool driving "innovation in every area of scientific and technical endeavor."¹³⁴

Much like software programs implemented on a general-purpose computer, the chemical arts too have general-purpose

128. *Id.* at 718 (Mayer, J., concurring) (citations omitted).

129. S. REP. NO. 82-1979 (1952), as *reprinted in* 1952 U.S.C.C.A.N. 2394, 2399 (emphasis added).

130. *Contra Ultramercial*, 772 F.3d at 720 (Mayer, J., concurring) ("[T]he relevant legislative history makes clear that while a person may have 'invented' something under the sun, it does not qualify for patent protection unless the Patent Act's statutory requirements have been satisfied.").

131. *Ultramercial*, 722 F.3d at 1353 (Rader, J.).

132. *Id.* (quoting *In re Alappat*, 33 F.3d 1526, 1545 (Fed. Cir. 1994)).

133. *See id.*

134. *Id.*

unit operations¹³⁵ in which a chemical method is implemented. Similar to a computer's specific software, storage space or processing speed, chemical processes are operated at a specific parameters such as temperature, pressure, and retention time. Both receive inputs: computers as a known array of data that is coded in a particular orientation of bits, and chemical processes as known compositions of matter.¹³⁶ Then, that input is transformed within the bounds of the device into a new and useful output as an arrangement of bits or atoms.¹³⁷ Unlike the chemical process, which simply states a method by which an input is transformed within a known device to give a desired output, under *Alice*, a transformation of data via computer is not patentable. Is this simply because the transformation occurred on the atoms of a silicon chip?

On the atomic level the computer has indeed been transformed just as the atoms in the chemical reaction have been transformed. The product in a chemical reaction would not have existed but for the general-purpose device, the reactor, operated under specific reaction parameters. The data displayed on the computer screen would not exist but for the particular arrangement of zeros and ones designated by the magnetic orientation of bits of the computer hard-drive as the result of the particular computer program operated under specific conditions and constrains imposed by the programmer.

In this way, the reasoning of *Alice* is flawed. Eligibility of subject matter should not turn on whether the device to implement a process is "general-purpose." Given § 100(b) of the Patent Act provides specifically for the patentability of a method, subject to the judicial constraints of the abstract idea, two conclusions result. Either *Alice* was decided incorrectly due to a flaw in logic or the chemical process is no longer patentable subject matter.

IV. RELATIVITY APPROACH TO ELIGIBLY SUBJECT MATTER

The *Mayo* framework endorsed in *Alice* is operable, but not practicable. To operate in a practical way, this judicial exception of the abstract idea as a bar to patentability must be refined to meet two criteria. First, the standard must uphold the

135. See JASMINA KHANAM, PHARMACEUTICAL ENGINEERING: UNIT OPERATIONS AND UNIT PROCESSES 2 (2008). A unit operation is a term to define general process components such as reactors, heat exchangers, or distillation columns; also Tim Olsen, *An Oil Refinery Walk-Through*, CHEMICAL ENGINEERING PROGRESS, May 2014, at 34.

136. See Olsen, *supra* note 135.

137. *Id.*

constitutional basis of the patent system to promote the progress of innovation.¹³⁸ Second, the test must survive the development of all technological areas and prevent swallowing up any particular field.

An alternative interpretation of *Alice* is that the inventive concept is relative to the breadth of the claims and the present state of the technology in the field of inquiry. Albert Einstein once explained his theory of relativity with the example of a speeding train and two observers: a first observer in the middle of the railcar and a second observer on a platform.¹³⁹ A flash of light is given off at two points in the railcar, equidistant from the first observer, just as the in the observer in railcar and the observer on the platform pass each other.¹⁴⁰ To the first observer, travelling at the same speed as the train, he observes the light beam coming from the front of the railcar before the light beam coming from the back of the railcar.¹⁴¹ But to the second observer the light from either point reaches her at the same instant.¹⁴² Einstein concludes that the time required for a particular occurrence, be it light traveling through the railcar or a man traversing the railcar, depends on the relative vantage point of the observer.¹⁴³

Like Einstein's first observer, the court must view innovation relative to the velocity of the technology. Yet, like the second observer, the court must also view patents relative to the fixed principles of our Constitution. However, unlike either observer, the courts cannot focus instantaneously on both sources of light, on both case precedent and technological prospect. Rather, the court must first look to the front of the train—to the future that requires to court to enable innovation. The court then should appreciate that insight in weighing precedent. To face rearward, with all focus to precedent, disregards the constitutional underpinnings of the patent, ignoring that the court must first promote the sciences.

This shift in perspective would remain consistent with precedent while simultaneously accelerating innovation. The relativity framework is a test that should be applied during the second—inventive concept—step of the *Mayo* test. The relativity framework includes the following determinations: first, whether

138. See U.S. CONST. art. I, § 8, cl. 8.

139. ALBERT EINSTEIN, RELATIVITY: THE SPECIAL AND GENERAL THEORY 25–27 (Robert W. Lawson trans., Methuen & Co. Ltd. 1920) (1916).

140. *Id.* at 25–26.

141. *Id.* at 26.

142. *Id.*

143. *Id.* at 26–27.

the abstract idea, as defined in the claim, produces a final result with specific practical application in its particular technological field; if so, second, whether the final result is a valuable asset.

This simple framework eliminates the ambiguity the court injected by using the phrase “inventive concept.” It provides two reasonable and clear guideposts for both the PTO and courts. Further, with respect to examination under the Constitution and the Patent Act, the relativity framework accomplished three tasks. First, it promotes developing and providing useful assets to the public. Second, it does not impinge on the scope of sections 102, 103, or 112 because it evaluates the final result, not the invention itself. Third, the relativity framework remains broad enough to encompass certain methods that promote business innovation like software.

V. CONCLUSION

The Supreme Court’s decision in *Alice* has injected uncertainty into the patent system. That uncertainty stems from the “inventive concept” component of the two-step *Mayo* test. As technology progresses into uncharted territories, it will become increasingly important for the courts to employ a subject matter eligibility standard that is flexible enough to conform to the dynamic environment of scientific progress in all fields, but stern enough to preserve the foundations of American innovation. The relativity test is a means to provide this needed flexibility, reduce current uncertainty, and uphold both precedent and the constitutional basis of our patent system.

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