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Patent Eligibility of Emerging Computer Technologies in the Aftermath of Alice Corp. v. CLS Bank

By: Michael J. Campolongo

I. Introduction

Computer technology innovations are the most frequent technologies for which patent protection is sought worldwide.¹ A study by the United States Government Accountability Office found that the number of software-related patents granted in the United States has steadily grown from 30% of all patents granted in 1991 to about half of all patents granted in 2011.² Since 2011, the number has exceeded 50% and continues to grow.³ The number of patents granted worldwide on artificial intelligence (AI), in particular, has exhibited an almost exponential increase from about 100 in 2000 to almost 3,000 in 2016, with more than half being granted in the United States alone. These trends in computer technologies are likely to continue to dominate the patent landscape as emerging technologies continue to develop and proliferate at a rapid pace.

¹ About 7% of patent applications published in 2015 worldwide were directed to computer technology, followed by electrical machinery, measurement, digital communication, and medical technologies. *World Intellectual Property Indicators 2017*, World Intellectual Property Association, 36 (2017), www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2017.pdf.

² *Intellectual Property: Assessing Factors that Affect Patent Infringement Litigation Could Help Improve Patent Quality*, United States Government Accountability Office, Report to Congressional Committees, GAO-13-465, (Aug. 2013), <https://www.gao.gov/assets/660/657103.pdf>.

³ R. Millien, *Alice Who? Over Half the U.S. Utility Patents Issued Annually are Software Related!*, IPWatchdog, (May 21, 2017), <http://www.ipwatchdog.com/2017/05/21/alice-over-half-u-s-utility-patents-issued-annually-software/id=83367/>.

In the United States, patent law is governed by federal statute, which sets out three requirements for patentability.⁴ First, under the “subject matter eligibility” requirement, the invention must fit within one of several patent-eligible categories of subject matter.⁵ Second, under the “novelty” requirement, the invention must not have been in public use, publicly disclosed, or commercially available prior to filing the patent application, with some exceptions for actions taken by the inventor or inventors.⁶ Third, under the “non-obviousness” requirement, the invention must be objectively non-obvious to a hypothetical skilled person in the field of the invention.⁷

Since the mid-1970s, the U.S. Supreme Court has placed limits on the types of computer-based inventions that are eligible for patent protection out of concerns over the patenting of general technological principles.⁸ Even with these limits, meeting the subject matter eligibility requirement in the 1990s and 2000s was not as significant a barrier to obtaining patent protection for computer innovations as were the requirements for novelty and non-obviousness.⁹ In 2014, however, a divided Supreme Court held in *Alice Corp. Pty. Ltd. v. CLS Bank Int’l* that claims to a computerized process for mitigating risk in a financial exchange were patent ineligible and thus

⁴ An additional “disclosure” requirement must also be satisfied, which pertains to the manner in which the inventor describes the invention and not to the inventive subject matter itself. *See* 35 U.S.C. § 112 (2012).

⁵ 35 U.S.C. § 101 (2012).

⁶ 35 U.S.C. § 102(a)(1) (2012) (“A person shall be entitled to a patent unless . . . the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention”).

⁷ 35 U.S.C. § 103 (2012) (“A patent for a claimed invention may not be obtained . . . if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains”).

⁸ *See Bilski v. Kappos*, 561 U.S. 593, 606 (2010) (“With ever more people trying to innovate and thus seeking patent protections for their inventions, the patent law faces a great challenge in striking the balance between protecting inventors and not granting monopolies over procedures that others would discover by independent, creative application of general principles.”).

⁹ *See* Harrison B. Rose, *Exploring Alice’s Wonderland of Patentable Subject Matter*, 2017 U. Ill. J.L. Tech. & Pol’y 275, 276 (2017).

invalid.¹⁰ Although the decision stems from the Court’s apprehensions over the abstract nature of so-called “business method patents,” *Alice* has far-reaching implications for a wide array of software innovations outside of the business context.¹¹ Moreover, the decision has called into question the validity of many patents issued during the last two decades under a less stringent standard.¹²

This paper examines the implications of *Alice* on the emerging technologies of AI, blockchain and cryptocurrency, and three-dimensional (3D) printing. Section II reviews the historical precedents of subject matter eligibility leading up to *Alice*. Section III discusses *Alice* along with its implications and criticisms. Section IV discusses the aftermath of *Alice* and a string of Federal Circuit decisions that followed. Section V discusses the impact of *Alice* and recent Federal Circuit decisions on patent eligibility of specific emerging technologies. This paper concludes with Section VI, where I argue that the *Alice* decision, despite its criticisms, has a net positive effect on innovation. I also discuss strategies for how patent applicants should prepare their applications to survive subject matter eligibility challenges.

II. Software Patent Eligibility Prior to Alice

The statutory requirement for patent eligibility is defined in 35 U.S.C. § 101, which states that “[w]hoever 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.”¹³ On its face, this statute appears to

¹⁰ *Alice Corp. Pty. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2349 (2014).

¹¹ *Netflix, Inc. v. Rovi Corp.*, 114 F.Supp.3d 927, 935 (N.D. Cal. 2015).

¹² *CLS Bank Int’l. v. Alice Corp. Pty. Ltd.*, 717 F.3d 1269, 1313 (Moore, J., dissenting in part) (concerned that the breadth of the holding “is the death of hundreds of thousands of patents, including all business method, financial system, and software patents as well as many computer implemented and telecommunications patents”).

¹³ 35 U.S.C. § 101 (2012).

allow for an inventor to seek protection so long as the invention falls into one of the four categories. Despite this broad language, the long-recognized position of the Supreme Court has been that abstract ideas, laws of nature, and natural phenomena are ineligible for patenting, even if they would otherwise fall into one of the statutory categories.¹⁴ These three specific ineligible categories are referred to as the “judicial exceptions” to patent eligibility.¹⁵ The judicial exceptions serve public interest by preventing inventors from claiming patent rights in “the basic tools of scientific and technological work,” the monopolization of which “might tend to impede innovation more than it would tend to promote it.”¹⁶ The Court has clarified, however, that an invention is not automatically patent ineligible if it involves one of the judicial exceptions—the invention can still be patent eligible if it “come[s] from the application of the law of nature to a new and useful end.”¹⁷

The Court’s jurisprudence on patent eligibility over the last several decades has been shaped largely by the advent and development of computer technology starting in the mid-twentieth century. The earliest case that addressed the eligibility of computer algorithms was *Gottschalk v. Benson* in 1972.¹⁸ In *Benson*, a patent applicant sought protection for an algorithmic method of converting binary coded decimal (BCD) signals into pure binary signals.¹⁹ The Court found the claimed process to be patent ineligible for being “so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion,” concluding

¹⁴ See *Le Roy v. Tatham*, 55 U.S. (14 How.) 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.”); see also *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

¹⁵ See Manual of Patent Examining Procedure § 2106, 9th ed., rev. 8 (Jan. 2018).

¹⁶ *Alice Corp.*, 134 S. Ct. at 2354 (quoting *Association for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013) and *Mayo Collaborative Servs. v. Prometheus Labs. Inc.*, 566 U.S. 66, 71 (2012)).

¹⁷ *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) (quoting *Funk Bros. Seed Co. v. Kalo Co.*, 333 U.S. 127, 130 (1948)).

¹⁸ *Id.* at 65.

¹⁹ *Id.* at 67.

that granting such a patent would “wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.”²⁰

The Supreme Court revisited the issue six years later in *Parker v. Flook*, this time reviewing a patent application related to a method for updating numerical alarm limits used for triggering alarms during the monitoring of industrial processes.²¹ Here, the patent applicant attempted to distinguish the claimed process from *Benson*, arguing that the claims did not preempt all uses of the claimed algorithm because they allowed room for other uses outside of the petrochemical and oil-refining industry.²² The Court rejected this argument as a narrow reading of *Benson* because it incorrectly assumed that a process is patent eligible by implementing a principle in a specific fashion.²³ Furthermore, the Court held that adjusting an alarm limit was merely a “post-solution activity” that was not enough to render the algorithm eligible for patenting.²⁴

A few years after *Flook*, the Court once again addressed the eligibility of software patents in *Diamond v. Diehr*, where it held that an application of a mathematical formula to a rubber curing process was patent eligible.²⁵ The Court recognized that the patent applicants “[did] not seek to patent a mathematical formula,” and although it acknowledged that “their process employs a well-known mathematical equation, they [did] not seek to pre-empt the use of that equation, except in conjunction with all of the other steps in their claimed process.”²⁶

²⁰ *Id.* at 71-72.

²¹ *Parker v. Flook*, 437 U.S. 584, 586 (1978).

²² *Id.* at 589-91.

²³ *Id.*, at 593 (determining the eligibility of patentable subject matter would “depend simply on the draftsman's art and would ill serve the principles underlying the prohibition against patents for ‘ideas’ or phenomena of nature”).

²⁴ *Id.*, at 590.

²⁵ *Diamond v. Diehr*, 450 U.S. 175, 192-93 (1981).

²⁶ *Id.* at 187.

The key difference between the claims at issue in *Diehr* and those of *Benson* and *Flook* was that the *Diehr* claims did not simply recite the practical application of the process as a post-solution activity, but instead tied the elements of the algorithm to the process “as a whole.”²⁷ Each algorithmic computation of the *Diehr* patent claims is associated with a non-computational physical action taken in order to control the curing process (*i.e.*, “constantly providing the computer with the temperature,” “calculat[ing] . . . the Arrhenius equation,” “repetitively comparing . . . total required cure time calculated with the Arrhenius equation and said elapsed time, and opening the press automatically when a said comparison indicates completion of curing”).²⁸

What could be gleaned from *Benson*, *Flook*, and *Diehr* was that software algorithms that only solved mathematical problems were not patentable unless the solution was used to perform a particular task while further satisfying the novelty, utility, and non-obviousness requirements.²⁹ Despite *Diehr*’s apparent victory for software-based processes, it was still not clear whether tasks performed solely by a computer implementing the algorithms were *per se* unpatentable. The majority in *Dierh* avoided addressing the question, while the dissenting justices believed it was not for the Court to decide.³⁰

In the decades that followed *Diehr*, however, nearly all software patent cases heard by the Federal Circuit were found to be patent eligible.³¹ Notable Federal Circuit cases of the 1990s where software innovations were found to be patent eligible include *In re Lowry*, *Arrhythmia*

²⁷ *Id.* at 188 (“In determining the eligibility of respondents’ claimed process for patent protection under [35 U.S.C.] § 101, their claims must be considered as a whole”).

²⁸ U.S. Patent No. 4,344,142 col. 7 l. 1 (issued Aug. 10, 1982)

²⁹ George B. Delta & Jeffrey H. Matsuura, *Law of the Internet* § 13.02 (4th ed. 2018).

³⁰ *Diehr*, at 216-17 (Stevens, J., dissenting) (“The broad question whether computer programs should be given patent protection involves policy considerations that this Court is not authorized to address”).

³¹ See *The History of Software Patents: From Benson, Flook, and Diehr to Bilski and Mayo v. Prometheus*, BITLAW, <http://www.bitlaw.com/software-patent/history.html> (last visited May 7, 2018).

Research Technology Inc. v. Corazonix Corp., and *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*³² In these cases, the Federal Circuit applied the “machine-or-transformation” test, which finds a claimed process patent eligible if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing.³³

The patent in *State Street* was directed to a system of implementing an investment structure for use by an administrator of a mutual fund.³⁴ In applying the machine-or-transformation test, the Court first found that the claims were directed to a machine or process by virtue of the specific structures claimed (e.g., a “CPU,” a “data disk,” and an “arithmetic logic circuit”), reasoning that the inclusion of such components is enough to categorize the claims as a statutory “machine.”³⁵ Although the analysis could have ended here, the Court further evaluated the second element of the test to overturn the judicially-created “business method exception” relied on by the district court.³⁶ Here, the Court reasoned that, even if the patent claims were directed toward an abstract idea, they could nevertheless be patentable.³⁷ In the case of business methods, the transformation of data representing dollar amounts through a series of mathematical calculations was deemed to constitute a practical application of an abstract idea that creates “a useful, concrete and tangible result,” representing a transformation within the meaning of the machine-or-transformation test.³⁸

³² See *In re Lowry*, 32 F.3d 1579, 1580 (Fed. Cir. 1994) (memory storing a data structure found patentable); *Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1054 (Fed. Cir. 1992) (transformation of electrocardiograph signals through mathematical calculations found patentable); *State St. Bank & Tr. Co. v. Signature Fin. Grp., Inc.*, 149 F.3d 1368, 1370 (Fed. Cir. 1998) (data processing system for implementing an investment structure found patentable).

³³ *Bilski*, 561 U.S. at 600.

³⁴ *State St. Bank & Tr. Co.*, 149 F.3d at 1370.

³⁵ *Id.* at 1371-72; To be precise, the specific structure was not explicit in the claims, but was construed to be present as a result of a claim interpretation derived from 35 U.S.C. § 112.

³⁶ *Id.* at 1375.

³⁷ *Id.*

³⁸ *Id.* at 1373.

It is difficult to envision a scenario in which a software invention would not pass the machine-or-transformation test after *State Street*. Given this broad holding, it would appear that any algorithm could meet the patent eligibility requirement so long as computer components are baked into the patent claims, which would appear to reduce patent eligibility to a mere formality overcome by “the draftsmen’s art” that the Supreme Court cautioned against in *Flook*.³⁹

While the 1990s set the bar low for patent eligibility, the standard began to shift back toward that of *Benson* and *Flook* in the next decade.⁴⁰ For example, the Federal Circuit case *In re Comiskey* dealt with patent claims directed to a method and system for mandatory arbitration resolution involving legal documents.⁴¹ The Court clarified that, despite what seemed to be a broad holding in *State Street*, business methods were still “subject to the same legal requirements for patentability as applied to any other process or method.”⁴² The claims were found to be directed to the mental process of resolving a legal dispute, and thus ineligible for attempting to “patent the use of human intelligence in and of itself.”⁴³ Although many of the claims recited computer components, the Court dismissed these recitations, reasoning that “[t]he routine addition of modern electronics to an otherwise unpatentable invention typically creates a *prima facie* case of obviousness.”⁴⁴ It is worth noting that, in making this determination, the Court folded the non-obviousness inquiry of 35 U.S.C. § 103 into the patent eligibility inquiry of 35 U.S.C. § 101.⁴⁵ Such mixing of the statutory requirements would eventually become a staple

³⁹ *Flook*, 437 U.S. at 593.

⁴⁰ See *Rose*, *supra* note 9, at 282.

⁴¹ *In re Comiskey*, 499 F.3d 1365, 1368 (Fed. Cir. 2007).

⁴² *Id.* at 1374 (quoting *State St. Bank & Tr. Co.*, 149 F.3d at 1375).

⁴³ *Id.* at 1379.

⁴⁴ *Id.* at 1380.

⁴⁵ *Id.*

of patent ineligibility analysis going forward, and is one of the major criticisms of the *Alice* decision.⁴⁶

In 2010, in *Bilski v. Kappos* the Supreme Court heard its first software case in nearly thirty years after *Diehr*.⁴⁷ The patent application at issue in *Bilski* claimed a system for allowing commodities buyers and sellers in the energy market to hedge against the risk of price changes.⁴⁸ The Court held this to be an unpatentable abstract idea out of preemption concerns.⁴⁹ Signaling its distaste for the Federal Circuit’s patent eligibility framework, the majority and concurring justices chastised the Federal Circuit for its overreliance on the machine-or-transformation test, recharacterizing it as an “*important example* of how a court can determine patentability under [35 U.S.C.] § 101,” and emphasizing that the Federal Circuit erred “by treating it as the *exclusive test*.”⁵⁰ The Court, however, did not overrule prior cases, such as *State Street*, and the majority opinion urged the Federal Circuit to persist in the “development of other limiting criteria that further the Patent Act’s purposes.”⁵¹

While *Bilski* did not articulate a new standard for evaluating subject matter eligibility, the Court would revisit the eligibility issue twice more in the next few years.

III. The Modern Legal Framework for Patent Eligibility: The Two-Prong Test

In 2012, the Court for the first time articulated a test for patent eligibility in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*⁵² The patent at issue related to the use

⁴⁶ See, e.g., Paxton M. Lewis, *The Conflation of Patent Eligibility and Obviousness: Alice’s Substitution of Section 103*, Utah L. Rev. OnLaw 13, 14 (2017).

⁴⁷ *Bilski*, 561 U.S. at 593.

⁴⁸ *Id.*

⁴⁹ *Id.* at 611-12 (“Allowing petitioners to patent risk hedging would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea.”).

⁵⁰ *Id.* at 659 (emphasis in the original).

⁵¹ *Id.* at 612-13.

⁵² *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 77 (2012).

of thiopurine drugs for the treatment of autoimmune diseases.⁵³ In evaluating the patent claims, the Court first asked (1) whether the claims were directed to a law of nature, natural phenomena, or an abstract idea; and (2) if so, whether the claims do significantly more than merely recite one of these three concepts.⁵⁴ Applying the first prong, the Court determined that the claims, which described a process for observing indicators of when a drug concentration in the bloodstream was too high or too low, were directed to a law of nature.⁵⁵ Applying the second prong, the Court determined that the claims did not rise to the level of adding “significantly more.”⁵⁶ The Court reiterated its old precedents and heeded its own warnings against circumvention of the eligibility requirements through the “draftsman’s art” and “insignificant postsolution activity.”⁵⁷ For the particular patent in question, the Court held that the claims amounted to “nothing significantly more than an instruction to doctors to apply the applicable laws [of nature] when treating their patients.”⁵⁸

In 2014, the Supreme Court once again took up the eligibility issue in *Alice*, applying the two-prong test from the biotech-themed *Mayo* case to computerized business method patents.⁵⁹ The patents at issue, which were owned by Alice Corp., related to a computerized method of mitigating settlement risk using a third-party intermediary.⁶⁰ Prior to reaching the Supreme Court, the Federal Circuit reversed the district court’s decision that the claims were directed to the abstract idea of “employing a neutral intermediary to facilitate simultaneous exchange of

⁵³ *Id.* at 73.

⁵⁴ *Id.* at 72.

⁵⁵ *Id.*

⁵⁶ *Id.* at 79.

⁵⁷ *Id.* at 72-73.

⁵⁸ *Id.* at 79.

⁵⁹ *Alice*, 134 S. Ct. at 2352.

⁶⁰ *Id.*

obligations in order to minimize risk,” but eventually reinstated the district court’s decision after rehearing the case *en banc*.⁶¹

In applying the two-prong test, the Supreme Court first found that the patent claims were directed to the abstract idea of a fundamental economic practice.⁶² Since the concept was similar in nature to the abstract risk hedging of *Bilski*, the Court did not feel the need to “labor to delimit the precise contours of the ‘abstract ideas’ category in this case.”⁶³ Next, the Court found that the claims did not amount to anything significantly more than the abstract idea.⁶⁴ Alice Corp. argued that the claims required the “use of a computer to create electronic records, track multiple transactions, and issue simultaneous instructions.”⁶⁵ It was further argued that the claims recited specific hardware to carry out these functions.⁶⁶ The Court disagreed, noting that such computer activity was “well-understood, routine, [and] conventional,” and that “each step does no more than require a generic computer to perform generic computer functions.”⁶⁷ Without specifying what would be needed to rise to the level of “significantly more,” the Court only hinted that improving upon the functioning of the computer itself or another technology may meet this standard.”⁶⁸

The *Alice* decision is controversial and has been criticized for failing to articulate a clear standard for determining what is abstract, and for conflating the eligibility analysis under 35 U.S.C. § 101 with the obviousness analysis under 35 U.S.C. § 103.⁶⁹ The majority opinion in

⁶¹ *Id.* at 2353 (citing *CLS Bank Intern. v. Alice Corp. Pty. Ltd.*, 768 F.Supp.2d 221, 252 (D.C. 2011)).

⁶² *Id.* at 2356.

⁶³ *Id.* at 2357 (“It is enough to recognize that there is no meaningful distinction between the concept of risk hedging in *Bilski* and the concept of intermediated settlement at issue here.”).

⁶⁴ *Id.* at 2359-60.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ Lewis, *supra* note 46, at 24.

Alice noted that abstract ideas are not limited to “preexisting, fundamental truths.”⁷⁰ However, no specific insight was given as to the scope of these limits except for a comparison to *Bilski* essentially stating that the claims in *Alice* were abstract without involve preexisting, fundamental truths because the claims in *Bilski* were abstract without involving preexisting, fundamental truths.⁷¹ In addition, the Court looked to external references to support its conclusion that intermediated settlement was an industry standard, making it difficult to distinguish the patent eligibility analysis from a prior art analysis performed in an obviousness inquiry.⁷² In determining whether the claims amounted to significantly more than the abstract idea, the Court indicated that an “inventive concept” must be present, but only provided examples of what was not inventive (*i.e.*, generic computer components) while leaving it an open question as to what would be.⁷³ Without any clear articulation of how to apply the *Alice* analysis, the lower courts were left without the proper tools for analyzing abstractness and inventiveness, and without clarity in how to parse out the differences between patent eligibility and obviousness.⁷⁴

IV. The Aftermath of the *Alice* Decision

In just two years after *Alice*, the Federal Circuit and district courts invalidated nearly 400 patents on the basis of subject matter ineligibility (approximately two-thirds of such cases).⁷⁵ The patent office quickly developed its own guidelines in response to *Alice*, leading to more aggressive examination procedures that have created significant roadblocks to obtaining patent protection on software innovations.⁷⁶

⁷⁰ *Alice*, 134 S. Ct. at 2356.

⁷¹ Lewis, *supra* note 46, at 24.

⁷² *Id.*

⁷³ John Clizer, *Exploring the Abstract: Patent Eligibility Post Alice Corp v. CLS Bank*, 80 Mo. L. Rev. 537, 553 (2015).

⁷⁴ Lewis, *supra* note 46, at 24.

⁷⁵ Jasper L. Tran, *Two Years after Alice v. CLS Bank*, 98 J. Pat. & Trademark Of. Soc'y 354, 356 (2016).

⁷⁶ *Id.* at 357-58.

While the impact has certainly been felt, a study by James E. Daily of Washington University suggests that perhaps it is not as strong of an impact as originally predicted by Judge Moore in his dissent.⁷⁷ A change in the consistency in which patentees pay their post-grant maintenance fees, which are necessary to keep a patent remaining in force, may serve as a strong indicator of patentee response to *Alice*.⁷⁸ It has been found that since *Alice*, patent abandonment rates via failure to pay maintenance fees has increased on average, leading to nearly an estimated 80,000 abandonments within the first four years of *Alice*.⁷⁹ While significant and likely influenced by speculation based on the invalidation rate of the courts, this is an order of magnitude lower than the “death of hundreds of thousands of patents” predicted by Judge Moore.⁸⁰

As of February, 2018, of the more than twenty-five cases heard by the Federal Circuit containing subject matter eligibility challenges, only about a third of the decisions have been favorable to the patentee/applicant.⁸¹ The first of these came in 2016 with the decision in *DDR Holdings, LLC v. Hotels.com, L.P.*⁸² The patents at issue in *DDR Holdings* related to a system that directs a website visitor, in response to clicking on a third-party advertisement, to a composite website that includes both information from the third-party and the original website without diverting visitor traffic to the third-party’s website.⁸³ The court distinguished the claims

⁷⁷ James E. Daily, *Alice’s Aftermath: Changes in Patentee Behavior Since Alice v. CLS Bank*, 23 B.U. J. Sci. & Tech. L. 284, 302 (2017).

⁷⁸ *Id.* at 298-99.

⁷⁹ *Id.*

⁸⁰ *Alice*, 717 F.3d at 1313 (Moore, J., dissenting in part).

⁸¹ For a summary of *Alice*-related court decisions, visit the *Alice* Tracker provided by Fish & Richardson at <https://www.fr.com/alice-tracker/>.

⁸² *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014).

⁸³ *Id.* at 1248.

from some of its recent cases where the claims were found abstract.⁸⁴ Unlike these prior cases where the claims were considered to have only utilized computers generically, the claims of *DDR Holdings* recited “a specific way to automate the creation of a composite web page . . . to solve a problem faced by websites on the Internet.”⁸⁵ While the court recognized the claimed invention solved the technical problem of “retaining control over the attention of the customer in the context of the Internet,” it was quick to clarify that “not all claims purporting to address Internet-centric challenges are eligible for patent.”⁸⁶

Two years later in *Enfish, LLC v. Microsoft Corp.*, the Federal Circuit decided another subject matter eligibility case in favor of the patentee.⁸⁷ The patent claims were directed to a self-referential data model for use in a computer database.⁸⁸ The district court concluded that the claims were abstract for merely organizing data in a logical table. The Federal Circuit disagreed with what it considered too high a level of abstraction, noting that the claimed self-referential table functioned differently than data structures of conventional databases.⁸⁹ Importantly, the court recognized that “[s]oftware can make non-abstract improvements to computer technology just as hardware improvements can, and sometimes the improvements can be accomplished through either route.”⁹⁰

⁸⁴ *Id.* at 1256-57 (citing *Bancorp Servs., L.L.C. v. Sun Life Assur. Co. of Canada (U.S.)*, 687 F.3d 1266, 1278 (Fed.Cir. 2012) (use of a computer “employed only for its most basic function, the performance of repetitive calculations”); *Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1344-45 (Fed.Cir. 2013) (generalized software components to implement tasks associated with insurance policies); *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715-16 (Fed.Cir. 2014) (using advertising as a currency in a particular technological environment); *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1355 (Fed.Cir. 2014) (using a computer to create a “transaction performance guaranty”)).

⁸⁵ *Id.* at 1259.

⁸⁶ *Id.* at 1258.

⁸⁷ *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1330 (Fed. Cir. 2016).

⁸⁸ *Id.*

⁸⁹ *Id.* at 1337.

⁹⁰ *Id.* at 1335.

Shortly after *Enfish*, the Federal Circuit found another software patent to be non-abstract in *McRO v. Bandai Namco Games America*.⁹¹ The court held that an algorithm for lip synchronization of animated characters was not abstract, but represented a technological improvement over pre-existing manual animation techniques.⁹² The court addressed concerns raised about preemption, noting that the rule-based structure of the claims was narrow and specific enough so as to not preempt all methods of automating lip synchronization.⁹³

Bascom v. AT&T Mobility is a case where the Federal Circuit held that claims directed to a method of filtering Internet content were abstract, but nevertheless found them inventive under the second prong of the *Alice* framework.⁹⁴ In applying the first prong, the court distinguished the claims from *Enfish*, finding that they were not “unambiguously directed to an improvement in computer capabilities.”⁹⁵ In applying the second prong, the court agreed with the district court that the limitations of the claims individually recite generic, uninventive components.⁹⁶ But the court ultimately found an inventive concept in the “ordered combination of claim limitations that transform the abstract idea of filtering content into a particular, practical application of that abstract idea.”⁹⁷

While only a minority of Federal Circuit cases sided with the patentee, these cases serve as guideposts in navigating the nebulous framework of *Mayo/Alice*. One underlying theme of these pro-software cases is that computer innovations that represent specific improvements to computer technology are not abstract.⁹⁸ Another is that claims drafted narrowly enough to avoid

⁹¹ *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1302-03 (Fed. Cir. 2016).

⁹² *Id.* at 1315-16.

⁹³ *Id.*

⁹⁴ *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility, LLC*, 827 F.3d 1341, 1352 (Fed. Cir. 2016).

⁹⁵ *Id.* at 1349.

⁹⁶ *Id.*

⁹⁷ *Id.* at 1352.

⁹⁸ See *Enfish*, 822 F.3d at 1335; *McRO*, 837 F.3d at 1313.

preempting the use of the generic concept may weigh in the patentee's favor when facing subject matter eligibility challenges.⁹⁹ The next section will explore how these themes play out in analyzing certain emerging technologies.

V. Patent Eligibility Issues for Emerging Computer Technologies

In weighing the impact of *Alice* on emerging technologies, it is worth recalling the Constitutional purpose of the patent system 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.”¹⁰⁰ Given the controversies that often accompany new technologies, such as the patenting of technologies having open source origins, ethical concerns associated with AI and certain biotechnologies, and the preemption of innovation tools by overbroad patent protection, the question arises as to whether the patent system should be promoting the progress of *all* innovation. In the narrower case of computer innovations, a variation on that question is this—do the *Alice* decision and subsequent Federal Circuit decisions serve the public interest by precluding certain classes of computer innovations from patentability?

Despite its criticisms, *Alice* is thought to have a beneficial public impact by making it more difficult for non-practicing entities, referred to pejoratively as “patent trolls,” to assert invalid patents against vulnerable companies in what often amounts to shake-downs.¹⁰¹ In such cases, the courts have treated subject matter eligibility issues as a threshold question, thus

⁹⁹ See Aaron J. Capron & Arpita Bhattacharyya, *Revisiting the Role of Preemption in Patent Eligibility*, Law360 (Dec. 19, 2016), <https://www.law360.com/articles/865364/revisiting-the-role-of-preemption-in-patent-eligibility>.

¹⁰⁰ U.S. Const. art. I, § 8, cl. 8.

¹⁰¹ Rose, *supra* note 9, at 290.

increasing judicial efficiency and reducing party costs by invalidating the patent at the onset of litigation.¹⁰²

A. *Artificial Intelligence: Improvements and Applications*

AI, broadly speaking, is a branch of computer science pertaining to the mimicry of human cognitive functions by machines.¹⁰³ Learning systems, such as artificial neural networks that are inspired by biological neural networks, can develop the ability to make determinations and classifications through training rather than through rules strictly defined via computer code.¹⁰⁴ Natural language processing systems, for example, may utilize machine learning algorithms as well as statistical models for recognizing human speech and speech patterns, understanding the context of natural language, and performing automatic translation.¹⁰⁵ Applications of AI are far reaching, and have found their way into various industries including healthcare, automotive technology, and finance. In the healthcare industry, for example, some surgical procedures have begun incorporating “smart machines” to assist with delicate maneuvers.¹⁰⁶ Autonomous cars are now being tested on public roadways, simultaneously creating visions of sustainability and efficiency while raising safety and regulatory concerns.¹⁰⁷

AI innovations can be classified into two categories. The first is innovations in AI itself, including improvements in machine learning, image/pattern recognition, and reasoning. The

¹⁰² Stephanie E. Toyos, *Alice in Wonderland: Are Patent Trolls Mortally Wounded by Section 101 Uncertainty*, 17 Loy. J. Pub. Int. L 97, 127 (2015).

¹⁰³ See Stuart J. Russel & Peter Norvig, *Artificial Intelligence: A Modern Approach* (3rd ed., 2009).

¹⁰⁴ Snezana Agatonovic Kustrin & Rosemary Beresford, *Basic concepts of artificial neural network (ANN) modeling and its application in pharmaceutical research*, 22 No. 5 J. Pharma Biomed. Anal. 717 (June 2000).

¹⁰⁵ See, e.g., Madeleine Bates, *Models of Natural Language Understanding*, 92 No. 22 Proc. Nat'l Acad. Sci. 9977 (1995).

¹⁰⁶ Eliza Strickland, *Autonomous Robot Surgeon Bests Humans in World First*, IEEE Spectrum (May 4, 2016), <https://spectrum.ieee.org/the-human-os/robotics/medical-robots/autonomous-robot-surgeon-bests-human-surgeons-in-world-first>.

¹⁰⁷ Jeffrey Mervis, *Are we Going Too Fast on Driverless Cars?*, Science (Dec. 14, 2017), <http://www.sciencemag.org/news/2017/12/are-we-going-too-fast-driverless-cars>.

second is innovations that utilize AI techniques but are not innovations in the underlying AI *per se*. An example would include a user interface that utilizes natural language processing to recognize and process speech, which is then used for another purpose such as playing music in response to a voice command.

1. Innovations in AI

Because of its mimicry of human activity, AI technology appears on its surface to be inherently susceptible to the *Mayo/Alice* framework. The analogy, however, does not match up to the reality, as the methods for simulating human cognition are fundamentally different in nature from the biological processes from which they originate.¹⁰⁸ The way that humans translate sentences, for example, differs greatly from AI-based translation systems, which utilize statistical approaches.¹⁰⁹ It may be strategic in drafting a patent application to emphasize any such distinctions, which may serve as a basis for arguing that the claims do not cover mental steps.¹¹⁰

In view of modern case law, advancements in AI are more likely to be patent eligible if the invention relates to a specific technical improvement, and any such improvements should be described with specificity.¹¹¹ These technical improvements, however, can be difficult to describe in a patent application, particularly due to problems that AI innovators have faced in explaining the mechanism behind how some AI systems functions.¹¹² To illustrate, suppose that an inventor designs an algorithm that defines a series of rules to be followed by an AI system in

¹⁰⁸ M. Hashiguchi, *Artificial Intelligence and the Jurisprudence of Patent Eligibility in the United States, Europe, and Japan*, 29 No. 12 *Intell. Prop. & Tech. L.J.* 3, 11, 2017.

¹⁰⁹ Hashiguchi, *supra* note 108; Brian Hayes, *The Manifest Destiny of Artificial Intelligence*, 100 No. 4 *Am. Scientist* 282, 286 (July-Aug. 2012).

¹¹⁰ Hashiguchi, *supra* note 108.

¹¹¹ Hashiguchi, *supra* note 108, at 10.

¹¹² *Id.*

adapting to new inputs. The algorithm and rules would likely not be patent eligible. If the algorithm leads to the AI system developing its own rules that ultimately improve its own data processing speed or efficiency, this combined result could likely be deemed a patent eligible invention. But the inventor may nonetheless fail to satisfy the disclosure requirements if he or she cannot describe the mechanism effecting the improvements with specificity.¹¹³

2. *Applications of AI*

With the rising commercial exploitation of AI innovations, it should be expected that a large volume of new patent filings will be directed to applications of AI rather than improvements thereto. It may be more difficult in such cases to show that the AI improves computer functionality, if the AI component is merely being used as a tool. Since the use of AI will invariably result in the generation of data, the use of that data is more likely to be found patent eligible than the mere generation thereof.¹¹⁴ If an AI system itself is claimed without claiming its use, and if the written description of the patent does not provide any details as to the technical problem solved by the AI system, this would likely be deemed patent ineligible.¹¹⁵

Recently, the Federal Circuit found an object tracking system for an aircraft to be patent-eligible subject matter.¹¹⁶ The patent claims recited determining an orientation of the object relevant to a moving reference frame based on signals received from inertial sensors.¹¹⁷ The court held that the claims were not abstract because of the novel way that the patent claimed the

¹¹³ See 35 U.S.C. § 112 (2012).

¹¹⁴ Frank A. DeCosta III & Aliza George Carrano, *Intellectual Property Protection for Artificial Intelligence*, 24 No. 10 Westlaw Journal Intellectual Property 1, 4 (Aug. 30, 2017).

¹¹⁵ *Vehicle Intelligence and Safety LLC v. Mercedes-Benz USA LLC*, 635 Fed. App. 914, 919 (Fed. Cir. 2015) (holding that claiming a vehicle “expert system” alone with no explanation as to how it improves on the prior art was patent ineligible).

¹¹⁶ *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1344 (Fed. Cir. 2017).

¹¹⁷ *Id.* at 1345.

positioning and use of the inertial sensors, and that the use of the tracking algorithm by itself did not render the claims abstract.¹¹⁸

As AI becomes more ubiquitous, it is likely that AI components in patent claims will be treated as generic computer components. Including more details in the claims can likely help to avoid the claims being deemed abstract, but may unduly narrow the scope of protection sought.¹¹⁹ In cases that may require significant narrowing of the claims, trade secrecy may be a more viable form of IP protection.¹²⁰

B. Blockchain Technology

Blockchains, which serve as the underlying technology making bitcoin and other decentralized electronic currencies possible, are distributed electronic ledgers that include chains of “blocks” representing transaction records.¹²¹ Each individual block stores information about a completed transaction, and is permanently stored in the blockchain ledger after its associated transaction has been verified.¹²² The blocks are linked in such a way that each transaction is part of a chain for which sequential transactions can be traced back to earlier transactions.¹²³ The chain structure and its distributed nature increases security and reliability of the network by making it nearly impossible to fraudulently alter prior block entries.¹²⁴ Using cryptographic

¹¹⁸ *Id.* at 1349-50.

¹¹⁹ Decosta, *supra* note 114, at 5.

¹²⁰ *Id.*

¹²¹ See *What is a blockchain? Here's Everything you Need to Know*, Digital Trends, <https://www.digitaltrends.com/computing/what-is-a-blockchain/> (last accessed May 7, 2018); see also Shawn S. Amual, Josias N. Dewey, & Jeffrey R. Seul, *The Blockchain: A Guide for Legal & Business Professionals* § 1:2 (2016).

¹²² Antonio M. DiNizo Jr., *From Alice to Bob: The Patent Eligibility of Blockchain in A Post-CLS Bank World*, 9 Case W. Reserve J.L. Tech. & Internet 1, 11 (2018).

¹²³ *Id.*

¹²⁴ *Id.*

methods, reliable identification of all transactions recorded in the blockchain is possible without the need of a third-party intermediary to verify the transactions.¹²⁵

Blockchain is expected to have a significant impact on the business transaction landscape, ranging from arms-length transactions, such as stock trading to real estate, to ongoing corporate business transactions.¹²⁶ The idea of “cryptosecurities” is being explored for use in high-frequency trading platforms and short sales.¹²⁷ Various property recording offices, such as the Cook County Recorder’s office in Illinois, began experimenting in the last couple years with blockchain ledgers for tracking and transferring real property title.¹²⁸ The great potential of blockchain technology has been recognized across the financial industry, with several large banks seeking to develop their own blockchain innovations and protect them with patents.¹²⁹

Blockchain technology, by its very nature, appears uniquely tailored to business purposes. Consequently, individuals and organizations seeking to protect mere applications of blockchain technology to otherwise patent ineligible business methods may be ill-advised. For example, suppose that the claims of U.S. Patent No. 7,725,375 at issue in *Alice* recited “storing the transaction in an encrypted block of a decentralized ledger” rather than in a “data storage unit,” as claimed.¹³⁰ Assuming that blockchain had been known and used at the time of the invention, the Supreme Court would have likely found the claims to be no less abstract since they would have simply been implementing known computer techniques. Based on today’s case

¹²⁵ Louis F. Del Duca, *The Commercial Law of Bitcoin and Blockchain Transactions*, 47 No. 2 UCC L. J. Art. 4 (July 2017).

¹²⁶ DiNizo Jr., *supra* note 122, at 4.

¹²⁷ Larissa Lee, *New Kids on the Blockchain: How Bitcoin's Technology Could Reinvent the Stock Market*, 12 *Hastings Bus. L.J.* 81, 82 (2016).

¹²⁸ S.H. Spencer Compton & Diane Schottenstein, *Questions and Answers about Using Blockchain Technology in Real Estate Practice*, 33 No. 5 *Prac. Real Est. Law.* 5, 7 (2017).

¹²⁹ Olga Kharif, *Big Banks Are Stocking Up on Blockchain Patents*, *BloombergTechnology* (Dec. 21, 2016), <https://www.bloomberg.com/news/articles/2016-12-21/who-owns-blockchain-goldman-bofa-amass-patents-for-coming-wars>.

¹³⁰ *See* U.S. Patent No. 7,725,375 (issued May 25, 2010).

law, describing the use of a blockchain or the exchange of a cryptocurrency in a patent claim would very likely be treated as the use of a “generic component,” thus being unlikely to advance the claim over the threshold of abstractness.

Although blockchain technology is well-suited to the implementation of business methods, the underlying framework and improvements thereto will likely be viewed as improvements to computer technology.¹³¹ The Federal Circuit’s *Enfish* decision sets a strong precedent for technologies that differ from their conventional counterparts.¹³² Where *Enfish* utilized a self-referential database that yielded increased speed and memory efficiency compared to conventional databases, blockchain technologies utilize cryptography and decentralization to solve the problems of conventional electronic ledgers pertaining to security and authenticity and, importantly, eliminates the need for third-party intermediaries.¹³³ In cases where an improvement in the underlying technology can be clearly and succinctly articulated in the patent application, it may be possible to overcome or avoid an *Alice* challenge by specifically stating the specific improvement in the patent claims.¹³⁴

Blockchain innovations that focus primarily on encryption and decryption may have more difficulty in withstanding *Alice* challenges. In the 2017 Federal Circuit case *RecogniCorp LLC v. Nintendo Co., Ltd.*, the court held that claims directed to a method for encoding and decoding image data were patent ineligible.¹³⁵ The court did not recognize any type of improvement in computer technology resulting from encoding and decoding algorithms, and

¹³¹ See DiNizo Jr., *supra* note 122, at 6.

¹³² *Id.* at 22.

¹³³ *Id.*

¹³⁴ See *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1370 (2018) (holding that the inventiveness of claims reciting storing data “without substantial redundancy” was a question of fact and that the claims were improperly invalidated on summary judgment).

¹³⁵ *RecogniCorp, LLC v. Nintendo Co., Ltd.*, 855 F.3d 1322, 1324 (2017).

essentially concluded that such innovations were *per se* abstract.¹³⁶ While the claims of *RecogniCorp* were related to image processing, this decision could likely be broadly applied to cryptography as well since encoding and decoding of data is the essence of cryptography. Thus, to avoid being categorically classified as abstract, patent applicants should be cautious when claiming improvements to blockchain technology to include more than encryption and decryption.

Many blockchain systems are open source, which can complicate intellectual property protection.¹³⁷ Given public concern over companies patenting the use of open source components, the *Alice* decision may serve public interest in this regard by making it more difficult to obtain patent protection on the use of blockchain technologies. Instead, *Alice* appears to incentivize innovation in the core underlying technology behind blockchain, which may lead to stronger patents and may be more acceptable to the public.

C. *Computer-Aided Design Files for 3D Printing*

3D printing is an additive manufacturing process that produces solid objects in a layer-by-layer manner based on digital instructions that describe the geometry of the sequential layers.¹³⁸ Unlike traditional subtractive manufacturing processes, such as milling, that start with bulk material for which material is removed to yield a final product, 3D printed objects are assembled from the ground up by adding small amounts of material until the final product emerges.¹³⁹

¹³⁶ *Id.* at 1327.

¹³⁷ Paul Haughey, Brian Olion & Thomas Franklin, *10 Considerations For Blockchain Patent Applications*, Law360 (Feb. 23, 2018), <https://www.law360.com/articles/1013270/10-considerations-for-blockchain-patent-applications>.

¹³⁸ A detailed introduction to 3D printing can be found at <https://3dprinting.com/what-is-3d-printing/>.

¹³⁹ *Id.*

In a typical 3D printing workflow, a designer uses a computer to generate a computer-aided design (CAD) file that contains data descriptive of the three-dimensional geometry of the object.¹⁴⁰ When it is time for 3D printing, the CAD file is subsequently converted into a file type readable by the 3D printer, such as a Standard Tessellation Language (STL) file.¹⁴¹ The 3D printer then prints the object by depositing small amounts of a liquid material, such as melted plastic, and curing with a laser to blend it together with previously deposited material until the final object is produced.¹⁴²

It is not difficult to surmise the various aspects of 3D printing that have been patented or are potentially protectable by patents, including mechanical components, software, the chemical compounds used, and the objects produced. A not so obvious aspect of 3D printing for which patents are desirable is the CAD files themselves, which allow an individual equipped with a 3D printer to produce any object as long as he/she has the CAD file that encodes it.¹⁴³ The ease of exchanging CAD files and the nature of what they encode gives rise to novel legal questions regarding subject matter eligibility and infringement.¹⁴⁴

Assuming that a 3D-printed object is protected by a patent, any individual who receives the associated CAD file and prints it would be liable as a direct infringer.¹⁴⁵ Suing individuals for printing patented objects in the privacy of their homes is impractical, and could possibly have a chilling effect on innovation in this setting. A more desirable and practical strategy

¹⁴⁰ Andrew Schreiber, *Go (En)fish: Drawing CAD Files from the Patent Eligibility Pool*, 58 IDEA: J. Franklin Pierce for Intell. Prop. 1, 8-9 (2017).

¹⁴¹ *Id.*

¹⁴² *Id.*

¹⁴³ Lucas S. Osborn, *Regulating Three-Dimensional Printing: The Converging Worlds of Bits and Atoms*, 51 SAN DIEGO L REV. 553, 559-62 (2014).

¹⁴⁴ *Id.* at 5.

¹⁴⁵ 35 U.S.C. § 271(a) (2012) (“[W]hoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent”).

would be to sue the distributor of 3D CAD files.¹⁴⁶ If the patent only covers the actual physical product, the distributor would clearly not be liable as a direct infringer.¹⁴⁷ Theories of indirect infringement, however, would also pose problems in this situation.¹⁴⁸ Under the theories of induced and contributory infringement, the patentee would have to prove that the distributor had knowledge of the patented object and that infringement would result from transmitting the CAD files to a recipient.¹⁴⁹ Thus, unless indirect infringement statutes are amended to include the distribution of CAD files as an infringement inducing or contributory activity, a patentee's options in the 3D printing community are limited.

Although no specific case law exists yet on this topic, another solution would be for the courts to recognize CAD files as being patent eligible, which would allow patentees of CAD files to sue distributors as direct infringers.¹⁵⁰ As discussed in Section I, for an invention to be patentable, it must be meet the subject matter eligibility, novelty, and obviousness requirements. For a 3D printed object to be patentable, the novelty and obviousness requirements must be met, while the subject-matter eligibility requirement will be trivial since a physical object easily falls into the category of machine or article of manufacture (and is clearly not an abstract idea). A CAD file encoding for the 3D printed object, however, may have a more difficult time crossing the subject-matter eligibility threshold.

The idea of a CAD file that encodes for the design of an otherwise patentable object is similar in nature to the well-known *Beauregard* claim, which is a way of claiming software in

¹⁴⁶ Daniel Harris Brean, *Patenting Physibles: A Fresh Perspective for Claiming 3D-Printable Products*, 55 Santa Clara L. Rev. 837, 840-41 (2015).

¹⁴⁷ *Id.*

¹⁴⁸ Schreiber, *supra* note 140, at 11.

¹⁴⁹ 35 U.S.C. § 271(b) (2012); 35 U.S.C. § 271(c) (2012); Davis Doherty, *Downloading Infringement: Patent Law as a Roadblock to the 3D Printing Revolution*, 26 Harv. J.L. & Tech. 353, 361 (2013).

¹⁵⁰ Schreiber, *supra* note 140, at 12.

the context of instructions encoded on a physical storage medium.¹⁵¹ A CAD file claimed in *Beauregard* style would be described, for example, as a “computer readable medium storing computer readable instructions which, when acted upon by a 3D printer, cause the printer to print a widget” in the preamble of the claim, while the attributes of the physical object produced therefrom would serve as the limiting elements of the claim.¹⁵² A distributor having a CAD file on its server that is read on by such a claim would be liable as a direct infringer for making the CAD file by virtue of its storage.¹⁵³

A disembodied version of the CAD file claim (*i.e.*, one that omits the computer readable medium) may be more desirable from a royalty base perspective, since only a single act of infringement is likely to occur when storing the file on the server.¹⁵⁴ This may make such a claim more susceptible to being deemed abstract, particularly in view of a 2014 Federal Circuit case.¹⁵⁵ In *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, the court held that device profile data for a digital image reproduction system was patent ineligible because it was claimed without regard to any tangible medium.¹⁵⁶

Under an *Alice* analysis, it is very likely that claims to CAD files, and particularly disembodied CAD files, would be deemed abstract; however, the patentability of the claimed physical object should ultimately be treated as the “inventive concept” that satisfies the second prong of the test. *Enfish* and its brethren provide little guidance for CAD files since they focus primarily on improvements to computer technology—arguing that a CAD file for a 3D printable

¹⁵¹ Brean, *supra* note 146, at 842-43; *See also In re Beauregard*, 53 F.3d 1583, 1584 (Fed. Cir. 1995) (a computer program stored on a floppy diskette met the requirements of 35 U.S.C. § 101 and did not run afoul of the “printed matter doctrine”).

¹⁵² Brean, *supra* note 146, at 844.

¹⁵³ *Id.* at 846.

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1348-49 (2014).

object represents an improvement in computer technology would be nonsensical. However, a patentee would have a strong argument that the claimed CAD file does not have a preemptive effect like a claim to an abstract concept or mathematical expression would, provided that the CAD file is limited in scope to the production of an otherwise patentable physical object.¹⁵⁷

VI. Conclusion

The Supreme Court's decision in *Alice* significantly changed the framework for the subject matter eligibility analysis, transforming the practically toothless interpretation of 35 U.S.C. § 101 in the 1990s into public enemy number one for today's patentees and patent applicants. While *Alice*, and its predecessor *Mayo*, mark the first time the Court laid out a test for subject matter eligibility, this test has been met with criticism for its alleged overbreadth and lack of clarity, as well as for the confusion it created in the lower courts as to how the standard should be applied.

In view of the *Alice/Mayo* framework, software innovators should give considerable thought to where their intellectual property resources are allocated. Prior to drafting a patent application, the inventor should be able to articulate the specific improvement in computer technology provided by the invention. Any such improvements should certainly be described in detail in the application and in such a way that the prosecutor/litigator has ammunition to surmount an *Alice* challenge. If the inventor is unable to articulate an improvement, the most cost-effective solution may be to forego filing the application. Trade secrecy may be a more viable option in such circumstances, such as when the invention relates to a difficult-to-describe AI innovation.¹⁵⁸ If the patent applicant is only interested in seeking protection in the United

¹⁵⁷ See Brean, *supra* note 146, at 852.

¹⁵⁸ Decosta, *supra* note 114, at 6.

States, he/she may be well-advised to file a non-publication request with the application.¹⁵⁹ This will allow the application to “test the waters” with regard to subject matter eligibility. For example, if overcoming an *Alice* challenge from the patent office results in significant narrowing of the patent claims, the applicant would be able to abandon the application in favor of trade secret protection. Filing the non-publication request can maintain the secrecy of the applicant’s disclosure without jeopardizing any trade secrets contained therein.

In spite of the criticisms of *Alice*, time may tell a different story as computer technology continues to develop in the coming decades. The initial prediction of the death toll for software patents has not yet lived up to Judge Moore’s prediction, and is unlikely to reach such proportions if patent abandonment rates are an accurate measure of the fallout.¹⁶⁰ It can be argued that *Alice* helped to resolve inconsistencies in how the Federal Circuit applied the standard, returning to the more conservative approach of the early 1980s that demanded claims do more than recite generic components.¹⁶¹ While the heightened standard may make patent prosecution and litigation more difficult for the inventor and attorney alike, the *Alice* standard along with the ad-hoc guidance provided by the Federal Circuit has incentivized inventors to focus on specific improvements in technology. Non-practicing entities are less threatening under this scheme because they are less likely to invest the resources necessary to identify such specific improvements now that *Alice* has removed much of the low-hanging fruit from their reach. Though too early to tell, it should not be surprising if the aftermath of *Alice* leads to higher quality patents in the future, smarter investments in innovation, and less frivolous patent infringement suits.

¹⁵⁹ 35 U.S.C. § 122(b).

¹⁶⁰ Daily, *supra* note 77.

¹⁶¹ Rose, *supra* note 9, at 290.