

## LOST IN PATENT WONDERLAND WITH ALICE: FINDING THE WAY OUT

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## ABSTRACT

This article is about finding a way out of the patent law morass created by the United States Supreme Court in *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*.<sup>1</sup> In *Alice*, the Supreme Court rejected then prevailing tests for patentable subject matter, articulated a need for fundamentally different approaches, yet provided no meaningful guidance about what those approaches should be.<sup>2</sup> Parties throughout the patent world have described *Alice* as a disaster for the patent system, rendering the incentives and legal constraints of patent law—indeed the scope of the patent system itself—without meaningful boundaries for almost a decade.<sup>3</sup> It is time to clean up the mess created by *Alice*. This article describes how.

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1. 573 U.S. 208 (2014).

2. *See id.* at 227 (citing 35 U.S.C. § 101).

3. The *Alice* standard has implications for key technologies in modern society and broad aspects of the patent system. The following summary of *Alice's* implications by Jay P. Kesan and Runhua Wang captures both these dimensions of the significance of the decision:

While the *Alice* test for eligible subject matter is most applicable to computer-implemented inventions (i.e., computer software), lower court decisions post-*Alice* show that none of the patent claims in any technology area are spared from review under the *Alice* framework (e.g., an improved high-performance computer memory system). Business methods that are software-implemented and involve the Internet often develop new types of e-commerce. Patents on business methods, a subject area similar to the patent at issue in *Alice*, may be eligible for patent protection, unless they merely involve an abstract idea and are insufficiently tied to a particular real-world implementation. Ognjen Zivojnovic believes that *Alice* kills all pure business methods patents because all business methods patents merely recite an abstract economic practice and simply employ a general purpose computer to implement the business method. . . .

In addition to software and business methods, *Alice* has negatively impacted patent eligibility in biotechnology (e.g., biocomputing and bioinformatics). Hallie Wimberly suggests that Congress or the Supreme Court should broaden the scope of patent subject matter eligibility because of the high burden placed on biotechnological inventions after *Alice*. The Biotechnology Industry Organization (BIO) and Pharmaceutical Research and Manufacturers of America (PhRMA) both argue that the restrictions on eligible subject matter after *Alice* should be loosened.

The *Alice* test impacts the entire lifecycle of a patent, including patent application preparation, patent prosecution in the U.S. Patent and Trademark Office (PTO), and patent enforcement in the courts and in post-issuance proceedings in the PTO. This creates significant uncertainties in all of these proceedings.

Jay P. Kesan & Runhua Wang, *Eligible Subject Matter at the Patent Office: An Empirical Study of the Influence of Alice on Patent Examiners and Patent Applicants*, 105 MINN. L. REV. 527, 532–53 (2020) (footnotes omitted) (first citing Ognjen Zivojnovic, *Patent Law, Patentable Subject Matter After Alice*—

I. THE TWIN DISASTERS OF *ALICE* FOR PATENT LAW AND  
TECHNOLOGY DEVELOPMENT

A. *Alice in a Nutshell*

*Alice* addresses judicially created exceptions to patentable subject matter—that is, the types of advances that can qualify for patent protections if other patent law requirements are met. Standards for patentable subject matter derive from two authoritative sources: the Patent Clause of the United States Constitution and the Patent Act<sup>4</sup> (as supplemented by a number of judicial opinions interpreting these sources). This subsection briefly summarizes these authoritative underpinnings and then notes the added contribution of *Alice*.

1. *The Constitutional Bedrock*

Patent rights, including patent subject matter limitations, are bounded by provisions of the Constitution granting Congress the authorization to create such rights. The Patent and Copyright Clause of the Constitution grants Congress the power to enact legislation “promot[ing] the progress of . . . useful arts, by securing for limited times to . . . inventors the exclusive right to their respective . . . discoveries.”<sup>5</sup> This language limiting the legitimate purposes of patent legislation—and, hence, the legitimate scope of patent rights serving those purposes—implies several restrictions on patentable subject matter.<sup>6</sup> A patentable advance must be a “discovery” (not a pre-existing natural item or previously known artificial item) created by an inventor (by defining an artificial item or “invention”) that

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*Distinguishing Narrow Software Patents from Overly Broad Business Method Patents*, 30 BERKELEY TECH. L. J. 807, 827 (2015); then citing Hallie Wimberly, Comment, *The Changing Landscape of Patent Subject Matter Eligibility and Its Impact on Biotechnological Innovation*, 54 HOUS. L. REV. 995, 1025 (2017)).

4. U.S. CONST. art. I, § 8, cl. 8; 35 U.S.C. §§ 100–212.

5. U.S. CONST. art. I, § 8, cl. 8. Congress has broad discretion in crafting legislation (and associated intellectual property rights) that will further the purposes of this constitutional language. See *Eldred v. Ashcroft*, 537 U.S. 186, 222 (2003) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 6 (1966)) (in interpreting Congress’s powers under parallel provisions of the Constitution dealing with copyright laws, the Supreme Court noted that “[a]s we read the Framers’ instruction, the Copyright Clause empowers Congress to determine the intellectual property regimes that, overall, in that body’s judgement, will serve the ends of the Clause.”).

6. See *Graham*, 383 U.S. at 5 (noting that the provisions of the Patent and Copyright clause of the Constitution are “both a grant of power and a limitation. [The authority given Congress to enact patent laws] is limit[ed] to the promotion of advances in the ‘useful arts.’”); see also Edward C. Walterscheid, “*Within the Limits of the Constitutional Grant*”: *Constitutional Limitations on the Patent Power*, 9 J. INTELL. PROP. L. 291, 297 (2002).

contributes to practical tools and related knowledge (thereby promoting the “useful arts”).<sup>7</sup>

## 2. Statutory Implementation

Pursuant to this Constitutional power, Congress has enacted a series of Patent Acts.<sup>8</sup> The portions of the current Patent Act addressing patentable subject matter are contained in section 101 which provides 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 [the remainder of the Patent Act].”<sup>9</sup>

Courts have generally applied broadly inclusive interpretations to this statutory language on patentable subject matter<sup>10</sup> with the aim of

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7. See generally Richard S. Gruner, *Intangible Inventions: Patentable Subject Matter for an Information Age*, 35 LOY. L.A. L. REV. 355, 413–67 (2002) [hereinafter, Gruner, *Intangible Inventions*] (arguing that “useful arts” should be interpreted to encompass intangible advances in information processing); Richard S. Gruner, *In Search of the Undiscovered Country: The Challenge of Describing Patentable Subject Matter*, 23 SANTA CLARA HIGH TECH. L.J. 395, 396–405, 427–39 (2007) [hereinafter Gruner, *In Search of the Undiscovered Country*] (noting the importance of an open ended interpretation of the “useful arts”—bounded only by the need for a patentable advance to provide utility to innovation users—as a means to ensure continuing relevance of patent incentives to developing and unpredictable lines of useful innovations).

8. For an overview of the succession of Patent Acts enacted by Congress, see DONALD S. CHISUM, CHISUM ON PATENTS §§ 1–7 (2022).

9. 35 U.S.C. § 101; see generally Gruner, *Intangible Inventions*, *supra* note 7, at 380–82 (These provisions envision four types of patentable advances: 1) processes (including sequences of steps producing a useful result), 2) machines (such as devices that work on other items such as machines used to manufacture products), 3) items of manufacture (including things like cans or tires made via manufacturing processes), and 4) compositions of matter (including chemical compounds and pharmaceutical drugs). A fifth, overarching category includes improvements in items within the prior four categories, providing a reminder that improvements of preexisting items can qualify for patents if other patent law requirements are met (although the resulting patents will only cover and restrict the improved versions of the items)).

10. See, e.g., *Diamond v. Chakrabarty*, 447 U.S. 303, 308–09 (1980) (noting that, by “choosing such expansive terms as “manufacture” and “composition of matter,” modified by the comprehensive “any,” Congress plainly contemplated [in drafting patentable subject matter standards] that the patent laws would be given wide scope” and further observing that the legislative history of present patentable subject matter tests also support broadly inclusive interpretations since these tests were based on Thomas Jefferson’s view that “ingenuity should receive a liberal encouragement.”) (first quoting Act of Feb. 21, 1793, 1 Stat. 319 § 1 (1793) (current version at 35 U.S.C. § 101); then quoting 5 THE WRITINGS OF THOMAS JEFFERSON 75–76 (H.A. Washington ed., New York, H.W. Derby 1861)).

including diverse lines of technology development within the incentives of the patent system.<sup>11</sup> For example, in considering the patentability of human-engineered bacteria, the Supreme Court found that these usual “inventions” were patentable subject matter twice over, constituting both new “items of manufacture” and “compositions of matter”.<sup>12</sup> The Court noted that, in passing the Patent Act, “Congress intended statutory subject matter to ‘include anything under the sun that is made by man.’”<sup>13</sup> Commentators have noted that this view suggests seemingly anything artificially created and practically useful might qualify as patentable subject matter.<sup>14</sup>

### 3. *Judicially Developed Exceptions*

Over time, a series of judicially created exceptions to patentable subject matter have restricted the breadth of patentable advances. Specifically, laws of nature (such as Einstein’s theory of relativity), natural phenomena (such as the breaking of white light into component colors via a prism), and abstract ideas (such as the notion that “2+2=4”) have been judicially recognized as unpatentable subject matters.<sup>15</sup> Controversies surrounding these exceptions have been extensive and litigation over the scope of these exceptions to patentability now dominate subject-matter considerations.<sup>16</sup> In

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11. See Gruner, *In Search of the Undiscovered Country*, *supra* note 7, at 396–405, 427–39 (arguing in favor of this type of broad interpretation of patentable subject matter as a means to ensure patent-based encouragement of innovation amidst uncertainty about where useful innovation will come from and what forms it will take).

12. *Chakrabarty*, 447 U.S. at 309–10 (quoting *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887)) (holding that “respondent’s micro-organism plainly qualifies as patentable subject matter. His claim is not to a hitherto unknown natural phenomenon, but to a nonnaturally occurring manufacture or composition of matter”).

13. *Id.* at 309 (quoting S. REP. NO. 82-1979 (1952); H.R. REP. NO. 82-1923 (1952), *reprinted in* 1952 U.S.C.C.A.N. 2394, 2399).

14. See, e.g., Matthew G. Sipe, *Patent Law 101: The View from the Bench*, 88 GEO. WASH. L. REV. ARGUENDO 21, 22 (2020).

15. See *Alice Corp. Pty. Ltd. v. CLS Bank Int’l.*, 573 U.S. 208, 216 (2014) (quoting *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)); see also *Chakrabarty*, 447 U.S. at 309 (quoting *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948)) (observing that “a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that  $E=mc^2$ ; nor could Newton have patented the law of gravity. Such discoveries are ‘manifestations of . . . nature, free to all men and reserved exclusively to none.’”).

16. For summaries of recent attacks on patent validity under judicially-created exceptions to patentable subject matter, see Robert Sachs, *Alice: Benevolent Despot*

patentability controversies, the exception hole has swallowed the patentable donut.

#### 4. *The Contribution of Alice*

The *Alice* opinion sought to define a standard for determining whether an advance falls within the judicially-created exceptions to patentable subject matter for laws of nature, natural phenomena, and abstract ideas. The Supreme Court set out a two-part test for assessing if patent claims cover patent ineligible subject matter: first, “determine whether the [patent] claims at issue are directed to one of those patent-ineligible concepts,” and, second, if so, additionally examine “the elements of each claim both individually and ‘as an ordered combination’ to determine whether [there are] additional elements [that nevertheless] ‘transform the nature of the claim’ into a patent-eligible application.”<sup>17</sup>

In short, the Court indicated that analysts should 1) see if a patent involves a problem (that is, determine if the patent appears to include excluded subject matter because it is directed to one of the excluded items) and 2) try to fix the problem if found (by determining if there is “something more” that transforms the excluded item into a patent-eligible application).<sup>18</sup> Unfortunately, the Court offered little guidance on the nature of the problem or how to pursue a fix. Specifically, the Court described neither what would make a patent “directed to” one of the excluded categories nor the features that would suffice as “something more” distinguishing a patentable advance from an excluded law of nature, natural phenomena, or abstract idea.

Understandably, given the lack of guidance in *Alice*, ensuing confusion in applying the standard has been widespread and the results inconsistent. Federal courts have had considerable difficulties in applying the *Alice* test to achieve similar results for similar inventions,

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or *Tyrant? Analyzing Five Years of Case Law Since Alice v. CLS Bank: Part I*, IP WATCHDOG (Aug. 29, 2019), <https://www.ipwatchdog.com/2019/08/29/alice-benevolent-despot-or-tyrant-analyzing-five-years-of-case-law-since-alice-v-cls-bank-part-i> [hereinafter Sachs, *Part I*]; Robert Sachs, *Alice: Benevolent Despot or Tyrant? Analyzing Five Years of Case Law Since Alice v. CLS Bank: Part II*, IP WATCHDOG (Sept. 3, 2019), <https://www.ipwatchdog.com/2019/09/03/alice-benevolent-despot-or-tyrant-analyzing-five-years-of-case-la-since-alice-v-cls-bank-part-ii/id=112769/> [hereinafter Sachs, *Part II*].

17. *Alice Corp.*, 573 U.S. at 217 (quoting *Mayo Collaborative Servs. v. Prometheus Lab’s, Inc.*, 566 U.S. 66, 77–79 (2012)).

18. *Id.* (quoting *Mayo Collaborative*, 566 U.S. at 72, 89) (“[I]n applying the § 101 exception, we must distinguish between patents that claim the ‘buildin[g] block[s]’ of human ingenuity and those that integrate the building blocks into something more, thereby ‘transform[ing]’ them into a patent-eligible invention.”).

ruling for example that a mathematically defined process for hedging against risks of price fluctuations in commodities markets was an “abstract idea” ineligible for patenting,<sup>19</sup> while a logic design for organizing and improving searchability of a “self-referential” database was patent eligible.<sup>20</sup> Courts, examiners at the United States Patent and Trademark Office (USPTO), and patent specialists have struggled to make principled distinctions between advances such as these and to provide meaningful guidance about the likelihood that particular advances will qualify as patentable subject matter.<sup>21</sup>

*B. What Alice Left Behind: A Wake of Ambiguity, Unpredictability, and Disruption*

The central problem with *Alice* is that its “standard” is vacuous—the emperor without clothes.<sup>22</sup> No matter how often we call this a “standard” it is not one—it is rather a notation of a problem without any indication of how to solve it. The *Alice* opinion stands out adversely among judicial rulings in at least four respects:

- 1) the opinion swept away several prior standards without meaningful analysis or criticism of their adverse qualities (from which some understanding of the goals of a new standard might have been gained);<sup>23</sup>
- 2) the purported *Alice* “standard” was framed in remarkably ambiguous terms which invited broad, narrow, derivative and creative reinterpretations by

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19. See *Alice Corp.*, at 218–21 (describing, as consistent with the *Alice* standard, the patentability analysis and result concerning the price hedging method at issue in *Bilski v. Kappos*, 561 U.S. 593, 612 (2010)).

20. *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1330 (Fed. Cir. 2016) (citing 35 U.S.C. §§ 101, 102).

21. Sipe, *supra* note 14, at 23 (quoting Hung H. Bui, *A Common Sense Approach to Implement the Supreme Court’s Alice Two-Step Framework to Provide “Certainty” and “Predictability”*, 100 J. PAT. & TRADEMARK OFF. SOC’Y 165, 165 (2018)).

22. Sadly, this analogy is not original to the author. Circuit Judge Jay Plager has described recent jurisprudence based on the *Alice* standard in similar terms. See *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1353–54 (Fed. Cir. 2018) (Plager, J., concurring in part and dissenting in part).

23. For a brief overview of the judicially developed patentable subject matter standards that preceded and were displaced by the *Alice* test, see Mark A. Lemley et al., *Life After Bilski*, 63 STAN. L. REV. 1315, 1317–22 (2011).



courts and others struggling to find meaning in the terms;<sup>24</sup>

- 3) the remainder of the Court’s opinion in *Alice* provided little guidance on how to add meaning to the standards mentioned, allowing lower courts to adopt highly diverse approaches as arguably consistent with *Alice* and producing a fragmented (and unpredictable) body of subsequent caselaw from which neither later courts nor patent specialists can draw much direction;<sup>25</sup> and
- 4) this realm of ambiguity is especially important because it damages a field where legal certainty is unusually significant—that is, because it undercuts the relative certainty and predictability about patent rights needed to create forward-looking patent incentives encouraging technology development and guide commercial processes in the face of patent enforcement threats.<sup>26</sup>

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24. The ambiguity of the standard is highlighted by the fact that two of its key terms—the features that make a patent “directed to” patent ineligible subject matter and the “something more” that can qualify an invention as patentable subject matter—had no antecedents in patent law and were not defined in *Alice*.

The Court itself added to confusion over the first of these terms, noting in *Alice* that all inventions are in some sense based on abstract ideas (thereby suggesting that all inventions are directed to abstract ideas) and then using the characteristic of being directed to an abstract idea as a means for identifying a subset of patents raising patentable subject matter problems (thereby suggesting that not all patents are directed to abstract ideas). *See Alice Corp.*, 573 U.S. at 217 (quoting *Mayo Collaborative Servs. v. Prometheus Lab’s, Inc.*, 566 U.S. 66, 71 (2012)).

The Court’s reference to “something more” distinguishing unpatentable subject matter from patentable inventions was ambiguous because it was a truism. It added no meaning or content to the Court’s standard. If abstract ideas and patentable inventions are given different treatment in the law, it follows that they must have distinguishing features. The relevant concern is not whether “something more” is required beyond an abstract idea to constitute a patentable advance but rather what is the “something more”? The Court gave no answer. *See id.*

25. The pervasive confusion wrought by the *Alice* standard was summarized by Administrative Patent Judge Hung H. Bui: “Like the myth of Sisyphus, we [search for abstract ideas in identifying patentable subject matter] because we must—even if those constructs fail[] and fail[] again, year after year . . . . Since *Alice* . . . the Federal Circuit, the district courts, and the United States Patent & Trademark Office (USPTO) have all struggled to implement the Supreme Court’s *Alice* two-step framework in a predictable and consistent manner. . . . However, none of [the resulting] precedential decisions provides sufficient guidance as to what aspect of a claimed invention suffices for the claim to transition from ineligible to eligible.” Bui, *supra* note 21, at 165–66.

26. “[I]f the core function of patent law is to incentivize research, development, and innovation, the landscape of those incentives must be clear *ex ante* to the

### C. Meaning for the Patent System

#### 1. A Chorus of Criticism

A wide variety of parties have criticized the impacts of *Alice* on the patent system.<sup>27</sup> A few highlights are presented here.<sup>28</sup> This subsection summarizes observations of leading individuals in the patent field. The next subsection describes additional empiric studies providing systematic evidence of the failures of *Alice*.

#### A. Judicial Views

Several present and past judges on the Federal Circuit Court of Appeals—the court having greatest experience with the *Alice* test and patent litigation generally—have been highly critical of the *Alice* standard. The following are a few examples.

In my view, recent cases [regarding patent eligibility] are unclear, inconsistent with one another and confusing. I myself cannot reconcile the cases. That applies equally to Supreme Court and Federal Circuit cases. Nor can I predict outcomes in individual cases with any confidence since the law keeps changing year after year. If I, as a judge with 22 years of experience deciding patent cases on the Federal Circuit's bench, cannot predict outcomes based on case law, how can we expect patent examiners, trial judges, inventors and investors to do so?

...

[T]he *Mayo/Alice* regime . . . creates impossible confusion. . . . The current state of [patent] eligibility must be characterized as chaotic.<sup>29</sup>

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relevant stakeholders, from solo inventors to major laboratories. As it stands [due to the ambiguity of the *Alice* standard], the landscape is poorly defined, even *ex post*, and even to the *adjudicators*. At a minimum, then, the status quo under § 101 appears untenable.” Sipe, *supra* note 14, at 30.

27. See, e.g., *The State of Patent Eligibility in America: Part I: Hearing Before the Subcomm. on Intell. Prop., U.S. S. Comm. on the Judiciary*, 116th Cong. (2019) (statement of Hon. Paul R. Michel, C.J. of U.S. Court of Appeals for the Federal Circuit (Retired)) [hereinafter *Hearing*].

28. For a more complete collection of views on the *Alice* standard, see U.S. PAT. & TRADEMARK OFF., PATENT ELIGIBLE SUBJECT MATTER: REPORT ON VIEWS AND RECOMMENDATIONS FROM THE PUBLIC (2017), [https://www.uspto.gov/sites/default/files/documents/101-Report\\_FINAL.pdf](https://www.uspto.gov/sites/default/files/documents/101-Report_FINAL.pdf) [hereinafter PATENT ELIGIBLE SUBJECT MATTER].

29. *Hearing, supra* note 27 (statement of Hon. Paul R. Michel).

—Former Chief Judge Paul R. Michel, Federal Circuit Court of Appeals

[The *Alice*] test . . . is indeterminate and often leads to arbitrary results.

. . .

Despite the number of [Federal Circuit] cases that have [applied the *Alice* standard] and attempted to provide practical guidance, great uncertainty yet remains. And the danger of getting the answers to [patentable subject matter] questions wrong is greatest for some of today’s most important inventions in computing, medical diagnostics, artificial intelligence, the Internet of Things, and robotics, among other things.<sup>30</sup>

—Richard Linn, Senior Circuit Judge, Federal Circuit Court of Appeals

There is almost universal criticism among commentators and academicians that the “abstract idea” idea has created havoc in the patent law.

. . .

Something as simple as a declaration by the Court that the concept of “abstract ideas” has proven unworkable in the context of modern technological patenting, and adds nothing to ensuring patent quality that the statutory requirements do not already provide, would remove this distraction from the salutary system of patent issuance and enforcement provided by the Congress in the 1952 Patent Act.<sup>31</sup>

—Jay Plager, Circuit Judge, Federal Circuit Court of Appeals

#### *B. Administrative Officials’ Views*

Several present and past officials within the United States Patent and Trademark Office (USPTO) have also been highly critical of the *Alice* standard as evidenced by the following comments.

[Current tests for determining if an advance is a patent ineligible abstract idea] confound the most sophisticated

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30. *Smart Sys. Innovations, LLC v. Chi. Transit Auth.*, 873 F.3d 1364, 1377–78 (Fed. Cir. 2017) (Linn, J., concurring in part and dissenting in part).

31. *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1353–55 (Fed. Cir. 2018) (Plager, J., concurring in part and dissenting in part) (commenting additionally that the “inventive concept” construct now part of patentable subject matter tests carries forward the deficiencies of prior case law that “provided no discernable boundaries for decision-making in specific cases, resulting in an incoherent legal rule that led to arbitrary outcomes.”).

practitioners in our patent system [because] [p]eople simply don't know how to draw [the] distinctions [specified in the tests].<sup>32</sup>

—Andrei Iancu, Director, United States Patent and Trademark Office

[Court rulings have left patentable eligibility] a real mess, and you could use stronger words than that.<sup>33</sup>

—David J. Kappos, former Director, United States Patent and Trademark Office

Like . . . Sisyphus, we [search for abstract ideas and related invention features in applying the *Alice* standard] because we must—even if those constructs fail—and fail—again, year after year.<sup>34</sup>

—Hung H. Bui, Administrative Patent Judge, Patent Trial and Appeal Board (PTAB)

### *C. Practitioners' Views*

Practitioners have also strongly criticized the *Alice* standard and pointed out its adverse implications for innovation. For example, the Chair of the Section of Intellectual Property Law of the American Bar Association has observed that:

the Supreme Court has injected ambiguity into the subject-matter eligibility determination. In particular, the current jurisprudence on patent eligibility under section 101 is confusing, creates uncertainty as to the availability and enforceability of patent assets, arguably risks the incentive to innovate provided by patents in technologies in which U.S. industry has historically led the world, and potentially places the U.S. in a less advantageous position on patent protection than our leading competitor nations. Indeed, the uncertainty that has resulted from recent Supreme Court precedent and its progeny may create the risk that investment by U.S. businesses in certain new technologies will be discouraged by virtue of

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32. Kevin Noonan, *Director Iancu Produces Glimmer of Patent Eligibility Hope*, JD SUPRA (Sept. 25, 2018), <https://www.jdsupra.com/legalnews/director-iancu-produces-glimmer-of-36294/> (quoting U.S. Patent and Trademark Office Director Andrew Iancu).

33. Ryan Davis, *Kappos Calls for Abolition of Section 101 of Patent Act*, LAW360 (April 12, 2016, 4:32 PM), <https://www.law360.com/articles/783604/kappos-calls-for-abolition-of-section-101-of-patent-act> (quoting former U.S. Patent and Trademark Office Director David J. Kappos).

34. Bui, *supra* note 21, at 165–66.

the Court's interpretation of the definition of what may be patented, as found in 35 U.S.C. § 101.<sup>35</sup>

*D. Innovators' Views*

Leading innovators—including the nation's number one patent recipient, the IBM Corporation—have condemned the *Alice* standard as dysfunctionally indeterminant. IBM representatives described the *Alice* test as “unworkably ambiguous.”<sup>36</sup> IBM's experience has convinced it that “[t]he identification of an ‘abstract idea’ is . . . too abstract an exercise to be of any value towards reaching a rational decision on whether an invention is patentable subject matter.”<sup>37</sup>

In a similar vein, officials from a group of research-focused companies (InterDigital, Fallbrook Technologies Inc., and Digimarc Corporation) voiced several particular objections to the *Alice* standard:

[T]he Supreme Court has established a test for patent subject matter eligibility (SME) that has left the state of SME law in disarray and confusion. Specifically, the current law (1) is unworkable because there is no definition of “abstract idea” that is sufficiently precise to serve as a legal standard, (2) is contrary to the actual language of the Patent Act, (3) confusingly conflates SME with obviousness, and (4) is unnecessary in view of the numerous other recent judicial and legislative changes that address overly broad and vague patents.<sup>38</sup>

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35. Letter from Donna P. Suchy, Section Chair Am. Bar Ass'n Section of Intell. Prop. L. to Hon. Michelle K. Lee, Under Sec'y of Com. for Intell. Prop. and Dir. of the U.S. Pat. and Trademark Off. (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20ABA-IPL.pdf> (footnote omitted).

36. PATENT ELIGIBLE SUBJECT MATTER, *supra* note 28, at 30 n.272 (quoting E-mail from Manny W. Schechter, Chief Pat. Couns., IBM Corp. & Kenneth R. Corsello, Site Couns., IP L., IBM Corp., to Elizabeth Shaw, Off. of Pat. Legal Admin., at 1 (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20IBM.pdf> [hereinafter Schechter & Corsello E-mail]).

37. *Id.* at 30 n.277 (quoting Schechter & Corsello E-mail, *supra* note 36 at 3).

38. Letter from Jannie K. Lau, Exec. Vice President, Gen. Couns. and Sec'y, Interdigital, Inc., Jeffrey A. Birchak, Assoc. Gen. Couns., Vice President Intell. Prop. and Assistant Sec'y, Fallbrook Techs. Inc. & Joel Meyer Exec. Vice President, Intell. Prop., Digimarc Corp. to The Hon. Michelle K. Lee, Under Sec'y of Com. for Intell. Prop. and Dir. of U.S. Pat. and Trademark Off. (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20InterDigital%20Inc.pdf>.

*E. Commentators' Views*

In 2017, the USPTO gathered and published the views of commentators and other members of the public regarding patent eligible subject matter standards.<sup>39</sup> Many persons were highly critical,<sup>40</sup> one concluding that the Supreme Court had “failed to [provide] objective, predictable criteria . . . to determine whether a claim is drawn to eligible or ineligible subject matter.”<sup>41</sup> The *Alice* test was described as a “nightmare,”<sup>42</sup> “unworkable,”<sup>43</sup> “fail[ing] to define crucial terms,”<sup>44</sup> and creating “[in]sufficient certainty to serve as a legal standard for anything, let alone the important determination of whether an invention is patent eligible.”<sup>45</sup>

Scholars have also raised many criticisms of the *Alice* test, describing it as “a foggy standard cloaked as a rule,”<sup>46</sup> “too

39. See generally PATENT ELIGIBLE SUBJECT MATTER, *supra* note 28.

40. Comments on the Supreme Court’s patentable subject matter jurisprudence were not uniformly negative. Some commentators noted possible benefits of this jurisprudence in 1) “[w]eed[ing] [o]ut [o]verly [b]road [p]atents,” 2) requiring claiming of specific innovation designs rather than results, 3) empowering patent litigants in battles with patent assertion entities, and 4) aiding domestic American companies by increasing competition over the development and implementation of unpatentable technologies in the United States. *Id.* at 23–27.

41. *Id.* at 29–30 (footnote omitted).

42. *Id.* at 30 (quoting Letter from Robert A. Armitage, Consultant, IP Strategy & Pol’y, to Michelle K. Lee, Undersec’y of Com. for Intell. Prop. & Dir., U.S. Pat. & Trademark Off., at 13 (Dec. 5, 2016), <https://www.uspto.gov/sites/default/files/documents/Armitage%20Response%20to%20USPTO%20Federal%20Register%20Notice%20on%20Patent%20Eligibility%20%20%20.pdf>).

43. *Id.* (quoting E-mail from Bruce D. Sunstein, Partner, Sunstein Kann Murphy & Timbers LLP, to Hon. Michelle K. Lee, Undersec’y of Com. for Intell. Prop. & Dir., U.S. Pat. & Trademark Off., at 1 (Jan. 12, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20Bruce%20Sunstein.pdf>).

44. *Id.* (first quoting U.S. PAT. & TRADEMARK OFF., TRANSCRIPT OF ROUNDTABLE ON PATENT SUBJECT MATTER ELIGIBILITY 194 (Dec. 5, 2016), <https://www.uspto.gov/sites/default/files/documents/RT2%20Transcript%20FINAL.pdf> [hereinafter Transcript]; then quoting E-mail from R&D Cos. to Hon. Michelle K. Lee, Undersec’y of Com. for Intell. Prop. & Dir. U.S. Pat. & Trademark Off., at 3 (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20InterDigital%20Inc.pdf> [hereinafter, R&D Cos. E-mail]; and then quoting MARTIN H. SNYDER, USPTO PATENT SUBJECT MATTER ELIGIBILITY ROUNDTABLE 2 COMMENTS 3 (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20MARTIN%20SNYDER.pdf>).

45. PATENT ELIGIBLE SUBJECT MATTER, *supra* note 28, at 30 n.277 (quoting R&D Cos. E-mail, *supra* note 44, at 6).

46. Michael Risch, *Nothing Is Patentable*, 67 FLA. L. REV. F. 45, 45 (2015).

philosophical and policy based to be administrable,”<sup>47</sup> “rife with indeterminacy,”<sup>48</sup> and raising a “crisis of confusion.”<sup>49</sup> The “abstract idea” concept incorporated in the *Alice* standard is “multiply ambiguous,”<sup>50</sup> resulting in a patentable subject matter standard that “has plunged into a seemingly ever widening maelstrom of uncertainty.”<sup>51</sup> In the face of this uncertainty, “the [Supreme Court] has provided little guidance with respect to the readjusted contours of the newly invigorated doctrine, and as a consequence, judges and the PTO have been thrown into a state of confusion with respect to the proper application of the doctrine; the high degree of uncertainty is even more problematic for patent attorneys and their clients.”<sup>52</sup>

Summarizing the frustration of many observers with both the indeterminacy of the *Alice* standard and the failure of courts to provide additional useful guidance despite almost a decade of opportunities, Gene Quinn, founder of the IP Watchdog legal blog and long-time patent system observer, suggested wryly that, rather than continuing to use the Supreme Court’s *Alice* test, “[w]hy don’t we just tie a rope around the necks of the inventors and see if they float? Such an approach would be almost more enlightened than the hide the ball test we have now. At least we’d all know the rules!”<sup>53</sup>

## 2. Systematic Evidence of Failure

Several empiric studies have examined the impact of *Alice* on decisions and behaviors of stakeholders in the patent system. This subsection summarizes the results of this research.

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47. Dennis Crouch, *Eligibility: Explaining the IPO Legislative Proposal*, PATENTLY-O (Feb. 9, 2017), <https://patentlyo.com/patent/2017/02/eligibility-explaining-legislative.html>.

48. Kevin Madigan & Adam Mossoff, *Turning Gold to Lead: How Patent Eligibility Doctrine is Undermining U.S. Leadership in Innovation*, 24 GEO. MASON L. REV. 939, 941 (2017).

49. David O. Taylor, *Amending Patent Eligibility*, 50 U.C. DAVIS L. REV. 2149, 2164 (2017).

50. Kevin Emerson Collins, *Bilski and the Ambiguity of “An Unpatentable Abstract Idea”*, 15 LEWIS & CLARK L. REV. 37, 41 (2011).

51. John M. Golden, *Flook Says One Thing, Diehr Says Another: A Need for Housecleaning in the Law of Patentable Subject Matter*, 82 GEO. WASH. L. REV. 1765, 1770 (2014).

52. Christopher M. Holman, *Patent Eligibility Post-Myriad: A Reinvigorated Judicial Wildcard of Uncertain Effect*, 82 GEO. WASH. L. REV. 1796, 1798 (2014).

53. Gene Quinn, *It is Time to Define the Term “Abstract Idea”*, IP WATCHDOG (May 18, 2017), <http://www.ipwatchdog.com/2017/05/18/time-define-term-abstract-idea/id=83393/>.

*A. Impacts on Patent Applicants*

Potential impacts on patent applicants due to *Alice* include changes in research patterns (as lines of research previously thought to be valuable based on patenting opportunities are marked down in value because patents may not be available) and changes in intellectual property protection strategies for completed research (as innovators adjust protection approaches to rely more often on trade secret protections in the absence of clearly available patent protections or adjust the wording of patent applications to emphasize features that will, hopefully, produce better results under the *Alice* standard).

A number of systematic studies have attempted to gauge the impact of the *Alice* standard on patent applications and the work of patent examiners at the United States Patent and Trademark Office (USPTO). The most extensive was completed by Jay P. Kesan and Runhua Wang in 2020.<sup>54</sup> Kesan and Wang evaluated patent applications and USPTO office actions over the five-year period between 2012 and 2016, roughly two years before and after the *Alice* decision in 2014.<sup>55</sup> Patent applications concerning technologies in the manufacturing sector were used as the control group because these applications are rarely rejected under the abstract ideas exclusion to patentable subject matter and are therefore very unlikely to be affected by *Alice*.<sup>56</sup> The study compared the office action results for patent applications in the control group with those for patent applications in three other technology areas—business methods, bioinformatics, and software.<sup>57</sup>

Looking at patent application filings, Kesan and Wang found post-*Alice* drops in several technology areas, suggesting a diminished attraction of patent rewards and corresponding drops in patent-based innovation incentives.<sup>58</sup> According to Kesan and Wang, “[p]atent applicants in all three technology areas decreased their reliance on the patent system and filed fewer patent applications as compared to the time period before *Alice*, with the greatest reduction occurring in bioinformatics.”<sup>59</sup>

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54. See generally Kesan & Wang, *supra* note 3.

55. *Id.* at 534.

56. *Id.* at 535 (citing *Alice Corp. Pty. v. CLS Bank Int’l*, 573 U.S. 208 (2014)).

57. *Id.* at 534–35 (first citing *Alice*, 573 U.S. 208; then citing 35 U.S.C. § 101).

58. *Id.* at 593–94 (footnote omitted) (citing *Alice*, 573 U.S. 208).

59. Kesan & Wang, *supra* note 3, at 604 (citing *Alice*, 573 U.S. 208).



In some technology areas, the drops in application numbers were dramatic. For example, Kesan and Wang found the following impacts of *Alice* on patent applications related to business methods:

Patent applicants filed fewer patent applications in business methods after *Alice*. In [USPTO Technology Center (TC)] 3600 for general business methods, the number of patent application filings per month on average decreased by 38.16% in the twelve months after the *Alice* decision (June 2014-June 2015) compared to the same length of time before the *Alice* decision (May 2013-May 2014). The median for the patent filing numbers per month was 9,018 before the *Alice* decision, and it decreased to 5,445 after the *Alice* decision. The degree of the decrease was higher for patent applications in the business methods of finance and e-commerce. In finance, the average number of patent application filings per month decreased by 57.63% in the thirteen months after the *Alice* decision. In e-commerce, the average number of patent application filings per month decreased by 79.11% after the *Alice* decision. Within e-commerce, after the *Alice* decision, the average number of patent application filings in cryptography per month decreased by 67.41%, and the average number of patent application filings in health care per month decreased by 86.41%.<sup>60</sup>

Applications also went down substantially in the bioinformatics field:

Patent applicants in bioinformatics . . . became pessimistic about filing more patent applications after *Alice*. The average number of patent applications filed in bioinformatics . . . decreased by 74.21% per month during the nineteen months after the *Alice* decision (June 2014 to December 2015) compared to the same length of time before the *Alice* decision (January 2013 to May 2014).<sup>61</sup>

These large drops in applications indicate that, at the very least, *Alice* was viewed as a sea change in patent eligibility in certain technology fields. Patents for advances in these fields—attractive in substantial numbers before *Alice*—dropped in perceived value after *Alice*.<sup>62</sup> The impacts of patent incentives in these fields (as well as of patent restrictions via patent rights enforcement) changed equally

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60. *Id.* at 596 (footnote omitted) (citing *Alice*, 573 U.S. 208).

61. *Id.* at 593–94 (footnote omitted) (citing *Alice*, 573 U.S. 208).

62. *Id.* at 594.

dramatically with *Alice*.<sup>63</sup> Yet, the policy bases and need for these large changes in patent impacts were not clearly explained by the Court in its opaque discussions of reasoning in *Alice*. Indeed, it is not clear if these impacts—including both large drops in patent applications and differential impacts on several key technologies—were even appreciated by the Court as probable consequences of its *Alice* ruling.

### *B. Impacts on Patent Examiners*

Additional studies have attempted to identify the impact of *Alice* on the work of examiners at the USPTO. These studies have measured both reductions in patent applications following *Alice* (particularly in applications for certain technologies) and changes in office actions adopted by USPTO examiners after *Alice*.<sup>64</sup>

In one of the most detailed studies of examiner behaviors post-*Alice*, Kesan and Wang's study (already introduced in subsection (a) above) used statistical analyses to measure differences in USPTO office actions before and after *Alice*.<sup>65</sup> They focused on office actions concerning three types of advances—innovations in business methods, bioinformatics, and software.<sup>66</sup> Employing difference-in-difference statistical regression methods, Kesan and Wang found that *Alice* resulted in more patentable subject matter rejections in the software, business methods, and biotechnology areas.<sup>67</sup> The patterns of rejections they observed suggested that *Alice* added material confusion to patent prosecution processes, at least for some technologies.<sup>68</sup> According to Kesan and Wang, “[o]ur causal empirical study of the *Alice* decision reveals how that case impacted both patent examiners and patent applicants, increasing the transaction costs associated with patent prosecution and creating uncertain outcomes in

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63. *Id.* at 593.

64. Office actions are rulings by examiners on whether a patent should be issued. Kesan & Wang, *supra* note 3, at 556; see generally *Responding to Office Actions*, U.S. PAT. AND TRADEMARK OFF. (July 26, 2018), <https://www.uspto.gov/patents/maintain/responding-office-actions>. In early stages of examiners' patent reviews, negative office actions are often tentative (described by the USPTO as “initial rejections” or “non-final office actions” as distinct from “final rejections”) and can be overcome by either arguments persuading an examiner that an initial rejection was unfounded or by making changes to the relevant patent application that remove the grounds for rejection. See *Reconsideration Before Final Action*, 37 C.F.R. § 1.112 (2022); Kesan & Wang, *supra* note 3, at 598).

65. Kesan & Wang, *supra* note 3, at 534.

66. *Id.* at 534–35.

67. *Id.* at 535, 562.

68. See *id.* at 604.

patent allowance.”<sup>69</sup> Their empirical results “portray a murky picture of how *Alice* plays out in different technology sectors—quite unworkable in several sectors, yet providing predictable guidance in a few areas.”<sup>70</sup>

Kesan and Wang found a disconnect in some technology fields between how examiners applied *Alice* and how patent applicants projected results under the test. Efforts by the USPTO to interpret *Alice* and instruct examiners on how to apply the *Alice* standard may have inadvertently increased confusion on the part of patent applicants. The result was greater difficulty on the part of applicants in responding to and overcoming initial adverse results in patent examination processes by making curative changes in patent applications. Kesan and Wang described this impact as follows for patent applications covering business methods:

Examiners gave more final rejections to applications in business methods under § 101 after the *Alice* decision. In other words, after the *Alice* decision, applicants faced difficulties in successfully overcoming § 101 rejections. For applications that initially received a § 101 rejection, *Alice* made it more difficult for them to overcome their initial § 101 rejections. The implementation of the law by the PTO increased the uncertainties in patent eligibility and the difficulties in overcoming these uncertainties to a higher degree . . . In [the fields of business methods addressing finance and e-commerce in particular], applicants were not clearly guided by the *Alice* decision, and they did not successfully adjust their patenting strategies, despite filing fewer patent applications. These applicants faced higher patent prosecution expenses because of *Alice* and the PTO’s implementation of it.<sup>71</sup>

Kesan and Wang’s conclusions regarding increased USPTO rejections post-*Alice* are consistent with the results of an earlier study by Colleen Chien and Jiun Ying Wu using different data.<sup>72</sup> Chien and Wu considered USPTO office actions between 2008 and mid-July 2017. They found that:

the data confirm that [section 101 standards including the *Alice* test are] playing an increasingly important role in the examination of software and medical diagnostics patents.

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69. *Id.*

70. Kesan & Wang, *supra* note 3, at 536.

71. *Id.* at 598.

72. Colleen Chien & Jiun Ying Wu, *Decoding Patentable Subject Matter*, 2018 PATENTLY-O PAT. L. J. 10, 10.

More than four years after the *Alice* decision, the role of subject matter does not appear to be receding, remaining an issue in a large share of cases not only at their outset but among applications that go abandoned through the last office action. That patentees cannot tell before they file whether or not their invention will be considered patent-eligible, and perceive that much depends not on the merits of the case but in what art unit the application is placed also presents a challenge to the goal of predictability in the patent system.<sup>73</sup>

In short, uncertainty over the *Alice* standards may have produced substantial differences in outcomes among subgroups of patent examiners, making the assignment of a patent application for review by one technology art unit (a subgroup of examiners) versus another a significant determinant of patent review outcomes. This dimension of uncertainty—stemming from administrative practices within the USPTO that are beyond patent applicant control—further undercuts the projected value of patent rewards and reduces the strength of patent incentives.

A third study by Robert Sachs suggests that patent examiners not only made significantly more rejections post-*Alice* in certain technology areas, but that the reasons for the rejections were frequently opaque to outsiders—making future predictions based on past rejections nearly impossible. This opacity raises questions about whether or not the rejections were meaningfully (and consistently) guided by the *Alice* standard. The findings of this study, reported in the *Bilski* Blog,<sup>74</sup> were as follows:

[W]hen it comes to business methods, we see [substantial changes in examiner results]: prior to *Alice*, [patent prosecutors representing patent applicants] overcame . . . non-final § 101 rejections generally about 62% of the time, leading to final rejection rates in the 23–46% range; thus prosecutors had more or less even odds of getting over the rejection. What is shocking is that after *Alice*, the final rejection rate soared into the 90% range.

Now I've reviewed several hundred post-*Alice* rejections, and I've talked to a large number of prosecutors. What I've found is that the majority of the non-final § 101 rejections were

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73. *Id.* at 17.

74. See generally Robert Sachs, *#AliceStorm in June: A Deeper Dive into Court Trends, and New Data on Alice Inside the USPTO*, BILSKI BLOG (June 30, 2015), <https://www.bilskiblog.com/2015/06/alicestorm-a-deeper-dive-into-court-trends-and-new-data-on-alice-inside-the-uspto> [hereinafter Sachs, *#AliceStorm*].

relatively formalistic, with little actual substantive analysis. Likewise, in a review of 87 office actions issued in November 2014 with § 101 rejections, Scott Alter and Richard Marsh . . . found that 63 percent of those actions were “boilerplate” rejections. In my view, most prosecutors put forward at least a *decent* argument to show that the claims are not abstract, have at least one significant limitation, and do not preempt the abstract idea. Response arguments to § 101 rejections tend to run longer than response to prior art rejections, and I’ve seen many that resemble appeal briefs if not legal treatises, all to overcome a one paragraph rejection. They all presented at least enough of an argument to overcome the prima facie case for the rejection. And yet the final rejections keep coming—and often with little or no substantive rebuttal of the prosecutor’s arguments.<sup>75</sup>

Thus, the track record of the USPTO has perpetuated (or even expanded) the ambiguities of *Alice*, giving practitioners little additional information about how to evaluate the patentability of advances, particularly in connection with business method advances and other types of innovations most extensively affected by *Alice*.

### *C. Impacts on Courts*

#### *i. The Federal Circuit—A History of Fragmented Views*

Primary evidence of the lack of guidance in *Alice* and other patentable subject matter cases from the Supreme Court lies in the extensive history of fragmented opinions and diverse analytic approaches by members of the United States Court of Appeals for the Federal Circuit in trying to find meaning and consistent patentable subject matter standards in the wake of *Alice*. In a series of cases—many decided in *en banc* proceedings resulting in numerous dissenting and concurring opinions but adding little clarity to the law—the Federal Circuit has attempted and failed to come to a consistent approach to patentable subject matter exceptions derived from *Alice* and related Supreme Court opinions. Bound to follow Supreme Court precedent, Federal Circuit judges cannot agree on what that precedent means.

Despite the centrality of this determination to their function as a specialized court interpreting and clarifying patent law features, the

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75. *Id.* (citing Scott Alter & Richard Marsh, Jr., *One Year After Alice: Was it the Right Medicine?*, LAW360 (June 19, 2015, 5:31 PM), <https://law360.com/articles/654471>).

Federal Circuit has failed to define a consistent, workable means to apply the *Alice* standard.<sup>76</sup> The confusion of the Federal Circuit court—despite extensive efforts to gain clarity with the support of diverse litigators specializing in patent law and related litigation—is concrete evidence of the vacuity of the *Alice* standard. And the failure of the Federal Circuit court to gain this clarity has ensured that the confusion and detrimental impacts of *Alice* have been passed on to lower courts and patent practitioners who must try to divine meaning and make predictions from the tea leaves of the all too opaque language of *Alice*.

A good example of the prevailing and continuing confusion at the Federal Circuit over the meaning of *Alice* was evident in a 86 page “order” issued by the court in 2019 concerning *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*.<sup>77</sup> The order announced the denial of a petition for rehearing *en banc* of a split decision by a Federal Circuit panel invalidating a medical diagnostics patent for lack of patentable subject matter.<sup>78</sup> The order denying the *en banc* petition was addressed in eight opinions from various combinations of Federal

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76. The Federal Circuit court was established, in part, to add clarity to patentable subject matter standards and other features of patent law. For many years, it served this function well. As summarized by Randall R. Rader, then a Circuit Judge on the Federal Circuit court and later Chief Judge:

[I]n 1982, the Court of Appeals for the Federal Circuit was created. It was put into place to correct the failures of the Supreme Court and to really provide a standard for what is an appropriate advance in the technological arts; an exclusive right. Over the years, the invention standard used by the Supreme Court had become incredibly diaphanous and a “veritable phantom” as it was labeled. The Federal Circuit, I think, has accomplished a great mission in bringing uniformity, predictability, and enforceability to law.

Randall R. Rader, *The United States Court of Appeals for the Federal Circuit: The Promise and Perils of a Court of Limited Jurisdiction*, 5 MARQ. INTELL. PROP. L. REV. 1, 2–3 (2001).

77. 927 F.3d 1333 (Fed. Cir. 2019).

78. *Id.* at 1335. The patent covers methods for diagnosing neurological disorders by detecting antibodies to a protein. *See* *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, 915 F.3d 743, 746 (Fed. Cir. 2019). The majority (Circuit Judges Lourie and Stoll) concluded that the claims in the patent were directed to a natural law and that the invention described there was indistinguishable from the natural law as steps described in the claimed method only required standard techniques to be applied in a standard way. *See id.* at 755. Judge Newman, writing in dissent, disagreed, finding that the claimed invention involved patentable subject matter because it was a “new and improved technique, for producing a tangible and useful result, [that] falls squarely outside those categories of inventions that are ‘directed to’ patent-ineligible concepts.” *See id.* at 757 (Newman, J., dissenting) (quoting *Rapid Litig. Mgmt. Ltd. v. CellzDirect, Inc.*, 827 F.3d 1042, 1050 (Fed. Cir. 2016)).

Circuit judges, four concurring in the denial of the petition and four dissenting in the denial.<sup>79</sup>

Remarkably, among both the judges supporting and opposing the rejection of the *en banc* petition, there was broad agreement that the *Alice* standard and related patentable subject matter case law from the Supreme Court lacked clarity and was compelling judges to embrace rulings that they thought ill advised.<sup>80</sup> The following excerpts from just two of the many opinions in the case suggest the frustration of many members of the court with the lack of guidance judges have been given by the Supreme Court in *Alice* and related patentable subject matter cases.

*Circuit Judge Hughes (writing on behalf of Chief Judge Prost and Circuit Judge Taranto and concurring in the rejection of the en banc petition):*

The multiple concurring and dissenting opinions regarding the denial of *en banc* rehearing in this case are illustrative of how fraught the issue of § 101 eligibility, especially as applied to medical diagnostics patents, is. I agree that the language in *Mayo*, as later reinforced in *Alice*, forecloses this court from adopting an approach or reaching a result different from the panel majority's. I also agree, however, that the bottom line for diagnostics patents is problematic. But this is not a problem that we can solve. As an inferior appellate court, we are bound by the Supreme Court.

I, for one, would welcome further explication of eligibility standards in the area of diagnostics patents. Such standards could permit patenting of essential life-saving inventions based on natural laws while providing a reasonable and measured way to differentiate between overly broad patents claiming natural laws and truly worthy specific applications.<sup>81</sup>

*Circuit Judge Moore (writing on behalf of Circuit Judges O'Malley, Wallach, and Stoll and dissenting in the rejection of the en banc petition):*

This is not a case in which the judges of this court disagree over whether diagnostic claims, like those at issue in *Athena*,

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79. The various opinions in this case are summarized in *Athena v. Mayo: A Splintered Federal Circuit Invites Supreme Court or Congress to Step Up On 101 Chaos*, IP WATCHDOG (July 8, 2019), <https://www.ipwatchdog.com/2019/07/08/splintered-federal-circuit-invites-supreme-court-review-athena-v-mayo/>.

80. See *Athena Diagnostics*, 927 F.3d at 1337, 1352.

81. *Id.* at 1337 (Hughes, J., concurring).

should be eligible for patent protection. They should. None of my colleagues defend the conclusion that claims to diagnostic kits and diagnostic techniques, like those at issue, should be ineligible. The only difference among us is whether the Supreme Court's *Mayo* decision [as further interpreted in *Alice*] requires this outcome. The majority of my colleagues believe that our hands are tied and that *Mayo* requires this outcome. I believe *Mayo* does not. The Patent Act renders eligible the invention or discovery of any new and useful process. 35 U.S.C. § 101. And the patent system exists to promote exactly this sort of specific, targeted application of a life-saving discovery, which is characterized by extraordinarily high initial market entry costs. The claims in this case should be held eligible, and they are distinguishable from *Mayo*.<sup>82</sup>

In short, for reasons that were poorly understood and difficult if not impossible for many of the judges to explain, the Supreme Court's *Alice* standard (restating the Court's earlier analysis in *Mayo*) compelled a result that a significant portion of the court—perhaps even a majority—felt was unwise with respect to a type of life-saving technology that all felt was valuable.<sup>83</sup> This sort of caselaw by opaque edict would be detrimental in any area of the law; it is particularly contemptuous of the incentive and regulatory goals of patent law where certainty about future rewards and commercial constraints lie at the heart of the legal regime.

*ii. Lower Federal Courts – Inconsistent Results*

A comprehensive analysis by Robert Sachs of lower court case law after *Alice* found dramatic changes in court rulings on patentable subject matter.<sup>84</sup> According to Sachs,

[i]n the five years [prior to 2019], 781 unique patents have been held invalid in whole or in part by federal courts. Compared with the five years prior to *Alice*, there has been a 1056% increase in the number of decisions finding ineligible claims, and a 914% increase in the number of invalidated patents.<sup>85</sup>

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82. *Id.* at 1352 (Moore, J., dissenting).

83. *Id.* at 1356. Despite the many pleas of the Federal Circuit judges writing in *Athena* for clarification of the governing patentable subject matter standards, the Supreme Court ultimately refused to grant certiorari in this case. *See Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, 140 S. Ct. 855 (2020).

84. *See Sachs, Part I, supra* note 16; *Sachs, Part II, supra* note 16.

85. *See Sachs, Part I, supra* note 16.



These sweeping results have been produced amidst extensive uncertainty about governing standards amidst district courts. This uncertainty starts with the lack of clarity they have inherited from the ambiguous tests promulgated by both the Supreme Court and the Federal Circuit court. Governed by these ambiguous tests, district courts have not surprisingly produced correspondingly ambiguous and inconsistent analyses that track their counterparts from higher courts. In addition, some district courts have added their own original approaches (a natural reaction in the absence of meaningful guidance from above), with the result that the diversity of approaches at the district court level is even broader than the morass of approaches at the Federal Circuit.

Summarizing the array of district court decisions in the wake of *Alice*, Robert Sachs observed that:

If you are a rights holder or licensor who depends on the objective certainty of patent rights, then the numbers [of struck down patents emerging from federal district courts] are merely a grim confirmation that bad patents and bad science make for bad law. The consistency that *Alice* brings to litigation is, at best, the epistemic certainty that a patent on just about any kind of technology can be subject to a motion to dismiss for ineligible subject matter—and that nearly 60% of such attacks succeed in the district courts and are then affirmed over 85% of the time on appeal to the Federal Circuit. You agree with the assessment that *Alice*'s edict is a fancy *I-know-it-when-I-see-it* shorthand for deciding whether patent claims have so-called “inventive merit”—an approach that Judge Plager described in *Interval Licensing v. AOL* (2018) as providing “no discernable boundaries for decision-making in specific cases, resulting in an incoherent legal rule that led to arbitrary outcomes.”<sup>86</sup>

#### *D. Impacts on Attorneys*

Patent attorneys and additional counsel who litigate patents are regularly called upon to predict the patentability of various inventions. Their ability to give reliable answers has been materially undercut by *Alice* and the ensuing uncertainty of patentable subject matter caselaw. To measure the scope of this effect, Jason D. Reinecke sought to test

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86. Sachs, *Part II*, *supra* note 16 (quoting *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1353 (Fed. Cir. 2018) (Plager, J., concurring in part and dissenting in part); *see also* Giles S. Rich, *Principles of Patentability*, 28 GEO. WASH. L. REV. 393, 405 (1960) (citing Patent Act of 1952, Pub. L. No. 82-593, 66 Stat. 792 (codified as amended in scattered sections of 35 U.S.C.) [hereinafter Rich, *Principles of Patentability*]).

the ability of attorneys to predict judicial outcomes under the *Alice* standards.<sup>87</sup> Reinecke submitted software patent claims to attorneys who were asked to predict how courts would rule regarding subject matter eligibility.<sup>88</sup> Each attorney surveyed was given five patent claims randomly chosen from a group of fifty software claims addressed in decisions of district courts at pleading stages in litigated cases.<sup>89</sup> Reinecke then compared attorneys' predictions to the actual rulings of district courts regarding the presence of patentable subject matter in the patent claims.<sup>90</sup>

Reinecke summarized his results as follows:

[P]atent prosecutors (attorneys who write patents) correctly identified how courts ruled 67.3% of the time. Patent litigators fared much more poorly, only correctly identifying court outcomes 59.7% of the time. Interestingly, patent litigators varied significantly in their inferential abilities. This means that some groups of patent litigators were much better than 59.7% at predicting court outcomes, and some were worse—with the difference being much more than one would expect due to chance alone.<sup>91</sup>

Reinecke speculated that the differences between results within the litigators surveyed may have stemmed from different litigators' lesser or greater familiarity with software patent claims and subject matter considerations, but he was unable to confirm this distinction with the data he possessed.<sup>92</sup>

The success rates found by Reinecke seem remarkably low.<sup>93</sup> A student who was only right about 67 percent of the time (the success rate for patent prosecutors in Reinecke's study) would receive a "D"

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87. See Jason D. Reinecke, *Is the Supreme Court's Patentable Subject Matter Test Overly Ambiguous? An Empirical Test*, 19 UTAH L. REV. 581, 582–83 (2019).

88. *Id.* at 583.

89. *Id.* at 593–94.

90. See *id.* at 597.

91. *Id.* at 583 (footnote omitted).

92. See Reinecke, *supra* note 87, at 599.

93. Reinecke was more sanguine about the results he obtained, concluding that: [t]he results clearly show that the two-step [*Alice*] test is not wholly ambiguous or as impossible to administer as some commentators have suggested. If patent prosecutors can correctly predict court outcomes over two-thirds of the time after spending less than one minute analyzing merely one piece of the puzzle, the two-step test is clearly not impossible to administer coherently.

*Id.* at 584. For the reasons mentioned in the main text, a success rate of only 67 percent (and lower for patent litigators) seems far below an acceptable level and appears to be evidence of predictive failure not success. *Id.* at 583.

grade on an exam. An attorney's clients would hardly be satisfied if they based multi-million-dollar products or licensing schemes on an attorney's advice only to lose most of their profits due to the attorney's errors about one-third of the time. And the success rate of 67 percent found for patent prosecutors does not seem materially higher than would have been obtained by guessing about the patentability of the claims in question—even flipping a coin to guess at patentable subject matter should produce correct answers about 50 percent of the time.<sup>94</sup> Presumably, attorneys should be able to provide more added value than flipping a coin. Yet *Alice* has left even patent specialists with little more predictability about patentable subject matter.

#### *E. Impacts on Patent Holders*

Impacts on patent holders from *Alice* include losses of value in pre-existing patents (as patents thought to be enforceable are struck down or called into question) and changes in patent litigation and licensing practices. The practical (and often uncertain) consequences for high-tech patent holders since *Alice* were summarized as follows by Robert Sachs:

With *Alice*, the snipe hunt for an invention is back, only this time it is typically a proxy for invalidating patents for obviousness, lack of written description or enablement without the costly need for the niceties of evidence. As a technology-savvy patent holder you view the Federal Circuit's decisions [since *Alice*] as inconsistent at best and based on an arbitrary division between claims using a computer as a tool (generally ineligible) and claims for improving the computer itself (generally eligible). Of course, you know that computers are inherently tools to do something useful, and that *Alice*'s mention of "improving a computer" was an example of an eligible transformation, not a requirement of one. Your experience before the USPTO has been similar, and until recently, patent examination of your company's software and/or biotech inventions have been dominated by Section 101 rejections, increasing your prosecution costs and the time to issuance. The value of your patents has dropped—sometimes

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94. *Id.* at 597. This point assumes that the claims used in this study were split roughly equally between claims that did and did not cover patentable subject matter. Under these conditions, a random guess (the equivalent of following the results of a coin flip) would be right as to the presence of patentable subject matter about 50 percent of the time.

to zero—and some licensees have aggressively attempted to renegotiate their agreements.<sup>95</sup>

One detailed study of results for patent holders in completed litigation found that the impacts of *Alice* have been industry-specific and most harmful to individual inventors and inventor-started companies.<sup>96</sup> Mark A. Lemley and Samantha Zyontz examined 808 case decisions applying the *Alice* standard for patentable subject matter.<sup>97</sup> These decisions have most clearly impacted patent rights in the information technology (IT) and biotech industries. According to Lemley and Zyontz: “90 percent of post-*Alice* decisions [regarding patentable subject matter] are in the software/IT industry; only 9 percent are biotech/life sciences decisions. Almost all *Alice* cases come from these industries; only 1 percent of decisions involve other industries.”<sup>98</sup>

Lemley and Zyontz found that *Alice* has most harshly affected individual inventors and inventor-started companies.<sup>99</sup> These types of patent holders were significantly more likely to have their patents invalidated under *Alice* than other types of patent owners.<sup>100</sup> Rather than serving primarily as a means of invalidating weak patents held by patent trolls (a justification for the *Alice* standard put forth by some defenders),<sup>101</sup> *Alice* has instead fallen hardest on small scale

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95. Sachs, *Part II, supra* note 16 (quoting *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 225 (2014)). Sachs points out that the implications of *Alice* have not been bad for all companies. *Id.* In particular, concerns that are more likely to be targets of patent suits than beneficiaries of patent rights may gain from the consequences of *Alice*. *Id.* In Sachs’ view:

[I]f you are a company that is a target of patent assertions, then these numbers are cause for celebration: [*Alice*] has made the world a better place by reducing your exposure to both the meritless claims of existing patents and—better yet—the possible universe of future patents that could have been used against you. If you have had to forego patent protection of your own by not filing, abandoning a few applications here and there, or just dealing with increased prosecution costs, it has been a small price to pay for the increased likelihood of successful outcomes as a defendant in patent litigation.

*Id.* (citing *Alice*, 573 U.S. 208).

96. See Mark A. Lemley & Samantha Zyontz, *Does Alice Target Patent Trolls?*, 18 J. EMPIRICAL LEGAL STUD. 47, 48 (2021).

97. *Id.* at 58.

98. *Id.* at 67.

99. See *id.* at 77.

100. *Id.* at 83, 88.

101. See, e.g., *Saved by Alice*, ELEC. FRONTIER FOUND., <https://www EFF/ORG/ALICE> (last visited May 22, 2022) (sources describe *Alice* as “a crucial tool for fighting back against . . . patent trolls”).

innovators seeking to defend and commercialize their own individually held patents.<sup>102</sup>

*F. Impacts on Investors*

A survey by David O. Taylor of impacts of *Alice* on decisions of investors to back innovative enterprises found significant negative impacts in some technology fields.<sup>103</sup> Taylor's findings reflected the views of 475 investors representing at least 422 investment firms.<sup>104</sup> Patent rights were significant to most investors.<sup>105</sup> *Alice* was seen as impacting those rights more in some fields than others.<sup>106</sup> Taylor summarized his results as follows:

The survey results indicate that investors as a whole believe patent eligibility is an important consideration in deciding whether to invest in a company developing technology. Furthermore, the results indicate that a significant portion of the investors who are familiar with the Supreme Court's cases believe these cases have reduced their firms' investments in technological development in all industries. These investors report primarily decreased investments, but also shifting of investments between industries, and in particular out of life sciences industries.<sup>107</sup>

Survey respondents who were familiar with *Alice* and the Supreme Court's other patentable subject matter cases felt that rulings in these cases adversely affected the value of the investors' present holdings and would curtail decisions to back future innovation.<sup>108</sup> Regarding present investments, "[a]bout 40% of knowledgeable investors indicated that the Court's decisions had somewhat negative or very negative effects on their firms' existing investments, while only about 14% of these investors reported somewhat positive or very positive effects."<sup>109</sup> With respect to future investment decisions, "the percentage of . . . investors who reported increasing investments as a result of the Supreme Court's known eligibility decisions stood at 8%,

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102. Lemley & Zyotnz, *supra* note 96, at 88.

103. David O. Taylor, *Patent Eligibility and Investment*, 41 CARDOZO L. REV. 2019, 2030 (2020) [hereinafter Taylor, *Patent Eligibility and Investment*].

104. *Id.* at 2047, 2051.

105. *Id.* at 2053.

106. *Id.* at 2070.

107. *Id.* at 2088 (footnotes omitted).

108. Taylor, *Patent Eligibility and Investment*, *supra* note 103, at 2074 (footnote omitted).

109. *Id.* at 2070 (footnote omitted).

significantly below the percentage indicating decreased investments at 49%.”<sup>110</sup>

## II. STARTING OVER: WHAT WAS *ALICE* TRYING TO ADDRESS?—THE INVENTION IS THE KEY

The fundamental difficulty with *Alice* and other related Supreme Court caselaw on patentable subject matter is that it never presents nor analyzes the problem it is trying to address. This caselaw is about a lack of invention. Abstract ideas, laws of nature and natural phenomena are unpatentable because they lack an invention. Some applications of these things are patentable because they add the elements of an invention. This transition from idea or phenomena to invention is what exclusions to patentable subject matter are about.

Had the Supreme Court focused carefully on this—and provided more guidance about the features of the idea-invention transition—it would have provided a workable standard for two key reasons. First, it would have tied its recent analyses to past caselaw defining the features of an invention. Second, it would have suggested a principled focus for subsequent, original court analyses of the minimum features of an invention beyond any underlying idea or natural phenomena. By failing to state the question to be answered, the Supreme Court left the tracks of useful analysis at an early stage.

Instead, the Court veered (and took lower courts with it) into the murky waters of trying to distinguish between some patent-worthy inventions and other patent-excluded inventions.<sup>111</sup> This inquiry was both statutorily unauthorized and substantively unwise.<sup>112</sup> The question at issue in *Alice* was not what sort of invention was present but rather whether any invention was present. Abstract ideas, laws of nature, and natural phenomena are unpatentable because they are not inventions. The search for an invention is coextensive with the search for the boundaries of unpatentable subject matter. Once an innovator makes the transition from idea or phenomena to invention, the realm of unpatentable subject matter is left behind. If we know the minimum features of an invention—and can hence identify the line between idea

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110. *Id.* at 2074.

111. The provisions of the 1952 Patent Act were drafted specifically to prevent courts from trying to make these distinctions, instead incorporating specific tests for novelty, non-obviousness, and enablement that were designed to systematically screen and prevent insufficiently original or fully defined advances from obtaining patent protections. *See Rich, Principles of Patentability, supra* note 86 at 405; *infra* Section III A–B.

112. *See Rich, supra* note 86 at 405; *infra* Section III A–B.

or phenomena and invention and when it is passed—we will have a workable test for patentable subject matter exceptions.

This section starts over, presenting the analysis of patentable subject matter exceptions in three parts:

1) Defining the problem to be solved: Identifying the concerns over abstract ideas, laws of nature, and natural phenomena that have produced corresponding exceptions to patentable subject matter;

2) Establishing criteria for a successful solution: Understanding the features of a successful standard for distinguishing unpatentable abstract ideas, laws of nature, and natural phenomena from patentable inventions; and

3) Providing a solution: Identifying a workable test for the idea/invention transition from past caselaw on the characteristics of patentable inventions.

#### *A. Defining the Problem—Exceptions as Non-Inventions*

There are no provisions in the Patent Act for abstract ideas, natural phenomena, or laws of nature. Concern over these stems from what they are not—they are not inventions. Only inventions can be patented.<sup>113</sup> If abstract ideas, natural phenomena, and laws of nature are not inventions, they are consequently exceptions to patentable subject matter. Hence, the entire bodies of caselaw addressing (poorly) the features of abstract ideas, natural phenomena, and laws of nature as exceptions to patentable subject matter derive from patent law tests for an invention and the failure of abstract ideas, natural phenomena, and laws of nature to meet these tests.

The reasons why abstract ideas, natural phenomena, and laws of nature are not inventions for patent law purposes differ somewhat. One shared failing is a lack of utility needed in an invention. All

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113. The Patent Act specifies four primary categories of inventions—processes, machines, manufactures, and compositions of matter—and a fifth category of improvements to one of the four prior types of advances. See 35 U.S.C. § 101. The presence or absence of an invention within these five specific categories of patentable advances mentioned in the Patent Act is the only patentable subject matter issue authorized by Congress. See *id.* Once an advance meets this test, the Patent Act specifies additional tests for novelty, non-obviousness, enablement, and other features that must be met to gain a patent. See 35 U.S.C. §§ 101–103, 112. However, the test for patentable subject matter is categorical—an advance (and potentially all advances with similar features in an entire domain of innovation) is either in or out. See *id.* § 101. Because particular subject matter rulings can sweep entire fields of innovation outside the patent system (and outside its potentially beneficial innovation incentives), the patentable subject matter inquiry (and the associated standards under which the inquiry proceeds) is a fundamentally important gatekeeper issue in patent law.

three—in their pure forms—lack practical consequences and are therefore not the type of useful advances that can be inventions. Only when they are augmented with implementation features producing practically-important results can abstract ideas, natural phenomena, and laws of nature be inventions. In addition, natural phenomena and laws of nature are not inventions because their operation and results preexist human effort—they are not artificial items created or discovered by man but rather features of nature operating the same ways with or without human effort. Natural phenomena and laws of nature (but not abstract ideas) lack human creation and are not inventions accordingly.

How much more than an insufficient abstract idea, natural phenomena, or law of nature is needed to produce an invention? The answer depends on the minimum features of a patentable invention, a topic on which—if one looks carefully at the full scope of patent caselaw—there is already substantial judicial analysis. Past caselaw identifies the minimum descriptive understanding, working characteristics, and practical results needed in a patentable invention. This past caselaw points the way out of the *Alice* swamp. Inventions consistent with this past caselaw are patentable; abstract ideas, natural phenomena, and laws of nature lacking necessary features of inventions as specified in past caselaw are exceptions to patentable subject matter.

The solution to the *Alice* problem is to clarify the minimum definition of a patentable invention, rather than agonizing over what is or is not an abstract idea, natural phenomena, or law of nature. Once we know what the test is, exceptions to patentable subject matter—whether they be abstract ideas, natural phenomena, laws of nature, or just incomplete attempts to produce practically useful devices or processes—will be clear as failures to meet the applicable test for an invention. In short, once we know what we are looking for we will gain clarity as to when we do or do not find it.

### *B. Desirable Characteristics of a Patentability Standard*

The standard for an invention faces an unusual hurdle for a legal standard—it must address what does not yet exist.<sup>114</sup> Patents are fundamentally about shaping the presently unknown future—they are designed to encourage innovators to create new solutions to practical problems and, in particular, new solutions that are so unusual that they

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114. See generally Gruner, *In Search of the Undiscovered Country*, *supra* note 7.



would not be obvious to most of the innovators' similarly trained peers.<sup>115</sup> Patentable inventions are long-shots, unpredictable successes and outliers in their respective lines of innovation. Yet, statutory tests for inventions must be clear enough that innovators can know with meaningful certainty that they are in pursuit of such an unusual advance and be motivated by promised patent rewards if they are successful in their quest. In addition, commercial actors considering the limiting effects of patent rights need to know where patent rights begin and end. In short, patent law must attach substantial rights and incentives to advances that few persons can project or define at any given time.

Amidst this peculiar lack of definition, the purposes of the patent system provide some guidance regarding the necessary features of a patentable invention. Patents are intended to promote solutions to practical problems to the benefit of the public.<sup>116</sup> This purpose was deemed important enough to embed the roots of the patent system in the United States Constitution, resulting in Congresses' enumerated authorization to pass patent legislation aimed at "promot[ing] the progress of . . . [the] useful arts."<sup>117</sup> Taking up this task, Congress passed the present Patent Act which authorizes patents for four classes of inventions—processes, machines, manufactures, and compositions of matter—specifying only that these inventions must be new and useful.<sup>118</sup> Congress did not specify how these advances should provide practical benefit—only that they be useful. Presumably, it was expected that innovators would use their ingenuity to discover new means to deliver utility and thereby to solve practical problems both old and new. The means of providing utility is not important—only the delivery of utility through new advances is necessary.<sup>119</sup>

This suggests the characteristics of a successful patentable subject matter standard consistent with the Patent Act and the general aims of the patent system. The standard should ensure that patentable advances provide practical utility to the public, thereby carrying out the quid-pro-quo bargain of the patent system of exchanging patent rights for increases in useful items and expansion of knowledge

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115. See 35 U.S.C. § 103.

116. See Gruner, *In Search of the Undiscovered Country*, *supra* note 7, at 396.

117. U.S. CONST. art. I, § 8, cl. 8.

118. 35 U.S.C. § 101. Congress also included a reminder that a fifth type of invention—involving improvements to any of the four listed categories of inventions—could also qualify for patent rights. *See id.*

119. See Gruner, *In Search of the Undiscovered Country*, *supra* note 7, at 413–14.

regarding the useful arts.<sup>120</sup> The standard should ensure that patentable advances and the results they achieve are defined with particularity, not only to ensure that the advances are fully transferred to the public via patent disclosures (and can be replicated) but also to aid evaluation and testing of the advances in commercial processes that will weed out some as un-advantageous and promote others into widely distributed and used products with large public impacts. And the standard should be technology neutral—that is, not limited to any particular means of achieving practical utility. All means of achieving utility at a given cost (short of independently illegal means) are of equal value to the public and, hence, equally important as targets of patent encouragement. Such a technology-neutral standard will ensure that patent incentives sweep to advance the broadest range of means for achieving increased practical utility and public benefit.

### *C. Finding an Invention: Standards in Past Caselaw*

Several bodies of case law have considered the minimum features of a patentable invention. The presence—or absence—of such an invention has figured in a number of types of patent law controversies, including cases turning on the minimum practical impacts of inventions, the timing of inventions, and elements of inventions (where the contributions of multiple parties to invention elements were disputed). These three bodies of case law—revolving around the utility of inventions, the timing of inventions, and the component elements of inventions—point to a workable definition of the minimum features of an invention for patent law purposes. This subsection summarizes these three key bodies of patent case law.

#### *1. Minimum Invention Utility*

Numerous judicial analyses have addressed the minimum practical impacts needed in patentable inventions.<sup>121</sup> Two types of utility considerations have received considerable attention: the type of practical impact needed in an invention and the timing and clarity of the impact.<sup>122</sup>

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120. See *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 63 (1998); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150–51 (1989).

121. For an overview of past judicial analyses of required utility in patentable inventions, see Nathan Machin, *Prospective Utility: A New Interpretation of the Utility Requirement of Section 101 of the Patent Act*, 87 CALIF. L. REV. 421, 426–36 (1999).

122. See *id.* at 428, 439.

*A. Broad Types of Utility are Acceptable*

While concerns were at one time raised about the domains of utility necessary in a patentable advance—and particularly whether the net utility achieved via new living items was sufficient<sup>123</sup>—judicial analyses eventually clarified that the Patent Act and patent incentives were not limited to particular types of utility. Rather, the Supreme Court reasoned that Congress’s lack of specification in the Patent Act of types of utility to be advanced by patent rights and rewards was indication that a broad view of acceptable utility was intended.<sup>124</sup> Patent laws are aimed at encouraging explorations of imperfectly understood domains to find new tools.<sup>125</sup> Much of the logic behind incentivizing such explorations applies regardless of the area of knowledge being advanced so long as the public gains a useful tool as the result. The Supreme Court has embraced the merit of patent-influenced explorations and incentives across diverse technologies and related practical benefits to the public.

The Supreme Court articulated its views on the desirability of a technologically diverse patent system—and the correspondingly broad patentability of inventions providing diverse types of utility—in *Diamond v. Chakrabarty*.<sup>126</sup> In *Chakrabarty*, the Court held that biotechnology advances (including new living things) can be patented.<sup>127</sup> While discussing whether a newly engineered bacteria had the minimum features needed in a patentable invention, the Court described and applied generally-stated criteria for identifying patentable subject matter. The Court specified that an invention must have features that distinguish the invention from its naturally occurring counterparts and have identifiable usefulness. The Court reasoned that:

respondent’s micro-organism plainly qualifies as patentable subject matter. His claim is not to a hitherto unknown natural phenomenon, but to a nonnaturally occurring manufacture or

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123. See *Diamond v. Chakrabarty*, 447 U.S. 303, 317–18 (1980) (noting the argument that the net lack of utility in living organism advances should put such advances outside patentable subject matter but rejecting this approach).

124. See *id.* at 308–09 (concluding that by choosing expansive terms for defining patentable subject matter in the present Patent Act, Congress intended to apply patent rights and incentives to broad ranges of new technologies, thereby giving liberal encouragement to ingenuity concerning practically useful items and processes).

125. See generally Gruner, *In Search of the Undiscovered Country*, *supra* note 7.

126. 447 U.S. 303 (1980).

127. See *id.* at 310.

composition of matter—a product of human ingenuity ‘having a distinctive name, character [and] use.’<sup>128</sup>

Accordingly, the Court concluded that the contested bacteria constituted an invention that was patentable (provided that other patent law requirements were met).<sup>129</sup>

In the quoted passage, the Court signaled its test for an invention under patent laws (articulating the test as it applied to the invention at hand). Restating the test in general language divorced from the particular invention at issue in *Chakrabarty*, a design for an item or practice is an invention for patent law purposes if the design is 1) man-made (that is, a nonnaturally occurring product of human ingenuity) with 2) a distinctive name, 3) a distinctive character, and 4) a distinctive use. An artificial (that is man-made) item with a separate form and use is a practical tool with social value in use. Such a transferable tool satisfies the quid pro quo demanded under patent law—it supplies a transferable new tool to society in exchange for patent rights.

What *Chakrabarty* did not say (despite the involvement of bioengineered life forms as a controversial means of providing utility in the invention under challenge) was that there were any limitations (short of specific legal bans such as prohibitions on certain illegal drugs) on the types of utility (or mechanisms for providing utility) that the patent laws were intended to promote. Utility of practical interest to the public was sufficient without regard to why or where the public found an invention valuable.

#### *B. Utility Must be Present and Clear*

One question left unanswered in *Chakrabarty* was the clarity of present benefit that must be conveyed to the public by an advance in order for the advance to constitute an invention. This issue was later addressed in *Brenner v. Manson*.<sup>130</sup> *Manson* involved patent claims to a new process for making certain chemical compounds.<sup>131</sup> The case turned on whether a new process that produced an identifiable compound had sufficient utility to qualify as an invention under patent laws even though, at the time a patent was sought for the process, there was no known, beneficial use for the resulting compound.<sup>132</sup> The

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128. *Id.* (quoting *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887)).

129. *See Chakrabarty*, 447 U.S. at 310.

130. 383 U.S. 519, 534–35 (1966).

131. *See id.* at 520.

132. *See id.* at 520, 535.

patent applicant asserted (and successfully convinced the Court of Customs and Patent Appeals) that new process produced sufficient beneficial results because knowledge about the process contributed to the body of potentially useful knowledge in the chemistry field.<sup>133</sup> The patent applicant's disclosure of the process arguably contributed beneficial knowledge in two ways—first, by confirming that the process reliably produced a specific chemical compound (thereby cutting off the need for further research to rediscover the process or to confirm that it worked) and, second, by providing a new tool for producing the resulting chemical and easing the course of research in which this chemical might be helpful in the future.<sup>134</sup>

The Supreme Court did not see these as sufficient practical benefits to support a patentable invention. The Court described its concerns and the minimum practical benefits that an invention must provide as follows:

[A] process patent in the chemical field, [for a process] which has not been developed and pointed to the degree of specific utility, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute. Until the process claim has been reduced to production of a product shown to be useful, the metes and bounds of that monopoly are not capable of precise delineation. It may engross a vast, unknown, and perhaps unknowable area. Such a patent may confer power to block off whole areas of scientific development, without compensating benefit to the public. The basic *quid pro quo* contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility. Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.<sup>135</sup>

The Court's standard demanded that an advance provide "specific benefit" to the public currently to constitute an invention. An advance must have practical benefits now and those benefits must be more than providing an intellectual advantage in present or future mental processes. Both the timing and type of practical advantages addressed in *Manson* are important.

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133. *See id.* at 521–22.

134. *See id.* at 532.

135. *Id.* at 534–35 (footnote omitted).

Present practical benefits are important in an invention for patent law purposes because without them patent rights (and associated restrictions on a patented item) might be given without the public receiving any practical benefits from a patented advance. The quid-pro-quo of patent rights exchanged for enhanced practical benefits to the public would be lacking. An invention (as understood and described by its inventor) must have identifiable practical benefits to its users beyond just some intellectual advantages. This distinction provides a clear ground for distinguishing mere abstract ideas (which, at best, confer mere intellectual advantages to users) from inventions (which must operate in practical contexts and convey benefits to users in those contexts).

Further portions of the Court's analysis in *Manson* clarified the type of "specific benefit" that a patentable invention must have.<sup>136</sup> The Court noted that its ruling would force would-be inventors hoping for patents to go beyond just identifying intellectually satisfying or research-enhancing results.<sup>137</sup> Rather, to constitute an invention that can qualify for a patent, the Court specified that an advance must have sufficient apparent value to figure in commercial processes rather than just contributing to intellectual discourse.<sup>138</sup> As the Court put it:

a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion. '(A) patent system must be related to the world of commerce rather than to the realm of philosophy.'<sup>139</sup>

Thus, according to the Court in *Manson*, an invention must include features that have commercial potential—that is, the invention must operate to produce results that are at least contenders for commercial interest—usually as indicated by commercial use or transfers. This suggests the need for concrete results with identifiable and transferable value. This does not mean that an invention must succeed in the marketplace—later testing in commerce will determine if this is the case. Rather, a patentable invention must produce valuable results that are defined with sufficient particularity to be considered in commercial processes and that have the potential for transfer to users via trade in commerce. This suggests a need for both concretely identifiable results from using an invention and a sufficient clear

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136. *Id.* at 536.

137. *See id.* at 531–32.

138. *See id.* at 532.

139. *Id.* (quoting *In re Ruschig*, 343 F.2d 965, 970 (C.C.P.A. 1965)).

description of those results that a trading party would be willing to set a price in trade for access to the results.

## 2. *Invention Completion*

In disputes among competing inventors over who should gain a patent, patent standards in force until 2013 made the timing of the inventors' respective dates of invention critically important.<sup>140</sup> Judicial analyses accordingly considered the steps needed to complete inventions since completion would determine a party's date of invention and potentially resolve an invention timing dispute. In describing the steps needed to complete an invention, courts sometimes set out the minimum knowledge that an inventor needed in hand to complete an invention. In effect, these accounts of the minimum knowledge needed to complete an invention were descriptions of the minimum features of an invention.

Judicial analyses of invention timing divide invention processes into two key steps: invention conception and invention reduction to practice.<sup>141</sup> This framework mirrors closely the evaluation of inventions by engineering specialists, who have seen inventions as proceeding in two stages: first, the imagination of a design for a practical item or process (often with the purpose of fixing or improving on prior items or processes for the same purpose) and, second, real world testing of items or processes based on the imagined design.<sup>142</sup>

Conception of a patentable invention requires the assembly by an inventor of a mental concept or image of an advance.<sup>143</sup> An inventor

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140. In most situations involving competing inventors who produced the same advance, only the party who could establish the earliest date of invention was entitled to a patent under the "first-to-invent" standards applicable before 2013. *See Interference Procedure*, DONALD CHISUM, 3A CHISUM ON PATENTS § 10.09 (2021). These standards were superseded in 2013 by "first-to-file" standards that generally give priority to a patent applicant who is the first to apply for a patent on an invention rather than to the party who is the first to invent the advance. *See Priority under the America Invents Act of 2011*, DONALD CHISUM, 3A CHISUM ON PATENTS § 10.10 (2021). *See also First-to-File vs. First-to-Invent: Who Really Benefits from Changing the U.S. Patent System?*, GEN. PAT. CORP. (Oct. 2007), <https://generalpatent.com/articles/first-file-vs-first-invent.html> (describing some of the implications of the change in the United States patent system from a first-to-invent system to a first-to-file system).

141. *See, e.g., Sewall v. Walters*, 21 F.3d 411, 415 (Fed. Cir. 1994); *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986).

142. *See generally* Richard S. Gruner, *Imagination, Invention, and Patent Incentives: The Psychology of Patent Law*, 2017 UNIV. ILL. J.L. TECH. & POL'Y 375 (2017).

143. *See Sewall*, 21 F.3d at 415.

must imagine all of the elements needed for the invention to function. Conception is complete upon “the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is [thereafter] to be applied in practice.”<sup>144</sup> The conception must include knowledge of all invention features over which patent rights are claimed.<sup>145</sup> What is not required at the conception stage, however, is knowledge confirming that a given design will work.<sup>146</sup> This further knowledge can be added through a reduction to practice of the new invention (described more completely below).

For purposes of patent law, a “[c]onception is complete . . . when the idea is so clearly defined in the inventor’s mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.”<sup>147</sup> An idea is sufficiently definite and permanent to reflect a patentable invention “when the inventor has a specific, settled idea, a particular solution to the problem at hand, not just a general goal or research plan he hopes to pursue.”<sup>148</sup>

Two aspects of this definition may be particularly important in distinguishing inventions from abstract ideas. The conception of an invention must include “particular” elements that a person of average skill in the relevant field of engineering or science could easily implement in a working device or process. In addition, the implementation must provide a solution to the “problem at hand,” implying that it must offer some practical value to users as designed (rather than providing benefit only with further research or by adding further implementing details completed in the future).

Because a conception of an invention is a mental act that may be remembered inaccurately or falsely described in later controversies where the conception is legally significant, courts have required substantial corroborating evidence before finding the completion of an

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144. *Hybritech*, 802 F.2d at 1376 (quoting 1 ROBINSON ON PATENTS 532 (1890)).

145. See *Coleman v. Dines*, 754 F.2d 353, 359 (Fed.Cir. 1985).

146. See *Applegate v. Scherer*, 332 F.2d 571, 573–74 (C.C.P.A. 1964).

147. *Burroughs Wellcome Co. v. Barr Laboratories, Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994); see also *Sewall v. Walters*, 21 F.3d 411, 415 (Fed.Cir. 1994).

148. *Burroughs Wellcome Co.*, 40 F.3d at 1228; see also *Fiers v. Revel*, 984 F.2d 1164, 1169 (Fed.Cir. 1993); *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1206 (Fed.Cir. 1991) (no conception of chemical compound based solely on its biological activity).



invention.<sup>149</sup> Courts' descriptions of the necessary corroborative evidence provide further insights into the minimum features of an invention. Typically, courts required that completion of the conception of an invention be corroborated by a contemporaneous disclosure by the inventor of information and details sufficient to enable a party skilled in the art other than the inventor to make the conceived invention.<sup>150</sup> Such a disclosure would confirm both when the invention design was made by the inventor (since it must have been made no later than the disclosure) and the completeness of the design as of the date of disclosure (which could be gauged from the content of the disclosure). As noted by the Court of Appeals for the Federal Circuit:

The conception analysis necessarily turns on the inventor's ability to describe his invention with particularity. Until he can do so, he cannot prove possession of the complete mental picture of the invention. These rules ensure that patent rights attach only when an idea is so far developed that the inventor can point to a definite, particular invention.<sup>151</sup>

The second stage of the inventive specification process—the reduction to practice—brings an imagined invention design into the real world. A reduction to practice involves the physical realization of an invention, as shown by the first working example of a new item incorporating the invention or by the first successful completion of a new procedure constituting the invention.<sup>152</sup> A reduction to practice typically involves two types of refinement to an invention design: 1) developing implementation features needed to make the production and use of a new invention practical and 2) testing that serves as a check on whether items or processes conforming to an imagined design will work at all.<sup>153</sup>

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149. In legal controversies raised under now superseded patent laws, the timing of an invention could determine an entire case outcome and shift litigation results by millions of dollars. Under these earlier standards, a prior invention by another party could invalidate patent rights granted to a later inventor. *See* CHISUM, *supra* note 140, at § 10.09. Hence, patent holders had strong motivations to testify to early invention dates and defendants had strong motivations to have competing inventors testify to their own early invention dates in order to invalidate patents threatening the defendants. False or misremembered testimony about dates of invention conceptions could therefore have devastating impacts on patent rights and the outcomes of patent litigation.

150. *See* *Coleman v. Dines*, 754 F.2d 353, 359 (Fed. Cir. 1985) (quoting *Field v. Knowles*, 183 F.2d 593, 600 (C.C.P.A. 1950)).

151. *Burroughs Wellcome Co.*, 40 F.3d at 1228.

152. *See id.* at 1229.

153. *See id.*

In the typical invention sequence (in which conception of an invention is followed by a reduction to practice), the effort to reduce a conceived design to practice serves as a valuable real world check on the imagination processes fueling invention processes.<sup>154</sup> The assembly of a working example of an invention forces an inventor to translate his or her imagined image of a design into real elements producing real results. The inventor must make practical choices about features of a design that add up to a working example having at least minimal functionality.<sup>155</sup> This process confirms the sufficiency and completeness of the inventor's earlier imagined design. It also provides at least one real world example illustrating how to implement the imagined invention, an example that may provide useful information in describing and transferring the invention to other parties.

### 3. *Invention Contributions*

Cases turning on invention contributions by multiple parties claiming to be co-inventors offer yet another perspective on the minimum features of an invention. For patent law purposes, inventions made by two or more individuals are termed "joint inventions" and the contributors are "joint inventors".<sup>156</sup> To be a joint inventor and share in resulting patent rights, a party must contribute to the definition of an invention. Judicial analyses of joint inventions have consequently forced courts to consider the minimum features of an invention coupled with assessments of who has contributed to those minimum features.

These analyses have confirmed that an invention is present where one or more parties link the operation of an advance to the achievement of a solution to a practical problem. Planned collaboration in achieving a problem solution can lead to an invention produced by multiple parties. Each of the multiple parties must

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154. Rarely, a working invention will be accidentally assembled and then later studied and understood. In this situation, the normal sequence of invention is reversed: an initial reduction to practice is followed by an invention conception when the full set of invention elements are identified and their workings understood.

155. The functionality needed in initial versions of an invention is very small. So long as some functional results with practical benefits are confirmed, the reduction to practice of an invention will be complete. It is assumed that an inventor who receives a patent—or successors to the inventor's interest—will continue to perfect the patented invention under the pressures of normal commercial forces promoting product improvements to maximize product sales and associated profits. *See Yasuko Kawai v. Metlesics*, 480 F.2d 880, 886 (C.C.P.A. 1973).

156. *See, e.g., Monsanto Co. v. Kamp*, 269 F. Supp. 818, 824 (D.D.C. 1967).

contribute to the definition of invention elements which, when operating together, produce results that solve a practical problem. As described by one court:

A joint invention is the product of collaboration of the inventive endeavors of two or more persons working toward the same end and producing an invention by their aggregate efforts. To constitute a joint invention, it is necessary that each of the inventors work on the same subject matter and make some contribution to the inventive thought and to the final result. Each needs to perform but a part of the task if an invention emerges from all of the steps taken together. It is not necessary that the entire inventive concept should occur to each of the joint inventors, or that the two should physically work on the project together. One may take a step at one time, the other an approach at different times. One may do more of the experimental work while the other makes suggestions from time to time. The fact that each of the inventors plays a different role and that the contribution of one may not be as great as that of another, does not detract from the fact that the invention is joint, if each makes some original contribution, though partial, to the final solution of the problem.<sup>157</sup>

This discussion of joint inventions reaffirms the definition of an invention reached by courts considering invention timing—that is, an invention is a design (perhaps developed by multiple parties acting in concert) linking the operation of specific invention features to concrete and practically significant results.

Parties making contributions to other aspects of research success are not making contributions to an invention, meaning that they are excluded from the ranks of co-inventors. A number of additional cases have identified types of contributions that did not add to an invention and that therefore did not make the contributing party a joint inventor. These cases provide additional guidance about the outer boundaries of inventions and the sorts of contributions that fall outside these boundaries. Non-inventive contributions to the development of inventions have included:

- 1) suggesting a desired end or result, with no description of means to achieve it,<sup>158</sup>

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157. *Id.*

158. See *Ethicon, Inc. v. U.S. Surgical Corp.*, 937 F. Supp. 1015, 1035 (D.Conn. 1996), *aff'd*, 135 F.3d 1456 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 923 (1998); *Univ. of Ca. v. Synbiotics Corp.*, 1993 U.S. Dist. LEXIS 20222, at \*13 (S.D.

- 2) providing information on design elements with no knowledge of the ultimate design project;<sup>159</sup> and
- 3) actions undertaken in ongoing collaboration or interaction regarding similar projects where there is no evidence of a joint contribution to the particular design effort leading to a patented invention.<sup>160</sup>

These cases confirm that an invention must specify the means of accomplishing a practical end. Parties who contribute invention design elements as part of a coordinated effort to develop this means-end combination are joint inventors; parties who merely add helpful information or aid testing of designs already formulated by others are not joint inventors.

*D. Distilling a General Standard from the Caselaw: Follow the Transferable Utility*

*1. Summarizing Themes from the Caselaw*

Several themes expressed in the caselaw summarized to this point add up to define a general standard for an invention under the Patent Act. An invention must have the following features:

- 1) Design elements connected to a functional result;
- 2) A result that provides transferable utility of measurable value to users of an advance; and
- 3) Specificity concerning the advance's internal elements sufficient to distinguish it from prior technologies and facilitate analysis of its novelty and value.

Some observations will make the content and impact of this standard clearer. First, the essence of an invention is the human design of a new tool for achieving a practical solution to a user problem. Just as a new design for a garden hoe may be an invention, so too a new design for software aiding tax return preparation may be an invention. Both are practical tools for advancing a valuable task and for solving an individual's problems in accomplishing that task. The nature of the

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Calif. 1993); *S.C. Johnson & Son, Inc. v. Carter-Wallace, Inc.*, 614 F. Supp. 1278, 1304 (S.D.N.Y. 1985), *aff'd in part, vacated in part, and remanded*, 781 F.2d 198 (Fed. Cir. 1986).

159. See *Ethicon*, 135 F.3d at 1460.

160. See *Trovan, Ltd. v. Sokymat Sa*, 299 F.3d 1292, 1303-04 (Fed. Cir. 2002).

task or the user is not important; an invention may address any task and aid any user.<sup>161</sup>

Second, the range of inventions is technology-neutral—that is, the presence of an invention does not turn on the means by which practical benefit is achieved for users via a new advance. Software-based advances, new life forms, and other types of new designs yet to come can qualify if they provide practically useful utility to users. The patent system—and its benefits to society from newly spurred advances—should not be restricted to any innovation approach or domain. Rather, the maximum range of approaches is encouraged, with the likely result of generating diverse innovation approaches and heightened competition among different approaches to win out in the marketplace as the best means for solving a particular practical problem.

Third, while patent rights enforcement is not the primary concern in defining patentable subject matter (the range of technology design approaches that will be incentivized being the primary concern in delineating patentable subject matter), an invention standard conforming to the criteria specified in prior caselaw will tend to produce policeable patents. A party seeking a patent will be compelled to articulate the features of an invention and these features will include specific internal elements producing a concrete result of assessable value. These necessary components in a patentable advance will help in later enforcement actions to identify when a patented advance is or is not present in an asserted infringer's conduct. This should in turn make infringement analyses (by both potential infringers and fact finders in patent cases) relatively focused and predictable.

## *2. Back to the Future—Once Again, Judge Rich was Right*

The patentable subject matter standard derived from the caselaw on invention and summarized in the prior subsection is not really new. Rather, it is a modest restatement of a test for patentable subject matter articulated by long-time patent law expert and Federal Circuit Judge

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161. The range of invention users benefitted by new inventions incentivized by patents ranges from the largest commercial corporations to private individuals working in their homes. The definition of an invention should not distinguish between the needs of these diverse types of innovation users as new technology can provide valuable gains and avoid wasted resources across diverse types of users and related activities.

Giles Rich in the last years of his career in shaping patent law.<sup>162</sup> Rich was the author of several Federal Circuit opinions defining the minimum features of patentable subject matter.<sup>163</sup> While these opinions were later disregarded by the Supreme Court with remarkably little analysis,<sup>164</sup> Judge Rich's opinions represent the most detailed thinking of any court about what is needed in patentable subject matter. What was lacking—perhaps due to Judge Rich's untimely death before he could write more extensively on the topic—was an explanation of why the test he articulated was desirable. This article provides some of the explanatory reasoning that more extensive attention by Judge Rich might have presented.

#### A. *The Opinions*

In three key Federal Circuit court opinions—two written by Judge Rich and a third interpreting Judge Rich's patentable subject matter standard—Judge Rich and his interpreters articulated and explained a generally applicable test for patentable subject matter.<sup>165</sup> This subsection summarizes the three key opinions illuminating Judge Rich's patentable subject matter standard.

##### i. *In re Alappat*

In *In re Alappat* the Federal Circuit court (speaking through Judge Rich) applied a new test for patentable subject matter.<sup>166</sup>

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162. Judge Rich was one of the seminal figures in patent law in the twentieth century. Writing of Judge Rich upon the occasion of the judge's death, then Acting Commissioner of Patents and Trademarks Q. Todd Dickinson remarked that "Judge Rich was the single most important figure in twentieth century intellectual property law . . . Judge Rich leaves a rich legacy in his voluminous body of judicial opinions and in the 1952 Patent Act which he helped to draft. We have lost the dean of the twentieth century patent system." Press Release #99-14, United States Patent and Trademark Office, Patent & Trademark Office Mourns Death of Judge Giles S. Rich (June 10, 1999), <https://web.archive.org/web/20201016162531/https://www.uspto.gov/about-us/news-updates/patent-and-trademark-office-mourns-death-judge-giles-s-rich>.

163. See *In re Alappat*, 33 F.3d 1526, 1544 (Fed. Cir. 1994) (en banc); *State St. Bank & Trust Co. v. Signature Fin. Grp., Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999).

164. See *Bilski v. Kappos*, 561 U.S. 593, 613 (2010) (Supreme Court affirming holding *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008), which disclaimed the tests established in *Alappat*, 33 F.3d 1526, and *State St. Bank & Trust Co.*, 149 F.3d 1368).

165. See *Alappat*, 33 F.3d at 1544; *State St. Bank & Trust Co.*, 149 F.3d at 1373; *AT&T Corp. v. Excel Comms., Inc.*, 172 F.3d 1352, 1361 (Fed. Cir. 1999), *cert. denied*, 528 U.S. 946 (1999) (first citing *Alappat*, 33 F.3d 1526; then citing *State St. Bank & Trust Co.*, 149 F.3d 1368).

166. See *Alappat*, 33 F.3d at 1544.

*Alappat* involved a computer system for controlling visual outputs on a cathode ray tube screen.<sup>167</sup> The computer system evaluated electronic signals and determined how to best display the signals on the screen.<sup>168</sup> The only new components in the computer system were new information processing sequences implemented via a computer program.<sup>169</sup> The Federal Circuit court found this computer system to be patentable subject matter because the system was “a specific machine [that produces] a useful, concrete, and tangible result.”<sup>170</sup> In short, patentable subject matter (at least in the context of an advance involving a machine) required four minimum features: 1) a specific advance in machine design producing a (2) useful, (3) concrete, and (4) tangible result.

ii. *State Street Bank & Trust Co. v. Signature Finance Group, Inc.*

In *State Street Bank & Trust Co. v. Signature Finance Group, Inc.*,<sup>171</sup> Judge Rich extended the *Alappat* standard to evaluate patentable subject matter in a business method.<sup>172</sup> *State Street* involved a business method calling for the central investment of funds from multiple financial institutions, with frequent status reports made to the contributing institutions (a so called “hub and spoke” system of investment and reporting).<sup>173</sup> The court described the data processing system in the case as one that offered “the advantageous combination of economies of scale in administering investments coupled with the tax advantages of a partnership.”<sup>174</sup> The court found that the business method under analysis met the *Alappat* test because the information being processed had practical consequences in managing funds and increasing profits.<sup>175</sup> The court noted that business methods and their advantages to companies and other business concerns should be treated no differently for patent law purposes than other practically useful advances.<sup>176</sup> In short, practical advantage from an advance

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167. *See id.* at 1537.

168. *See id.*

169. *See id.* at 1544–45.

170. *Id.* at 1544.

171. 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999).

172. *See id.* at 1377 (citing 35 U.S. § 101).

173. *See id.* at 1370.

174. *Id.* at 1370.

175. *See id.* at 1373.

176. *See id.* at 1375.

supported a finding of patentable subject matter regardless of the nature or context of the advantage.

*iii. AT&T Corp. v. Excel Communications, Inc.*

In *AT&T Corp. v. Excel Communications, Inc.*,<sup>177</sup> the Federal Circuit (in an opinion authored by Circuit Judge S. Jay Plager) further analyzed the scope of patentable subject matter in information processing advances. The advance in dispute involved a new electronic record keeping method for recording information on long distance calls.<sup>178</sup> The court found this method to constitute patentable subject matter because the method had practical significance in carrying out specialized phone usage billing systems affecting the amounts charged for long distance calls.<sup>179</sup> In short, commercial utility was once again sufficient to bring this advance within the range of patentable subject matter regardless of the intangible information processing means used to gain the utility.

Judge Plager's opinion in *AT&T* went on to explain the background of the *Alappat* standard and how that standard fit within the Supreme Court's prior caselaw on patentable subject matter:

In *State Street*, this court, following the Supreme Court's guidance in [*Diamond v. Diehr*, 450 U.S. 175 (1981)], concluded that "[u]npatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not 'useful.' . . . [T]o be patentable an algorithm must be applied in a 'useful' way." In [*State Street*], the claimed data processing system for implementing a financial management structure satisfied the § 101 inquiry because it constituted a "practical application of a mathematical algorithm . . . [by] produc[ing] 'a useful, concrete and tangible result.'"

The *State Street* formulation, that a mathematical algorithm may be an integral part of patentable subject matter such as a machine or process if the claimed invention as a whole is applied in a "useful" manner, follows the approach taken by this court en banc in *In re Alappat*[]. In *Alappat*, we set out our understanding of the Supreme Court's limitations on the patentability of mathematical subject matter and concluded that:

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177. 172 F.3d 1352 (Fed. Cir. 1999), *cert. denied*, 528 U.S. 946 (1999).

178. *Id.* at 1353.

179. *Id.* at 1358.



[The Court] never intended to create an overly broad, fourth category of [mathematical] subject matter excluded from § 101. Rather, at the core of the Court’s analysis . . . lies an attempt by the Court to explain a rather straightforward concept, namely, that certain types of mathematical subject matter, *standing alone*, represent nothing more than *abstract ideas until reduced to some type of practical application*, and thus that subject matter is not, in and of itself, entitled to patent protection.

Thus, the *Alappat* inquiry simply requires an examination of the contested claims to see if the claimed subject matter as a whole is a disembodied mathematical concept representing nothing more than a “law of nature” or an “abstract idea,” or if the mathematical concept has been reduced to some practical application rendering it “useful.” In *Alappat*, we held that more than an abstract idea was claimed because the claimed invention as a whole was directed toward forming a specific machine that produced the useful, concrete, and tangible result of a smooth waveform display.<sup>180</sup>

This last passage confirms that the *Alappat* test was articulated to serve as a generally applicable standard for distinguishing patentable inventions (involving patentable subject matter) from unpatentable advances such as newly formulated abstract ideas or newly discovered natural phenomena or laws of nature. Put another way, the features emphasized in the *Alappat* standard are the elements needed to transform an unpatentable abstract idea, natural phenomena, or law of nature into a patentable invention.

#### *B. Augmenting Judge Rich’s Test*

Judge Rich’s test for patentable subject matter was never fully explained by its author who died soon after the *AT&T* opinion was issued by the Federal Circuit Court.<sup>181</sup> However, the *Alappat* test, as applied and explained in *State Street* and *AT&T*, charts the needed path out of the *Alice* swamp, provided that the *Alappat* standard is understood and interpreted as a test for transferable utility in an advance submitted for patenting. The elements in an advance

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180. *Id.* at 1357 (emphasis in original) (quoting *in re Alappat*, 33 F.3d 1526, 1543 (Fed. Cir. 1994)).

181. The *AT&T* opinion was issued on April 14, 1999 and Judge Rich passed away on June 9, 1999. *See id.* at 1352; Bart Barnes, *Giles S. Rich Dies at 95*, WASH. POST (Jun. 11, 1999), <https://www.washingtonpost.com/archive/local/1999/06/11/giles-s-rich-dies-at-95/cef021c8-cddd-40f6-b647-ad37785e131c/>.

demanded by the *Alappat* test will (if properly understood and applied) ensure that a patentable advance has transferable utility. This subsection describes how the proper interpretation of the *Alappat* test will ensure that advances found to have patentable subject matter possess the type of transferable utility required under the Patent Act.

The elements of the *Alappat* test for patentable subject matter ensure that patentable inventions involve transferable utility in the following ways:

1) *A specific advance*—Satisfying this element ensures three important aspects of transferable utility. First, specifying the internal elements of an advance will clarify the features (if any) that distinguish the advance from earlier technology used to achieve similar results. This will help ensure that the advance is evaluated on its own terms, thereby facilitating development, production, and market processes that will selectively assess, enhance, and distribute new technologies to the extent that they are superior to alternatives. Specification of the essential, functionally-important elements of an advance will support later commercial processes that evaluate and distribute successful technologies to large numbers of users. Second, specifying the functionally important features of an advance ensures that incompletely developed advances (lacking some element needed to function and produce results) do not qualify for patents. This will screen out both advances that are incompletely conceived (and submitted for patenting before all necessary functional features are in hand) as well as advances based on false science and inherently dysfunctional designs (such as perpetual motion machines) that cannot function no matter how much further development is completed. Third, specifying the functionally important features of an advance will define the scope of the invention covered by a patent application and the corresponding scope of patent rights being sought, thereby aiding and clarifying later patent enforcement evaluations turning on whether or not the same invention (involving the same or similar elements) has been made, used, sold, or imported.<sup>182</sup>

2) *Producing a useful result*—Satisfaction of this requirement will ensure that an advance is not just a partial research result with potential future benefits (such as the advance rejected as unpatentable in *Manson*) but rather an advance with immediate, practical consequences. Patent rights will be granted only for advances that add

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182. The making, using, selling, or importation of a patented invention without the permission of the relevant patent holder are forms of patent infringement supporting recoveries of lost royalties and profits. *See* 35 U.S.C. §§ 271, 284.

to users' tools for solving practical problems and advancing practical tasks.

3) *Producing a concrete result*—Just as the functionally important elements of an advance should be specified to ensure later understanding and evaluation of the advance, so too should the results achieved by the advance be clearly understood and stated in a patent application before patentable subject matter is recognized. The evaluation of the net merit of an advance—and the relative value of the advance in comparison with other means for achieving similar results—can only be fully evaluated by both producers and users of the advance if the combination of means and results is concretely defined. The net value of an advance will turn on both the results achieved and the cost of the means used to produce the results. The net gain from the advance follows from the combination of these qualities. Only by defining and evaluating both the operative features and the results associated with a new advance can the transferable value of the advance be assessed by users and in market transactions benefitting potential users. Hence, the definition of results from advances in a manner that can be conveyed to potential users for evaluation is a key feature of ensuring that patentable advances incorporate transferable utility.

4) *Producing a tangible result*—While many useful results to users of an advance will have equal value across numerous users, results that merely structure or enhance mental processes (often referred to in patent analyses as enhancements in “mental steps”) will achieve such varying effects in different individuals that these advances will lack the type of predictable and transferable utility required under patent laws.<sup>183</sup> Mental steps enhancements will be consequently omitted from patentable subject matter by the requirement a patentable advance must have results in physical

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183. Advances that are no more than processes for conducting mental analyses or that entail no more than mental steps in a specified sequence have consistently been excluded from patentable subject matter under what is sometimes referred to as the “mental steps doctrine.” Under this doctrine, processes that can be performed within the mind of a human being, perhaps with the aid of a pencil and paper, are presumed to be patent-ineligible. Ben Hattenbach & Gavin Snyder, *Rethinking the Mental Steps Doctrine and Other Barriers to Patentability of Artificial Intelligence*, 19 COLUM. SCI. & TECH. L. REV. 313, 317–18 (2018). The mental steps doctrine and the advances it addresses carve out a specifically targeted exception to patentable subject matter aimed at separating patent rights and restrictions from any impact or limitation on thinking, ideas and their transmission, or beliefs. See Kevin Emerson Collins, *Propertizing Thought*, 60 SMU L. REV. 317, 354–55 (2007); Miriam Bitton, *Patenting Abstractions*, 15 N.C. J. L. & TECH. 153, 168 (2014).

settings. Several means of producing “tangible results” are possible, including operating physical devices, producing physical consequences, or interpreting physical conditions. All of these types of results have been found sufficient to support patentable inventions.<sup>184</sup> Beyond ensuring that regularly achieved and transferable utility are present in all patentable advances, the limitation of patentable subject matter to advances producing tangible results (and the corresponding exclusion of advances limited to purely mental processes and results) ensures that patent rights do not extend to (or in any way limit) mental processes, attitudes, or speech.

Based on these considerations (and interpreted in the manner suggested above to ensure that patentable subject matters have transferable utility), the *Alappat* standard provides a workable and valuable patentable subject matter standard. This standard implements the will of Congress that the Patent Act sweep broadly to enhance all areas of technology development and deliver the maximum range of useful advances to society. Recognition that patentable subject matter encompasses any 1) specific advance producing a (2) useful, (3) concrete, (4) tangible result provides the way out of the *Alice* swamp.

#### *E. Policy Considerations Surrounding the Standard*

Revitalizing the *Alappat* standard will have a number of important policy consequences for patent law and innovation. This subsection considers some of these impacts.

##### *1. Judicial Deference to Congress’ Authorization of Broadly Inclusive Patenting*

The proposed standard returns Congress to the lead in defining patentable subject matter standards by severely shrinking the scope of judicially developed exceptions to patentability.<sup>185</sup> Congress’

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184. See, e.g., *Diamond v. Diehr*, 450 U.S. 175, 185–87 (1981) (patentable subject matter in means for operating a physical rubber mold); *Diamond v. Chakrabarty*, 447 U.S. 303, 308–10 (1980) (patentable subject matter in new bacteria capable of producing physical consequences in cleaning up oil spills); *Arrhythmia Rsch. Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1059 (Fed. Cir. 1992) (patentable subject matter in advance for analyzing heartbeat data to interpret and characterize heart conditions).

185. The Supreme Court has already recognized Congress’s broad discretion in specifying the scope of intellectual property rights granted under the Patent and Copyright Clause of the Constitution. *Eldred v. Ashcroft*, 537 U.S. 186, 222 (2003) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 6 (1966)) (in interpreting Congress’s powers under portions of the Patent and Copyright clause of the Constitution dealing

patentability standard in the current Patent Act—specifying that patents extend to new and useful inventions in five listed categories—signals no lines between types of practically useful innovations qualifying as patentable subject matter.<sup>186</sup> Rather, as the Supreme Court recognized in *Diamond v. Chakrabarty*,<sup>187</sup> Congress indicated in the Patent Act that the innovation incentives of patents should sweep broadly, extending to all new machines, manufactures, compositions of matter, or processes that are non-naturally occurring products of human ingenuity, distinctly defined, and having a distinct use and result.<sup>188</sup> The relevant lines of innovation were not restricted, nor were the types of results that need to be achieved so long as they are of practical utility to users.<sup>189</sup> All advances are appropriate targets of patent incentives if transferable utility is created in a human designed advance capable of adding utility to the array of tools available to innovation users. Transferable utility—of any sort—is the touchstone of patentable subject matter as authorized by Congress.

This broad authorization violates no Constitutional limit on Congress' choice of extensive patentable subject matter. This type of Constitutional limit was rejected in *Chakrabarty* where the legitimacy of patents for new life forms was at issue.<sup>190</sup> The Court found there that advances in life forms were within both the extensive patentable subject matter provided for by Congress in the Patent Act and the enhancements in the “useful arts” that Congress was Constitutionally authorized to support in patent legislation.<sup>191</sup>

Courts seeking a path out of the *Alice* swamp should respect the broad sweep of the Patent Act, following the lead of the Supreme Court in *Chakrabarty*.<sup>192</sup> The range of incentives and limitations inherent in the patent system is a choice for Congress to make. It has made it, expressing support for broadly inclusive patentable subject

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with copyright laws, the Supreme Court observed that “[a]s we read the Framers’ instruction, the Copyright Clause empowers Congress to determine the intellectual property regimes that, overall, in that body’s judgment, will serve the ends of the Clause.”).

186. 35 U.S.C. § 101.

187. 447 U.S. 303 (1980).

188. *Id.* at 309–10 (quoting *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887)).

189. *Id.* at 310 (citing 35 U.S.C. § 101).

190. *Id.* at 309.

191. *Id.* at 307–10.

192. *Chakrabarty*, 447 U.S. at 309 (quoting S. REP. NO. 82-1979, at 5 (1952); H.R. REP. NO. 82-1923, at 6 (1952) as reprinted in 1952 U.S.C.C.A.N. 2394, 2399) (finding “Congress intended statutory subject matter to ‘include anything under the sun that is made by man’”).

matter.<sup>193</sup> Judicial deference should support this choice until Congress speaks again.

## 2. *Other Features of Patent Law Limit Excessive Patent Rights*

Recognition of broadly inclusive patentable subject matter does not mean a flood of patents. Other features of patent law preclude patents for old technologies<sup>194</sup> or advances that no more than obviously extend or modify past items.<sup>195</sup> Additional patent law standards ensure that patent rights are only granted where inventors provide sufficient disclosures to enable additional parties to make patented advances—thereby maintaining the quid-pro-quo of new access to patented technology in exchange for temporary patent rights covering a patented advance.<sup>196</sup> The path to a patent is a multi-hurdle journey and specifically-targeted patent law features filter out advances that are old, obvious from past knowledge, incompletely formulated, or incompletely revealed in patent application descriptions.

There are strong reasons to believe that these multiple patent law requirements are sufficient to police excessive patent rights and minimize the impacts of abusive patents (thereby avoiding the need for broad exceptions to patentability that bluntly prevent patenting of both wheat (valuable advances) and chaff (abusive patents)). These multiple requirements apply thrice over in patent processes: first, in the reviews of examiners serving as patent law specialists in the United States Patent and Trademark Office; second (frequently) in post-issuance administrative reviews of patent validity in the Patent Trial and Appeal Board (PTAB); and, third, in litigation as patents are attempted to be enforced against asserted infringers.<sup>197</sup> Patents covering old, obvious, incomplete, or ill-described advances generally will either not be issued or invalidated in these processes. These specific processes—each subject to extensive development through years of practice and review in extensive caselaw—represent well-tuned means to police and ferret out advances that should not qualify for patent rights.

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193. *Id.*

194. *See* 35 U.S.C. §§ 101, 102 (requiring that patentable advances incorporate new designs involving elements different than prior technologies).

195. *See* 35 U.S.C. § 103 (requiring that patentable advances incorporate features that are not just obvious changes to older designs).

196. *See* 35 U.S.C. § 112; U.S. Pat. and Trademark Off., *The Enablement Requirement*, MANUAL OF PATENT EXAMINATION PROCEDURE § 2164 (2020).

197. *See* 35 U.S.C. §§ 6, 131, 271, 311-319.

3. *Patentable Subject Matter is a Blunt Tool to Achieve a Narrow End*

Use of patentable subject matter standards to exclude occasionally unworthy advances from patenting represents use of a blunt club to achieve results better suited to a scalpel. It risks completely excluding categories of publicly valuable technology from the incentives of patent rights. If a type of new technology is deemed unpatentable subject matter, then even the most useful, non-obvious advance in that field will not be encouraged by patent rights.<sup>198</sup> Even if a particular advance excluded from patenting on subject matter grounds was not worthy of a patent—perhaps because it was a mere obvious extension of prior technologies—the next advance in the same field might be truly revolutionary and far from obvious. A ruling that advances with certain characteristics can never constitute patentable subject matter and never qualify for patent incentives risks devaluing and deemphasizing the entire range of innovation in that field. Individual advances with diverse types of practical value deserve the individualized review of narrowly focused tests of novelty, non-obviousness, and written description (the scalpel) rather than the blunt instrument of exclusion from patenting via patentable subject matter rejections (the club).

4. *Preemption of Broadly Important Advances is a Feature Not a Flaw*

Objections to broad patentability standards because they will lead to patent rights broadly limiting or “preempting” widely useful advances are misguided. Indeed, some new advances of sweeping importance in later technology development may be patented under the proposed standard. Patent rights for an advance with broad applicability in later technology designs and products may effectively “preempt” use of the patented advance in later designs and products (if created without the permission of the patent holder). It is likewise true that patent rights governing broadly reusable advances will limit subsequent use of the advances in broad contexts. However, this is the way large patent rewards for widely important advances should work—it is a feature not a flaw.

Highly important advances with broad implications for extensive reuse deserve large rewards. These rewards are implemented in the patent system by giving originators of important advances important

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198. See David O. Taylor, *Confusing Patent Eligibility*, 84 TENN. L. REV. 157, 162–63 (2016) [hereinafter Taylor, *Confusing Patent Eligibility*].

rights over the full range of reuses of their advances (for the limited term of their patent rights). The resulting rewards are self-scaling: patented advances with extensive reuse are highly valuable and produce extensive patent-induced returns, while patented advances with few if any uses generate few if any returns.

In thinking about the impacts of patent rewards and restrictions, one must not fall into the trap of assuming an advance exists and then arguing for minimal restrictions on the advance to spread the benefits of the advance to the maximum number of parties.<sup>199</sup> Rather, one must assume the advance does not exist (and is typically hard to develop and unlikely to exist) and then think about the optimal rewards promise to best incentivize pursuit of the advance. Under these conditions, large rewards for broadly reusable advances make sense. Big rewards should track (and incentivize realization of) big consequences.

Such self-scaled rewards not only match the deserts of parties who have produced widely useful advances (more impactful advances deserving more extensive rewards), but the promise of such scaled rewards serves valuable signaling and resource redirection purposes.<sup>200</sup> Big projects with big results have the promise of big rewards.<sup>201</sup> Presented with a choice of pursuing an innovation project (often with large chances of failure) or a more mundane but predictably successful commercial projects (such as investing more money in advertising existing products), the scope of potential patent-influenced returns from high risk projects may be deciding factors. Large benefits should imply large rewards. Precluding patenting for

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199. Fewer rights (and lower product costs due to the lack of an obligation to compensate rights holders for use of patented advances) will always tend to increase access to associated advances as lower prices that result make the associated products within reach of more parties and tend to cause the products to be used more frequently. However, this is not the relevant analysis for patentable advances. Such advances do not exist when associated rights must have their sway. The question is not what rights regime will optimize access to existing products, but rather what rights regime will optimize *creation and access* to as yet undeveloped products and processes. If patent incentives are not adequate to incentivize the creation of a product (and other incentive systems likewise fail in encouraging creation of the product) then it does not matter what price for the nonexistent product would have maximized distribution and access. Patent rights (both their scope and the rewards to innovators they achieve) must be constructed to provide sufficient incentives for creation of rare, non-obvious advances (of the sort that can qualify for patents) amidst research processes that frequently fail (and where the failures must be compensated and offset by high rewards for the occasional successes).

200. See Daniel F. Spulber, *How Patents Provide the Foundation of the Market for Inventions*, 11 J. OF COMPETITION L. & ECON. 271, 291–92 (2015).

201. *Id.* at 291.



advances with large opportunities for reuse—as will rulings against the patentability of advances due to their potential to “preempt” later innovation—frustrates the type of encouragement of big impact advances that the patent system was intended to promote.

#### *5. Courts Are Poor Sources of Patentable Subject Matter Restrictions*

As the history of confusing litigation stemming from *Alice* demonstrates, courts are poor parties for developing patentable subject matter standards and limitations.<sup>202</sup> Beyond the need for judicial deference to Congress’s preeminent legislative powers and support for broad patentable subject tests, courts should refrain from aggressively developing new exceptions to patentability because they lack the technological insights and information to accurately develop detailed tests for exclusions from patentable subject matter. Federal courts lack the institutional resources and industry-specific insights needed to assess the impacts of various patentable subject tests across the innovation and commercial practices of different industries. Varying standards developed by different courts not only raise the possibility of different results for similar patent cases brought in different parts of the country, but risk a general decrease in patent incentives nationwide as confidence in the scope of patentable subject matter and the validity of patents shadows innovation in all parts of the country. Court by court development (and variation) will result in murkiness of patentable subject matter tests and the related boundaries of the patent system as now exists at the Federal Circuit and elsewhere.<sup>203</sup> Judicial restraint in developing exclusions from patentable subject matter would avoid these problems stemming from limited judicial capacity.

#### *6. Lack of Predictability Undercuts the Patent System*

Because of the forward-looking impact intended for patent rights (encouraging risk taking and pursuit of new technologies with societal benefits), predictability in patent standards and results is particularly important, more so than in most legal domains. Unpredictable patent

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202. See, e.g., KEVIN J. HICKEY, CONG. RSCH. SERV., R45918, PATENT-ELIGIBLE SUBJECT MATTER REFORM IN THE 116TH CONGRESS 20–22 (2019) (finding the Supreme Court’s recent jurisdiction on patent has received criticism for being “excessively vague” and “subjective”; “legally flawed” since it “misinterprets [35 U.S.C.] Section 101”; and for having “detrimental effects on incentives to innovate,” putting the U.S. at a “disadvantage relative to international competitors”).

203. See generally Jasper L. Tran, *Alice at Seven*, 101 J. PAT. & TRADEMARK OFF. SOC’Y 454 (2021).

validity due to murky patentable subject matter standards undercuts several critically important features of the patent system. Innovators are uncertain about the scope of patent rewards (if any) for particular lines of innovation, leading them to either forego the innovation or to undertake it in secret where it can be protected by trade secret rights.<sup>204</sup> Parties considering production of patented products or licensing of rights to use patented inventions are deterred from doing so out of fear that their efforts will be duplicated at lesser cost by parties operating outside the relevant patents when the patents are later invalidated.<sup>205</sup> And parties threatened by patents are deterred from commercial activities that may be legitimate because the applicable patents are invalid but cannot be firmly determined as such because the applicable subject matter tests are murky.<sup>206</sup> A clear and simple standard of the type advocated in this article will reduce these adverse effects of patentable subject matter uncertainty.

#### *7. Lurches in Patentable Subject Matter Tests Threaten Key Industries*

Developments in patentable subject matter tests since *Alice* have peculiarly threatened incentives in two industries where United States innovators have particular strength: biotechnology and software development.<sup>207</sup> From an earlier period in which patents in these domains were strongly supported by courts, more recent judicial developments have created extensive uncertainty about the scope of patents available in these areas.<sup>208</sup> Two undesirable results have followed.

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204. Michael R. McGurk & Jia W. Lu, *The Intersection of Patents and Trade Secrets*, 7 HASTINGS SCI. & TECH. L. J. 189, 190 (2015).

205. See generally Lemley & Zyontz, *supra* note 96.

206. Taylor, *Confusing Patent Eligibility*, *supra* note 198, at 240–41.

207. See *id.* at 240; Lemley & Zyontz, *supra* note 96, at 65 (noting especially high concern in the biotechnology and software technology industries over the patentability implications of *Alice*).

208. See PATENT ELIGIBLE SUBJECT MATTER., *supra* note 28, at 29 (quoting Transcript, *supra* note 44, at 212–13) (biotechnology industry representatives finding “thousands of existing patents have come under a cloud of unpatentability and invalidity after large investments have been made over decades”); *id.* at 36 n.330 (quoting Transcript, *supra* note 44 at 320–21) (biotechnology industry representatives documenting “a steady increase in § 101 rejections at the USPTO in biotechnology following *Mayo* and *Alice*”); *id.* at 38 (citing Transcript, *supra* note 44, at 400–01) (finding software industry representatives who were “critical of the Supreme Court’s *Alice* decision favored legislative change, blaming the decision for injecting uncertainty into their business practices).

First, incentives for innovation in some key areas have gone down, with the natural result that related funding and research in these fields have decreased as well.<sup>209</sup> The adverse consequences will be hard to measure as they will be felt in advances not made. It is always hard to measure action not taken. However, given the importance of the fields involved, the restriction of patent rights and incentives in these important lines of innovation should be a realm for action by Congress (if any restrictions are to be made at all) rather than lurching and unclear actions by courts.

Second, as attempts to articulate standards for patentable subject matter restrictions have emerged from various courts, patent practitioners have simply tried to draft around the limitations resulting in patents emphasizing specific features of advances that only partially reward or cover the essence of what has been invented and provided to the public.<sup>210</sup> Such patents are flawed in two ways: first, they may not disclose the most valuable features of an innovator's work (since these features are not patentable).<sup>211</sup> Second, the elements that they cover may only capture a fraction of the value of an advance and, consequently, only produce rewards for a fraction of the benefit provided to the public (with the result that the patent recipient is only partially rewarded for his or her advance and future innovators are signaled that similarly discounted rewards are likely to apply to any parallel projects they are contemplating).<sup>212</sup> Patentable subject matter standards should ensure full rewards for public value received (thereby matching incentive size to value conveyed) and be predictable enough that future innovators understand and are

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209. See Kesan & Wang, *supra* note 3, at 604 (citing *Alice*, 573 U.S. 208) (“Patent applicants . . . decreased their reliance on the patent system and filed fewer patent applications as compared to the time period before *Alice*, with the greatest reduction occurring in bioinformatics.”); Hon. Paul R. Michel & Matthew J. Dowd, *From a Strong Property Right to a Fickle Government Franchise: The Transformation of the U.S. Patent System in 15 Years*, 69 DRAKE L. REV. 1, 22, 48 (2021) (footnote omitted) (finding that, as a result of its patent strategy, “rather than increasing government support for critical research and development funding, the United States has reduced it”).

210. See Richard S. Gruner, *Why We Need a Strong Patent System and When: Filing the Void Left by the Bilski Case*, 28 SANTA CLARA COMPUT. & HIGH TECH. L.J. 499, 611 (2012) [hereinafter Gruner, *Strong Patent System*]; Janet Freilich, *Patent Shopping*, 10 U.C. IRVINE L. REV. 619, 625 (2020).

211. See Gruner, *Strong Patent System*, *supra* note 210, at 508–09 (describing the impacts of patent law as a “tool for encouraging disclosures of useful inventions by successful inventors who would . . . otherwise keep their inventions secret” and the reasons why curtailing patent rights often reduces invention disclosures).

212. Gruner, *Strong Patent System*, *supra* note 210, at 555.

motivated by promised patent rewards into actions commensurate with the public value at stake in their research.

### III. WALKING AWAY FROM THE *ALICE* SWAMP

It is time to recognize the failure of *Alice* and subsequent cases derived from it and to start again. This article has described the deficiencies of the *Alice* approach to patentable subject matter, located an alternative approach in prior caselaw, and described why the standard developed by Judge Giles Rich in *Alappat* and related caselaw offers a preferable patentable subject matter standard truer to patent law goals and the specification of broadly inclusive patentable subject matters by Congress in the Patent Act.

The appropriate range of patentable subject matter is all human-created innovations that incorporate 1) a specific advance producing a (2) useful, (3) concrete, and (4) tangible result. This broadly inclusive approach to patentable subject matter ensures that patent incentives will encourage advances as the targets of innovation shift to new means to provide utility and convey public benefit. The future paths of innovation are unclear. Patents apply to the most difficult of those paths where the routes to new advances are especially unclear and non-obvious to most technology specialists in the same field.<sup>213</sup> Whether our most important new technologies will come from computer-enhanced processes, new biotechnology insights, or elsewhere will never be clear in advance; patents and patent incentives should cover all these lines of innovation. By tying patentable subject matter to transferable utility—however achieved—we ensure patents have relevance to innovation no matter where that innovation emerges.

The encouragement—in both innovation and commercialization processes—of outlier innovations by parties able to see beyond the generally obvious should be widely embraced. Transferable utility—with corresponding benefit to users and the public generally—is the essential quality of patentable subject matter. By tailoring subject matter standards to this principle, we can ensure that the benefits of patent incentives influence the broadest range of innovation directions and increase the largest number of beneficial new technologies. The public will gain from access to the resulting, enhanced range of technological tools.

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213. See 35 U.S.C. § 103 (2022); *Graham v. John Deere Co.*, 383 U.S. 1, 18 (1966).