

PATENT LAW 101: I KNOW IT WHEN I SEE IT

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ABSTRACT

In the decade since its creation by the Supreme Court, the *Alice/Mayo* test for patentable subject matter under § 101 has been sharply criticized by many — and yet is still without meaningful reform. This Article adds to the corpus by empirically demonstrating a troubling consequence of contemporary § 101 doctrine: panel-dependent outcomes at the Federal Circuit. Specifically, this Article relies on a novel, whole-population dataset (all § 101 decisions made by the Federal Circuit up to 2023, hand-coded on a claim-by-claim basis) under natural-experiment circumstances (random panel assignments). Analysis of that data indicates that which judges are assigned to a panel bears an especially strong relationship to whether the subject matter will be found eligible on appeal. In particular, even after controlling for other critical case characteristics, panels with a majority of § 101-strict judges are roughly twice as likely to find a given patent ineligible compared to panels with a majority of § 101-lenient judges.

This kind of intra-circuit split — at the unitary, specialized, and expert patent appeals court — indicates that § 101 reform is urgently needed. For the last ten years, Congress and the Supreme Court have given the Federal Circuit the last word on § 101. A lack of consistency from that body is cause for great concern, and further indicates that intervention from one of the former is warranted. Accordingly, the Article concludes with suggestions for an improved § 101 framework going forward, achievable via legislation or caselaw: reducing *Alice/Mayo* to a single step, and reallocating most of the force of *Alice/Mayo*'s step two to obviousness doctrine under § 103.

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TABLE OF CONTENTS

I. SECTION 101 AND THE AFTERMATH OF <i>ALICE/MAYO</i>	448
II. METHODOLOGY	458
III. ANALYSIS	466
IV. INTERPRETIVE CRITIQUES	481
V. IMPROVING SUBJECT-MATTER ELIGIBILITY	487
VI. CONCLUSION	499

I. SECTION 101 AND THE AFTERMATH OF *ALICE/MAYO*

After nearly thirty years on the bench, former Federal Circuit Judge Kathleen O'Malley provided her insights on subject-matter eligibility under § 101 of the Patent Act:

The ascendance of Section 101 as an independent source of litigation, separate from the merits of patentability, is a new uncertainty for inventors [W]e have propounded at least three incompatible standards, devoid of consensus, serving simply to add to the unreliability and cost of the system of patents as an incentive for innovation. With today's judicial deadlock, the only assurance is that any successful innovation is likely to be challenged in opportunistic litigation, whose result will depend on the random selection of the panel.¹

Have you ever seen all 12 active judges on a single circuit court beg the Supreme Court for guidance, and the Supreme Court says no? It's absurd.²

Section 101 of the Patent Act governs what kind of subject matter is patentable — on its face, seemingly anything: “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent”³ As the Supreme Court once stated, “Congress

1. *CLS Bank Int'l v. Alice Corp.*, 717 F.3d 1269, 1321 (Fed. Cir. 2013) (Newman, J., concurring in part and dissenting in part).

2. Dani Kass, *From Alice to Fintiv: Judge O'Malley Dishes on Patent Law*, LAW360 (Mar. 23, 2022), <https://www.law360.com/articles/1476073/from-alice-to-fintiv-judge-o-malley-dishes-on-patent-law> [<https://perma.cc/WPY2-HZUC>] (quoting former Federal Circuit Judge Kathleen O'Malley).

3. 35 U.S.C. § 101.

intended statutory subject matter to ‘include anything under the sun that is made by man.’”⁴ Over time, a series of judicially created exceptions have come to cabin this textual breadth, and now offer the central doctrine of subject-matter eligibility. That is: “Laws of nature, natural phenomena, and abstract ideas” cannot receive patent protection.⁵

In some cases, determining whether one of these exceptions applies is quite easy. Einstein, for example, “could not patent his celebrated law that $E=mc^2$ [.] nor could Newton have patented the law of gravity,” because such formulae are plainly laws of nature.⁶ But things quickly become dizzyingly complex. Lab-isolated genes relating to breast cancer are natural phenomena ineligible for patenting, whereas trimmed, exon-only “complementary DNA” is eligible.⁷ A mathematically defined process for hedging against price fluctuations in commodities is an abstract idea ineligible for patenting,⁸ whereas a logic model for organizing and improving searchability of a database is eligible.⁹

*Alice Corp. v. CLS Bank International*¹⁰ and *Mayo Collaborative Services v. Prometheus Laboratories*¹¹ offer the Court’s most recent discussions of § 101, but little in the way of clarity.¹² Between the two cases, the Court set forth a challenging two-step framework for adjudicating subject-matter eligibility: (1) “[D]etermine whether the [patent] claims at issue are directed to one of those patent-ineligible concepts,”¹³ such as an abstract idea; and (2) if so, then 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.”¹⁴

This test is unpopular, to say the least. In the immediate aftermath of *Alice*, one academic stated that “there is now less clarity on the basic question of patent-eligibility than at almost any other time in American

4. *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980) (quoting S. REP. NO. 82-1979, at 5 (1952); H.R. REP. NO. 82-1923, at 6 (1952)).

5. *Alice Corp. 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 *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (“The Court’s precedents provide three specific exceptions to § 101’s broad patent-eligibility principles: ‘laws of nature, physical phenomena, and abstract ideas.’”) (quoting *Chakrabarty*, 447 U.S. at 309).

6. *Chakrabarty*, 447 U.S. at 309.

7. *Myriad*, 569 U.S. at 580 (holding that “a naturally occurring DNA segment is a product of nature and not patent eligible merely because it has been isolated,” whereas “cDNA is patent eligible because it is not naturally occurring”).

8. *Bilski*, 561 U.S. at 612.

9. *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016) (“In sum, the self-referential table recited in the claims on appeal is a specific type of data structure designed to improve the way a computer stores and retrieves data in memory Accordingly, we find the claims at issue are not directed to an abstract idea.”).

10. 573 U.S. 208 (2014).

11. 566 U.S. 66 (2012).

12. *Alice*, 573 U.S. at 212; *Mayo*, 566 U.S. at 70.

13. *Alice*, 573 U.S. at 217 (citing *Mayo*, 566 U.S. at 76–78).

14. *Id.* (quoting *Mayo*, 566 U.S. at 78, 79).

patent law.”¹⁵ Even now, after the two-step framework has been the governing test for a decade, the patent community appears to struggle greatly with the “virtually indiscernible” boundaries of patent-eligible subject matter.¹⁶ Administrative Patent Judge Hung Bui described the task in Sisyphean terms: each new legal construct “fail[s] and fail[s] again, year after year.”¹⁷ Multiple former U.S. Patent and Trademark Office (“USPTO”) Directors have made similar comments, stating that the *Alice/Mayo* test has created “[p]roblematic confusion and unpredictability,”¹⁸ leading to “the most important issue [in] substantive patent law” today.¹⁹ District court judges are similarly pessimistic: “[T]he two-step test may be more like . . . Justice Stewart’s most famous phrase . . . ‘I know it when I see it.’”²⁰ Even the judges on the specialized Court of Appeals for the Federal Circuit have pleaded for help—over and over again:

“If I, as a judge with 22 years of experience deciding patent cases on the Federal Circuit’s bench, cannot predict [§ 101] outcomes based on case law, how can we expect patent examiners, trial judges, inventors and investors to do so?”²¹

“[T]he state of the law is such as to give little confidence that the outcome is necessarily correct. The law . . . renders it near impossible to know with any

15. Jeffrey A. Lefstin, *The Three Faces of Prometheus: A Post-Alice Jurisprudence of Abstractions*, 16 N.C. J.L. & TECH. 647, 649 (2015); see also J. Jonas Anderson, *Applying Patent-Eligible Subject Matter Restrictions*, 17 VAND. J. ENT. & TECH. L. 267, 269 (2015) (“The Supreme Court’s interest in, and difficulty with, promulgating a consistent standard for determining which inventions are patent-eligible has not gone unnoticed in the academy.”).

16. Daryl Lim, *The Influence of Alice*, 105 MINN. L. REV. HEADNOTES 345, 346 (2021).

17. Hon. 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).

18. David Kappos, *The State of the Patent System: A Look at the Numbers*, LAW360 (Nov. 27, 2017), <https://www.law360.com/articles/987044/the-state-of-the-patent-system-a-look-at-the-numbers> [<https://perma.cc/8PUX-2JB9>].

19. Andrei Iancu, Director, USPTO, Plenary Session at the 27th Annual International Intellectual Law & Policy Conference: Government Leaders’ Perspectives on IP (Apr. 25, 2019) (emphasis omitted) https://ir.lawnet.fordham.edu/ipli_conf_27th_2019/3/ [<https://perma.cc/Z8E6-QXVW>].

20. *McRO, Inc. v. Namco Bandai Games Am., Inc.*, No. CV 12–10327, 2014 WL 4749601 at *5 (C.D. Cal. Sept. 22, 2014) (quoting *Jacobellis v. Ohio*, 378 U.S. 184, 197 (1964) (Stewart, J., concurring)); see also *CareDx, Inc. v. Natera, Inc.*, 563 F.Supp.3d 329, 337 (D. Del. 2021), *cert. denied*, 144 S. Ct. 248 (2023) (“[T]he state of § 101 law is, to use the words of various Federal Circuit judges, ‘fraught,’ ‘incoherent,’ ‘unclear, inconsistent[,] . . . and confusing,’ and ‘indeterminate and often lead[ing] to arbitrary results.’”) (citations omitted) (alterations in original).

21. *The State of Patent Eligibility in America, Part I: Hearing Before the Subcommittee on Intellectual Property of the S. Comm. on the Judiciary*, 116th Cong. 2 (2019) (statement of retired Judge Paul R. Michel).

certainty whether the invention is or is not patent eligible. Accordingly, I also respectfully dissent from our court's continued application of this incoherent body of doctrine."²²

"The problem with this [*Alice/Mayo*] test, however, is that it is indeterminate and often leads to arbitrary results."²³

"In the current state of Section 101 jurisprudence, inconsistency and unpredictability of adjudication have destabilized technologic development in important fields of commerce."²⁴

"What we have here is worse than a circuit split — it is a court bitterly divided. As the nation's lone patent court, we are at a loss as to how to uniformly apply § 101."²⁵

"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, for one, would welcome further explication of eligibility standards . . ."²⁶

"I believe the law needs clarification by higher authority, perhaps by Congress, to work its way out of what so many in the innovation field consider are § 101 problems . . . Section 101 issues certainly require attention beyond the power of this court."²⁷

Despite their considerable collective experience, even these judges consider § 101 doctrine to be utterly unworkable and unpredictable after *Alice* and *Mayo*.

22. *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1348 (Fed. Cir. 2018) (Plager, J., concurring in part and dissenting in part).

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

24. *Yu v. Apple Inc.*, 1 F.4th 1040, 1049 (Fed. Cir. 2021) (Newman, J., dissenting).

25. *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 977 F.3d 1379, 1382 (Fed. Cir. 2020) (Moore, J., concurring).

26. *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, 927 F.3d 1333, 1337 (Fed. Cir. 2019) (Hughes, J., concurring in the denial of reh'g en banc).

27. *Berkheimer v. HP Inc.*, 890 F.3d 1369, 1374 (Fed. Cir. 2018) (Lourie, J., concurring in the denial of reh'g en banc).

To be clear, before *Alice* and *Mayo*, subject-matter eligibility was “effectively a dead letter,” easily satisfied for most inventions due to the capacious text of § 101.²⁸ Now, § 101 has come to occupy a position of enormous importance in the patent system. First, it operates as a per se rule against patentability. That is — even if an invention is new, useful, adequately disclosed, timely filed, and so on — subject-matter ineligibility will act as an absolute bar to obtaining a patent. Take the recent petition for certiorari in *CareDx, Inc. v. Natera, Inc.*²⁹ as an example.³⁰ Only after developing an entirely novel method of diagnosing organ rejection (by measuring single nucleotide polymorphisms in bloodstream DNA fragments), successfully obtaining patents from the USPTO, securing significant third-party investment, proceeding with successful clinical studies, and obtaining Medicare approval did the inventors learn that their discovery was ineligible for patenting under § 101 — per a district court’s order, their patents have been rendered worthless.³¹ Second, the issue of eligibility under § 101 can be raised early and cheaply in patent infringement litigation as a defense (or affirmatively in seeking a declaratory judgment of invalidity). It is “ultimately an issue of law,” reviewed de novo on appeal.³² Although there are sometimes “underlying issues of fact” precluding such disposition, many § 101 disputes are therefore “resolved on a Rule 12(b)(6) motion,”³³ without the need for costly and time-consuming discovery.³⁴

The power and ease of deploying § 101 — combined with the higher bar set by *Alice* and *Mayo* — has led to an explosion in use. In the first seven months after *Alice*, “over one hundred patents [were] invalidated for claiming ineligible subject matter, more than the total number of patents invalidated under Section 101 in the [preceding] five

28. Mark A. Lemley, Michael Risch, Ted Sichelman & R. Polk Wagner, *Life After Bilski*, 63 STAN. L. REV. 1315, 1318 (2011) (“Through the 1980s and 1990s, courts gradually eroded the requirement that a software invention be tied to a particular machine For a decade after 1998, patentable subject matter was effectively a dead letter. That changed dramatically in 2008 when the Federal Circuit decided *In re Bilski* en banc.”). *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc), eventually gave rise to the Supreme Court’s more formal articulation of the two-part test in *Alice* and *Mayo*.

29. 144 S. Ct. 248 (2023).

30. See Petition for a Writ of Certiorari, *CareDx, Inc.*, 144 S. Ct. 248 (No. 22-1066). The Supreme Court ultimately denied certiorari, declining the opportunity to revisit the issue of § 101 patent eligibility.

31. *Id.* at 4–10.

32. *Berkheimer v. HP, Inc.*, 881 F.3d 1360, 1365 (Fed. Cir. 2018); cf. *Bilski v. Kappos*, 561 U.S. 593, 602 (2010) (“The § 101 patent-eligibility inquiry is only a threshold test.”).

33. *Uniloc USA, Inc. v. LG Elecs. USA, Inc.*, 957 F.3d 1303, 1306 (Fed. Cir. 2020). To wit, more than half of the cases represented in this dataset involve appeals from motions to dismiss or motions for judgment on the pleadings.

34. See generally PETER S. MENELL, MARK A. LEMLEY & ROBERT P. MERGES, *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 301 (2017) (observing that judges are apt to use § 101 as a “quick way to screen out weak patents” early in litigation, not unlike the “quick look” doctrine in antitrust).

years.”³⁵ Comparing the last thirty months leading up to *Alice* with the first thirty months after, district courts nationwide adjudicated more than seven times as many motions to dismiss alone based on § 101.³⁶ The District of Delaware, finding itself “flooded with legal briefs arguing that a patent covers ineligible material,” has even established dedicated “Section 101 Day[s]” to deal with the volume.³⁷ § 101 has become the single most common basis for invalidating patents in district court³⁸ and is a significant source of rejected patent applications at the USPTO.³⁹ All this hinges on a test that the finest patent minds in the nation are unable to comprehend.

Reform efforts have recently gained some traction, but have not yielded actual change in the law regarding § 101. In 2017, the USPTO sought the public’s views and recommendations regarding patent-eligible subject matter.⁴⁰ Overall, commentators expressed that the Supreme Court had “failed to articulate objective, predictable criteria . . . to determine whether a claim is drawn to eligible or ineligible subject matter.”⁴¹ In particular, the *Alice/Mayo* two-step was described

35. Daniel A. Taylor, *Down the Rabbit Hole: Who Will Stand Up for Software Patents After Alice?*, 68 ME. L. REV. 217, 247 (2016) (quoting Robert R. Sachs, *Twenty-Two Ways Congress Can Save Section 101*, BILSKIBLOG (Feb. 12, 2015), <https://www.fenwick.com/bilski-blog/twenty-two-ways-congress-can-save-section-101> [<https://perma.cc/FA37-HY3S>]).

36. Sanford Warren, *Update on Alice and Motions to Dismiss*, INT’L RISK MGMT. INST. (Sept. 21, 2018), <https://www.irmi.com/articles/expert-commentary/update-on-alice-and-motions-to-dismiss> [<https://perma.cc/AEB5-TVKS>] (finding 20 motions to dismiss on § 101 grounds granted in the 30 months preceding *Alice*, compared to 151 successful motions in the 30 months after).

37. Matthew Bultman, *‘Section 101 Day’ Yields Quick Ruling on Patent Eligibility*, LAW360 (Feb. 28, 2019), <https://www.law360.com/articles/1133434/section-101-day-yields-quick-ruling-on-patent-eligibility> [<https://perma.cc/MNA7-E2BJ>]; Nathan R. Hoeschen, *Passing the 101 Day Torch*, IP/DE (July 14, 2022), <https://ipde.com/blog/2022/07/15/passing-the-101-day-torch/> [<https://perma.cc/ZB5W-FWXU>] (“The 101 day has been the highlight of the Delaware patent law hearing calendar for many years now . . . I had been a bit worried that the practice would not survive Judge Stark’s departure . . . But my fears were laid to rest last week when Judge Burke — who frequently presided with Judge Stark over 101 days past — held his first solo 101 day.”).

38. See Stephen Yelder, *Prior Art in the District Court*, 95 NOTRE DAME L. REV. 837, 854 (2019) (documenting 509 invalidations based on § 101 out of 1,542 total district court invalidity rulings between 2011 and mid-2017).

39. See U.S. PAT. & TRADEMARK OFF., *Agency Trends: Rejections in Office Actions for Patent Applications*, <https://developer.uspto.gov/visualization/agency-trends-rejections-office-actions-patent-applications> [<https://perma.cc/BVW3-4FGB>] (looking at the first four years after *Alice*, for example, indicates that twenty percent of all rejecting Office Actions included § 101 as a basis).

40. 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://perma.cc/5Z7X-4Y6Y>].

41. *Id.* at 29–30.

variously as a “nightmare,”⁴² “unworkable,”⁴³ “fail[ing] to define crucial terms,”⁴⁴ and lacking “sufficient certainty to serve as a legal standard for anything, let alone the important determination of whether an invention is patent eligible.”⁴⁵ Along similar lines, the Senate Judiciary Committee’s Subcommittee on Intellectual Property held hearings and solicited testimony from dozens of witnesses regarding § 101 in 2019, including “representatives from industry, academia, bar associations, and trade groups” alike — many of whom made similar arguments about the need for greater certainty.⁴⁶ With the assistance of the Federal Judicial Center, the author of this Article deployed a judicial survey that same year, seeking the views of federal district court judges on the state of § 101 doctrine.⁴⁷ This survey confirmed that judges themselves “consider subject-matter eligibility to be the least settled area of [patent] law,” and one of the principal sources of difficulty in adjudicating patent disputes.⁴⁸ In 2021, the USPTO again sought the views and recommendations of the public, with the responses suggesting that little to no improvement had occurred since their previous solicitation.⁴⁹

42. *Id.* at 30 (quoting Robert A. Armitage, Response to the October 17, 2016, Federal Register Notice on Patent Subject Matter Eligibility: Exploring the Legal Contours of Subject Matter Eligibility, 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> [<https://perma.cc/E6VN-N5ST>]).

43. *Id.* (quoting Bruce D. Sunstein, Written Comments on Legislation Concerning Patent Eligibility, at 1 (Jan. 12, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20Bruce%20Sunstein.pdf> [<https://perma.cc/Y5ES-5Z58>]).

44. *Id.*

45. *Id.* (quoting R&D Companies, Response to Request for Comments Related to Exploring the Legal Contours of Patent Subject Matter Eligibility, at 6 (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20InterDigital%20Inc.pdf> [<https://perma.cc/JF7E-N8P2>]).

46. Kevin J. Hickey, *Patent-Eligible Subject Matter Reform: Background and Issues for Congress*, CONG. RSCH. SERV. R45918, 36 (2019), <https://fas.org/sgp/crs/misc/R45918.pdf> [<https://perma.cc/5BQA-DTBC>]; see Bruce M. Wexler, Yar R. Chaikovsky, Philip Ou, Alexandra Cho & Iman Kholdebarin, *Senate Hearing on “The State of Patent Eligibility in America”: Analysis of Viewpoints on Looming Section 101 Change*, PAUL HASTINGS (June 25, 2019), <https://www.paulhastings.com/insights/client-alerts/senate-hearing-on-the-state-of-patent-eligibility-in-america-analysis-of-viewpoints-on-looming-section-101-change> [<https://perma.cc/26LY-EHQD>] (“In particular, many witnesses stressed how the lack of certainty in current patent eligibility law has impacted investment in research and innovation.”).

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

48. *Id.* at 28–30.

49. See Mary Critharis, Charles Eloschway, Amy Nelson, Courtney Stopp & Rahul Das, *Report to Congress on “Patent Eligible Subject Matter: Public Views on the Current Jurisprudence in the United States* at 19, 41, U.S. PAT & TRADEMARK OFF. (June 29, 2022), <https://www.uspto.gov/sites/default/files/documents/USPTO-SubjectMatterEligibility-PublicViews.pdf> [<https://perma.cc/H5Z7-DX4Q>] (“[C]ritics expressed concern that the jurisprudence has unreasonably and improperly expanded the scope and application of the judicially created exceptions to eligibility, resulting in significant inconsistencies, uncertainty, and unpredictability in the issuance and enforcement of patents.”); see also Victoria T. Carrington & Jorge L. Contreras, *Assessing Responses to the PTO’s 2021 Patent Eligibility Study*,

Concrete action, however, has been limited despite the importance of the issue and frequency of calls for reform. The USPTO revised its Manual of Patent Examining Procedure to better track *Alice/Mayo* and subsequent caselaw,⁵⁰ including exemplary § 101 analyses, but did not (and could not⁵¹) change the substantive law that must actually be applied. Meanwhile, the Supreme Court has consistently declined to hear any cases regarding § 101 — even those with a highly divided Federal Circuit below⁵² and strong support from the Solicitor General for a grant of certiorari.⁵³ High-profile and bipartisan attempts at legislation

PATENTLYO (Feb. 1, 2022), <https://patentlyo.com/patent/2022/02/assessing-responses-eligibility.html> [<https://perma.cc/WFJ4-KXJ7>] (recognizing that there was not necessarily a “consensus view” on what § 101 reform should look like, but finding that sixty-five percent of submitted comments “viewed current jurisprudence . . . in a negative light,” compared to only thirty-two percent viewing positively).

50. See *Change Summary for the Ninth Edition Manual of Patent Examining Procedure* at 3, U.S. PAT & TRADEMARK OFF. (June 2020), <https://www.uspto.gov/web/offices/pac/mpep/old/e9r10-2019/mpep-0005-change-summary.pdf> [<https://perma.cc/2D3P-W9TU>] (“Chapter 2100 was amended to include the following notices: *October 2019 Patent Eligibility Guidance Update*, 84 [Fed. Reg.] 55941 (October 18, 2019); . . . and *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 [Fed. Reg.] 50 (January 7, 2019).”) (emphasis in original).

51. See *Merck & Co. v. Kessler*, 80 F.3d 1543, 1550 (Fed. Cir. 1996) (“Such deference as we owe to the PTO’s interpretive ‘Final Determination’ . . . thus arises, not from the rule of *Chevron*, but solely from, *inter alia*, the thoroughness of its consideration and the validity of its reasoning, *i.e.*, its basic power to persuade . . .”) (citing *Skidmore v. Swift & Co.*, 323 U.S. 134, 140 (1944)); see also *Cooper Techs. Co. v. Dudas*, 536 F.3d 1330, 1335–36 (Fed. Cir. 2008) (“To comply with [35 U.S.C.] section 2(b)(2)(A), a Patent Office rule must be ‘procedural’ — *i.e.*, it must ‘govern the conduct of proceedings in the Office.’”); *Merck*, 80 F.3d at 1550 (“[T]he broadest of the PTO’s rulemaking powers . . . does NOT grant the Commissioner the authority to issue substantive rules . . . Thus, the rule of controlling deference set forth in *Chevron* does not apply.”).

52. See, *e.g.*, *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 966 F.3d 1347 (Fed. Cir. 2020) (splitting six-to-six on whether to take the case en banc, with five separately authored opinions).

53. Brief for the United States as Amicus Curiae at 19–20, *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, No. 20-891 (May 24, 2022), *cert. denied*, 142 S. Ct. 2902 (2022) (“This is only the most recent Section 101 case that has fractured the Federal Circuit . . . Ongoing uncertainty has induced ‘every judge on [the Federal Circuit] to request Supreme Court clarification.’”). In the last three years alone, the Solicitor General has recommended that the Court grant review in two other § 101 cases as well. *E.g.*, Brief for the United States as Amicus Curiae at 10, *Interactive Wearables, LLC v. Polar Electro Oy*, 143 S. Ct. 78 (2022) (No. 21-1281); *Tropp v. Travel Sentry, Inc.*, 143 S. Ct. 2483 (2022) (No. 22-22), 2023 WL 2817859. Even when the Solicitor General has recommended denying review in a particular case, the briefs emphasize the ongoing need for the Court to resolve the issue. See, *e.g.*, Brief for the United States as Amicus Curiae at 8, *Hikma Pharms. USA Inc. v. Vanda Pharms. Inc.*, 140 S. Ct. 911 (2020) (No. 18-817), 2019 WL 6699397 (“The confusion created by this Court’s recent Section 101 precedents warrants review in an appropriate case.”); Brief for the United States as Amicus Curiae at 10, *HP Inc. v. Berkheimer*, 140 S. Ct. 911 (2020) (No. 18-415), 2019 WL 6715368 (“[T]his Court’s recent decisions have fostered uncertainty concerning those substantive Section 101 standards The Court should grant review in an appropriate case to clarify the substantive Section 101 standards”); see *infra* Part IV (describing the comparable issues caused by inter- and intra-circuit splits).

have likewise stalled,⁵⁴ though similar legislation has been recently re-introduced.⁵⁵ Thus, the *Alice/Mayo* two-step framework very much remains the law, with the Federal Circuit as the de facto court of last resort.

On the one hand, the unitary structure of patent appeals might — indeed, was designed to⁵⁶ — promote uniformity and clarity where other sources have failed to do so. On the other hand, the Federal Circuit has been subject to repeated critiques of panel-dependent decision-making.⁵⁷ The issue of patent claim construction in particular has generated a considerable body of scholarship on panel dependence.⁵⁸ Where it exists, panel dependency naturally implicates a host of issues like notice and fairness. This should be particularly concerning in the patent context, insofar as it reduces incentives to innovate by unpredictably upsetting investment-backed efforts. Moreover, because the Federal Circuit conceals the identity of panel members until oral

54. See Press Release, Off. of Sen. Thom Tillis, Sens. Tillis and Coons and Reps. Collins, Johnson, and Stivers Release Draft Bill Text to Reform Section 101 of the Patent Act, SEN. THOM TILLIS (May 22, 2019), <https://www.tillis.senate.gov/2019/5/sens-tillis-and-coons-and-reps-collinsjohnson-and-stivers-release-draft-bill-text-to-reform-section-101-of-the-patent-act> [<https://perma.cc/AT92-Q6BN>]; see also Dani Kass, *Justices' Patent Eligibility Denial Won't End Fight for Clarity*, LAW360 (June 30, 2022), <https://www.law360.com/articles/1507770/justices-patent-eligibility-denial-won-t-end-fight-for-clarity> [<https://perma.cc/S32Y-YDX3>] (“Multiple senators have repeatedly addressed their frustrations with the state of patent eligibility law, but [the] two large patent reform bills released in the last year didn’t address Section 101 of the Patent Act.”).

55. Press Release, Off. of Sen. Thom Tillis, *Tillis, Coons Introduce Landmark Legislation to Restore American Innovation*, SEN. THOM TILLIS (June 22, 2023), <https://www.tillis.senate.gov/2023/6/tillis-coons-introduce-landmark-legislation-to-restore-american-innovation> [<https://perma.cc/K55B-RAHX>].

56. See H.R. REP. NO. 97-312, at 22–23 (1981) (“[T]he central purpose is to reduce the widespread lack of uniformity and uncertainty of legal doctrine that exist in the administration of patent law.”); see generally Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25 (creating the Court of Appeals for the Federal Circuit).

57. See, e.g., Paul R. Michel, *The Court of Appeals for the Federal Circuit Must Evolve to Meet the Challenges Ahead*, 48 AM. U. L. REV. 1177, 1191 (1999) (“The problem most frequently mentioned by practitioners is known as ‘panel-dependency.’ Panel dependency is the belief that the result in a case is a function of the membership of the three-judge panel.”); Craig Allen Nard & John F. Duffy, *Rethinking Patent Law’s Uniformity Principle*, 101 NW. U. L. REV. 1619, 1669 (2007) (“[M]any lawyers and commentators believe that the Federal Circuit is highly ‘panel dependent,’ with the application of the law differing dramatically depending on the judges drawn for a particular panel. While that charge remains controversial, many lawyers believe it to be true.”) (emphasis omitted).

58. See, e.g., Jeremy W. Bock, *Behavioral Claim Construction*, 102 MINN. L. REV. 1273, 1274 (2018) (examining the “behavioral elements — such as cognitive biases, priors, and situational factors — that may influence how [different adjudicators] interpret[] a claim”); R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1112 (2004) (“Our findings . . . indicate that claim construction at the Federal Circuit is panel dependent.”); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 12 FED. CIR. B.J. 1, 21 (2003) (suggesting a “high degree of conformance among voting patterns of the Federal Circuit judges in these claim construction appeals”); Christian A. Chu, *Empirical Analysis of the Federal Circuit’s Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1119 (2001) (rejecting the hypothesis of panel dependency in claim construction).

argument,⁵⁹ panel dependency at that level makes negotiation and settlement especially challenging — and undermines the perceived legitimacy of judicial outcomes. Without other circuits to generate visible splits, panel-dependent outcomes are also the best possible indicator that Supreme Court (or congressional) intervention is urgently needed. Prior scholarship on § 101 has included empirical analyses of, for example, the uneven use of Rule 36 summary affirmances,⁶⁰ but the specific issue of panel-dependent outcomes has never been tested.

Now is an ideal time to take stock of § 101 at the Federal Circuit level. As a baseline, there is a full decade of cases applying the *Allice/Mayo* framework, and an ongoing dialogue around § 101 reform in general. On top of that, disagreement among the Federal Circuit judges has become increasingly explicit in written opinions. The judges openly dispute, for example, when a claim is “directed to” an ineligible concept under step one, given that almost all patent claims indirectly cite or rely on abstract ideas, laws of nature, and natural phenomena to function.⁶¹ They likewise dispute when “additional elements” save an otherwise ineligible claim under step two, given that subject-matter eligibility is a question of law and factual questions of novelty and non-obviousness exist separately.⁶² The widespread perception that § 101 is an outlier in terms of clarity within patent law — coupled with such clear disagreement at the Federal Circuit on fundamental questions of scope and depth — suggests that an empirical examination of panel dependence is well warranted.

59. UNITED STATES COURT OF APPEALS FOR FED. CIR., *Daily Schedule*, <https://cafc.uscourts.gov/home/oral-argument/daily-schedule/> [https://perma.cc/2E2B-DTJG] (“The names of panel members are posted one hour before the scheduled start of the argument.”); see also Avalon Zoppo, *‘One More Stressor’: Three Circuits Keep Panels Secret Until Argument Day*, NAT’L L.J. (Feb. 28, 2024), <https://www.law.com/nationallawjournal/2024/02/28/one-more-stressor-three-circuits-keep-panels-secret-until-argument-day/> [https://perma.cc/85PE-GJLZ] (noting that the Fourth, Seventh, and Federal Circuits “do not disclose the names of judges sitting on a panel until the morning of oral arguments”).

60. See, e.g., Paul R. Gugliuzza & Mark A. Lemley, *Can A Court Change the Law by Saying Nothing?*, 71 VAND. L. REV. 765, 767 (2018) (“Remarkably, although the court has issued over fifty Rule 36 affirmances finding the asserted patent to be invalid, it has not issued a single Rule 36 affirmance when finding in favor of a patentee. Rather, it has written an opinion in every one of those cases.”).

61. See, e.g., *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 967 F.3d 1285 (Fed. Cir. 2020) (Moore, J., dissenting) (“Section 101 is monstrous enough, it cannot be that use of an unclaimed natural law in the performance of an industrial process is sufficient to hold the claims directed to that natural law.”).

62. Compare, e.g., *Intell. Ventures I LLC v. Cap. One Fin. Corp.*, 850 F.3d 1332, 1338 (Fed. Cir. 2017) (“Patent eligibility under § 101 is an issue of law that we review without deference.”), with, e.g., *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1365 (Fed. Cir. 2018) (“The patent eligibility inquiry may contain underlying issues of fact.” (citing *Mortg. Grader, Inc. v. First Choice Loan Servs. Inc.*, 811 F.3d 1314, 1325 (Fed. Cir. 2016))).

II. METHODOLOGY

This dataset⁶³ covers every Federal Circuit case in which § 101 eligibility was contested on appeal, from the Circuit’s founding in 1982 up to January 1, 2023. To identify this subset of Federal Circuit cases, Professor Jason Rantanen’s *Compendium of Federal Circuit Decisions* was used as a starting point;⁶⁴ the majority of cases in the *Compendium* have already been coded for whether or not § 101 eligibility was at issue.⁶⁵ Datasets from previous empirical work by Professors Paul Gugliuzza and Mark Lemley,⁶⁶ the author,⁶⁷ and law firms⁶⁸ were used as a supplemental check for any cases missing from or erroneously coded as lacking § 101 issues in the *Compendium*. The cases in the *Compendium* that were not already coded for § 101 were likewise checked individually by the author.

After initial identification, however, more granular information was needed on these cases than preexisting sources can offer. Docket information from PACER, coding performed by the *Compendium*, and commercial analytics like WestLaw’s *Lex Machina* platform⁶⁹ are excellent for certain applications, but they are generally unable to capture individual judges’ doctrinal views on a case-by-case level. Such sources indicate information like a case’s final disposition (e.g., “affirmed in part and reversed in part”), but no systematic way to tell which outcomes apply to which findings made below — or whether certain findings below were addressed on their merits at all. Cases where § 101 was nominally at issue on appeal but resolved on the basis

63. The authors’ dataset is available at Federal Circuit § 101 Eligibility Appeals - Dataset, Google Drive, https://drive.google.com/drive/u/3/folders/1qCkzzgNUW2MKNJ7_vD8ujG_YnZjq3bHI [<https://perma.cc/FHH6-GCYP>].

64. See generally Jason Rantanen, *The Landscape of Modern Patent Appeals*, 67 AM. U. L. REV. 985 (2018) (explaining the creation and contents of the *Compendium* dataset).

65. See *The Compendium of Federal Circuit Decisions*, FED. CIR. DATA PROJECT AT U. IOWA (last accessed Feb. 4, 2024), <https://empirical.law.uiowa.edu/compendium-federal-circuit-decisions> [<https://perma.cc/6DJ8-4GC8>] (fully describing the current dataset and offering a detailed codebook for researchers).

66. See Gugliuzza & Lemley, *supra* note 60 (collecting roughly one hundred cases involving § 101 between the *Alice* decision and 2018).

67. See Matthew G. Sipe, *Experts, Generalists, Laypeople — and the Federal Circuit*, 32 HARV. J.L. & TECH. 575, 577 (2019).

68. See GIBSON, DUNN & CRUTCHER LLP, *Overview of Section 101 Patent Cases Decided after Alice v. CLS Bank* (Mar. 1, 2019), <https://www.gibsondunn.com/wp-content/uploads/2019/03/Overview-of-Section-101-Patent-Cases-Decided-After-Alice-v-CLS-as-of-03-01-19.pdf> [<https://perma.cc/9FE2-MY4V>].

69. LEX MACHINA, <http://law.lexmachina.com> [<https://perma.cc/5PGA-N3WW>].

of collateral estoppel⁷⁰ or waiver,⁷¹ for example, don't provide useful information on the substantive application of § 101, and therefore needed to be culled from the set. Multiple opinions in a single case also present an issue; an opinion styled as a dissent (or dissent in part) may take no view at all on the merits of the § 101 issue⁷² (or concur with the majority on it⁷³). These kinds of problems only multiply further in the many cases where many claims and patents are separately at issue on appeal, with potentially divergent outcomes.

Accordingly, hand-coding was necessary. The author read and annotated the materials for each case in the dataset — direct review of the appellate and district court docket, briefs, orders, and opinions as needed — to most accurately determine the substantive § 101 issues raised and their outcomes. Those issues and outcomes were, in turn, converted into data points, and compiled into a database on which statistical operations could be performed. As other scholars have noted, this type of hand-coding is “notoriously difficult and time consuming, requiring deep knowledge of patent law,”⁷⁴ but it also solves the myriad problems noted above. The result: a uniquely accurate picture of Federal Circuit decision-making on § 101.

As in previous empirical work by the author,⁷⁵ claim-case combinations are used as the unit of analysis. In other words, for each case, subject-matter eligibility issues that were actually reviewed on appeal are indexed by the set of affected patent claims. This approach attempts to best simulate the reality of decision-making; if the Federal Circuit and litigants treated a given set of claims as all rising or falling together under § 101 on appeal, then so will the dataset. This kind of claim indexing is entirely straightforward in most cases, because of how strongly and explicitly the Federal Circuit itself has embraced grouping claims together for § 101 purposes.⁷⁶ In turn, litigants will often

70. *See, e.g.*, *Intell. Ventures I LLC v. Cap. One Fin. Corp.*, 850 F.3d 1332, 1337 (Fed. Cir. 2017) (“We conclude that under Fourth Circuit law, collateral estoppel attaches in light of the JPMC court’s partial summary judgment order.”).

71. *See, e.g.*, *Move, Inc. v. Real Est. All. Ltd.*, 721 F. App’x 950, 958 (Fed. Cir. 2018) (“Our review of the record reveals instead that REAL expressly conceded the invalidity of the ‘576 patent. We see no error by the district court under these unique circumstances.”).

72. *See, e.g.*, *Return Mail, Inc. v. U.S. Postal Serv.*, 868 F.3d 1350, 1371 (Fed. Cir. 2017) (Newman, J., dissenting) (finding a lack of jurisdiction).

73. *See, e.g.*, *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1369 (Fed. Cir. 2018) (Wallach, J., concurring in part and dissenting in part) (“I agree with the majority that the U.S. District Court for the Eastern District of Texas . . . did not err either in determining that claims 11 and 13 of U.S. Patent No. 8,434,020 (‘the ‘020 patent’) and claims 8–9 of U.S. Patent No. 8,713,476 (‘the ‘476 patent’) . . . are patent eligible . . .”).

74. John R. Allison, Mark A. Lemley & David L. Schwartz, *Our Divided Patent System*, 82 U. CHI. L. REV. 1073, 1081 (2015).

75. Sipe, *supra* note 67, at 592.

76. *See, e.g.*, *Voter Verified, Inc. v. Election Sys. & Software LLC*, 887 F.3d 1376, 1385 (Fed. Cir. 2018) (“While these claims encompass both methods and systems, we find there to

stipulate outright that a certain claim or claims are representative of a larger set,⁷⁷ or — by virtue of their briefing — concede as much.⁷⁸ Taking the litigants’ arguments as a starting point, the district courts⁷⁹ and USPTO⁸⁰ are quick to engage in this kind of grouping as well.

In short, by the time a case has reached the Federal Circuit and led to an opinion, claim indexing is typically not a difficult task:

We first consider the claims of the ’539 patent Claim 22 is representative of the ’539 patent claims at issue [W]e agree with the district court that, like the claims at issue in *Prism*, claim 22 is directed to an abstract idea Turning to *Alice* step two, the district court rejected USR’s argument that the claim’s recitations of (1) time-varying codes and (2) sending data to a third-party as opposed to the merchant each rise to the level of an inventive concept We agree.

. . . .

We next consider the claims of the ’813 patent Claim 1 of the ’813 patent is representative We agree with the district court that the claims are directed to an abstract idea, not a technological solution to a technological problem, as USR asserts We

be no distinction between them for § 101 purposes, as they simply recite the same concept.”); *Content Extraction and Transmission LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343, 1348 (Fed. Cir. 2014) (“The district court, however, correctly determined that addressing each claim of the asserted patents was unnecessary PNC is correct that claim 1 of the ’855 patent and claim 1 of the ’416 patent are representative, because all the claims are ‘substantially similar and linked to the same abstract idea.’”) (citation omitted); *Bancorp Servs., LLC v. Sun Life Assur. Co. of Canada (U.S.)*, 687 F.3d 1266, 1277 (Fed. Cir. 2012) (“The only difference between the claims is the form in which they were drafted. The district court correctly treated the system and method claims at issue in this case as equivalent for purposes of patent eligibility under § 101.”).

77. *See, e.g.*, *Genetic Techs. Ltd. v. Merial LLC*, 818 F.3d 1369, 1371 (Fed. Cir. 2016) (“For purposes of this appeal, the parties have stipulated that claim 1 is representative of all of the invalidated claims.”).

78. *See, e.g.*, *W. Express Bancshares, LLC v. Green Dot Corp.*, 816 F. App’x 485, 486 (Fed. Cir. 2020) (“Western Express does not separately argue the other claims in the ’932 patent, nor contest the district court’s determinations that independent Claims 17 and 29 are ‘substantially similar to Claim 1,’ and the dependent claims ‘do not add significant limitations to Claim 1.’”) (citation omitted).

79. *See, e.g.*, *SmileDirectClub, LLC v. Candid Care Co.*, 505 F. Supp. 3d 340, 346–47 (D. Del. 2020), *aff’d*, 856 F. App’x 893 (Fed. Cir. 2021) (“After reviewing all thirty claims of the #522 patent, I conclude that the claims are all substantially similar and that no individual claim contains limitations that raise distinct issues for determining that claim’s § 101 eligibility The independent claims all describe methods or systems that cover the same business strategy.”).

80. *See, e.g.*, *Bozeman Fin. LLC v. Fed. Rsrv. Bank of Atlanta*, 955 F.3d 971, 977–78 (Fed. Cir. 2020) (“The [PTAB] nevertheless viewed as applicable the reasoning it provided in the CBM related to the ’840 patent and held ineligible the claims of the ’640 patent.”).

agree with the district court that the claims fail to recite an inventive concept that would transform the abstract idea into patentable subject matter.

....

We next turn to the claims of the '826 patent Claim 10 is representative of the '826 patent claims at issue We agree with the district court that the claims are directed to an abstract idea We agree with the district court's conclusion that the claims do not recite an inventive concept.

....

Finally, we consider the claims of the '137 patent Claim 12 is a system claim and is representative of the '137 patent claims at issue Although claim 12 of the '137 patent is more detailed than claim 10 of the '826 patent, we nonetheless agree with the district court that it too is directed to an abstract idea Turning to step two, the district court determined that claim 12 'lacks the inventive concept necessary to convert the claimed system into patentable subject matter' On appeal, USR asserts that the use of a time-varying value, a biometric authentication indicator, and authentication information that can be sent from the first device to the second device form an inventive concept We disagree.⁸¹

With the Federal Circuit separately analyzing a single representative claim for each patent, this particular case provided four data points: one for the '539 patent, one for the '813 patent, one for the '826 patent, and one for the '137 patent. Other cases distinguished between claims within a single patent, but were equally straightforward in their analysis:

Claims 1–23 and 36–68 are method claims; claims 24–35 are “paradigm” claims. Claim 1 . . . is representative of Applicants' method claims Claim 24 . . . is representative of Applicants' paradigm claims

....

As to Applicants' method claims, which at least nominally fall into the category of process claims, this court's recent decision in *Bilski* is dispositive We

81. *Universal Secure Registry LLC v. Apple Inc.*, 10 F.4th 1342, 1348–58 (Fed. Cir. 2021).

hold, therefore, that Applicants' method claims are not patentable.

....

Turning now to Applicants' paradigm claims [they] must satisfy at least one category [of statutory subject matter] We hold that they do not.⁸²

Hence, this case provided two data points: one for claims {1–23, 36–68}; and one for claims {24–35}.

For cases with written opinions, this method of coding is entirely straightforward and requires almost no subjective interpretation of the case materials. More challenging, however, is the Federal Circuit's use of summary affirmances under Rule 36.⁸³ Because Rule 36 affirmances do not explain the specific basis for affirming, it is not clear on the face of the opinion how it should be counted for purposes of the dataset. Nevertheless, for most Rule 36 cases, a review of the decision below (to locate and index any § 101 holdings) and the appellate briefing (to confirm that each holding was actually disputed on appeal) was still sufficient to determine what the Federal Circuit was necessarily affirming. For example, *Essociate, Inc. v. Clickbooth.com, LLC*⁸⁴ involved a Rule 36 affirmance.⁸⁵ But the district court's decision below very clearly selected one representative claim for the patent at issue, found a lack of § 101 eligibility on that basis, and reached no other grounds for invalidating the patent.⁸⁶ The parties' appellate briefing confirms that the § 101 holding was actually appealed on its merits — and that the choice of claim 1 as representative was not disputed.⁸⁷

Even when a Rule 36 case involves multiple grounds for invalidity, there is little issue in determining whether the § 101 holdings below actually provided the basis for affirming the outcome. Often, this is because the § 101 holding is the only one to encompass all asserted claims. In *Kroy IP Holdings, LLC v. Safeway, Inc.*,⁸⁸ for example, the district court found claims {1, 19, 20, 21, 23, and 24} of the '830 Patent

82. *In re Ferguson*, 558 F.3d 1359, 1361–65 (Fed. Cir. 2009).

83. FED. CIR. R. 36 (stating that “[t]he court may enter a judgment of affirmance without opinion, citing this rule, when . . . an opinion would have no precedential value” and the decision below presents no error requiring reversal, vacatur, or remand).

84. 641 F. App'x 1006 (Fed. Cir. 2016).

85. *Id.*

86. *Essociate, Inc. v. Clickbooth.com, LLC*, No. SACV 13–01886, 2015 WL 1428919 at *4 (C.D. Cal. Feb. 11, 2015) (“*Essociate* alleges that *Clickbooth* and *CrakMedia* are infringing multiple claims of the '660 Patent, but the parties agree that analysis of Claim 1 is representative of the analysis of the other claims Claim 1 of the '660 Patent is a method claim and reads as follows”).

87. *See, e.g.*, Brief of Defendants-Appellees at *8, *Essociate, Inc. v. Clickbooth.com, LLC*, 2015 WL 5120859 (Fed. Cir. Aug. 26, 2015) (“All parties agree that claim 1 is representative for purposes of this appeal”).

88. 107 F. Supp. 3d 656 (E.D. Tex. 2015).

“invalid for anticipation and obviousness,”⁸⁹ and claims {1, 19, 20–25} invalid under § 101.⁹⁰ Because two of the asserted claims can only be found in the § 101 set (claims {22, 25}), that holding must have been reviewed and affirmed on appeal for the judgment below to stand. Hence, although the case was a Rule 36 affirmance, it can confidently be included in the dataset as a § 101 case.⁹¹ This sort of set logic — rather than ad hoc mixing and matching — tracks the Federal Circuit’s approach in written opinions:

Customedia Technologies, LLC appeals the Patent Trial and Appeal Board’s final written decisions holding claims 1–6, 8, 17, and 23 of U.S. Patent No. 8,719,090 and claims 1–4, 6–7, 16–19, 23–24, 26–28, 32–36, and 41 of U.S. Patent No. 9,053,494 ineligible under 35 U.S.C. § 101 and finding claims 1 and 5 of the ’090 patent unpatentable under 35 U.S.C. § 102. Because the claims are ineligible under § 101, we affirm the Board’s determinations. We do not reach the Board’s § 102 findings.⁹²

Very rarely, the set structure of holdings below would have theoretically allowed the Federal Circuit to affirm a judgment of invalidity below while avoiding any § 101 issues reached below.⁹³ For example, in *In re Villena*,⁹⁴ the PTAB made the following determinations regarding patent application 10/536,692: (1) claims {133, 141, 142, and 145} were anticipated; (2) claims {134–140, 143, 144, 146–151, and 155} were obvious; and (3) claims {133–151, and 155} were invalid under § 101. Set (3) is simply the union of sets (1) and (2), so it is possible that the Federal Circuit’s use of Rule 36 in this case reflects an affirmance of the anticipation and obviousness holdings alone, without ever considering § 101. But this would be at odds with the Federal Circuit’s apparent preference for relying on § 101 grounds over others; coding of the written opinions revealed case after case where there were alternative grounds available for affirming, but the Federal Circuit still

89. *Id.* at 677.

90. *Kroy IP Holdings, LLC v. Safeway, Inc.*, 107 F. Supp. 3d 677, 705 (E.D. Tex. 2015).

91. *Kroy IP Holdings, LLC v. Safeway, Inc.*, 639 F. App’x 637 (Fed. Cir. 2016) (affirming based on Rule 36).

92. *Customedia Techs., LLC v. Dish Network Corp.*, 951 F.3d 1359, 1360–61 (Fed. Cir. 2020).

93. This kind of ambiguity can logically only apply in the invalidity context. If a district court, for example, found a given set of claims eligible under § 101 and non-obvious as well, then a Rule 36 judgment would necessarily be affirming both findings. Otherwise, the end result — patent validity — would not stand.

94. 669 F. App’x 573 (Fed. Cir. 2016).

chose § 101 alone.⁹⁵ Hence, to best reflect the realities of Federal Circuit decision-making, the small number of unusual edge cases like *In re Villena* are counted in the dataset.

In relevant part, each claim-case data point includes the following information:

- (1) Federal Circuit case number, name, and date;
- (2) Nature of the opinion (precedential, non-precedential, or summary affirmance);
- (3) Patent numbers and claims affected;
- (4) Technology classes of the patents affected;
- (5) Specific tribunal and judges below (e.g., Eastern District of Texas, PTAB, etc.);
- (6) Subject-matter eligibility finding by the tribunal below (including the exclusion and test applied);
- (7) Posture of the finding below (e.g., summary judgment, *inter partes* review, etc.);
- (8) Federal Circuit panel members, opinion authors, and their respective positions on the subject-matter eligibility issue (including the exclusion and test applied); and
- (9) Bottom-line disposition on appeal (e.g., affirmed, vacated, etc.).

A brief explanation is warranted regarding patent technology classes in particular. For each patent, the author began with the USPTO's United States Patent Classification ("USPC") designation, if available. For example, Patent No. 8,744,933 (entitled "Payroll processing, certification, reporting and project management system and method"⁹⁶) is labeled by the USPTO as within USPC class number 705: "Data Processing: Financial, Business Practice, Management, or Cost/Price

95. See, e.g., *In re Greenstein*, 782 F. App'x 1035, 1038 (Fed. Cir. 2019) ("Thus, we conclude the Board did not err in holding that the claims of the '768 application are ineligible under § 101. Because we conclude that the Board did not err in holding all of the claims ineligible, we need not review its anticipation and obviousness rulings."); *In re Gitlin*, 775 F. App'x 689, 692 (Fed. Cir. 2019) ("Because we affirm the Board's rejection of the appealed claims under § 101, we need not review the Board's alternative § 103 rejection or its § 112, second paragraph rejection of a subset of the claims."); *In re Greenstein*, 774 F. App'x 661, 665 (Fed. Cir. 2019) ("Thus, we conclude that the Board did not err in holding that Greenstein's claims are ineligible for patenting under § 101, and, accordingly, we need not review its obviousness ruling."); *In re Wang*, 737 F. App'x 534, 535 (Fed. Cir. 2018) ("Because, as explained below, we agree with the Board that the application claims on appeal are directed to non-statutory subject matter, we affirm the Board's decision. We do not reach the remaining issues decided by the Board.") (emphasis omitted).

96. U.S. Patent No. 8,744,933 (issued June 3, 2014).

Determination.”⁹⁷ In turn, those class designations were condensed and simplified into the six supercategories used by the National Bureau of Economic Research (among others) for more sensible quantitative use: (1) chemical, (2) computers and communications, (3) drugs and medical, (4) electrical and electronics, (5) mechanical, and (6) not otherwise classified.⁹⁸ The aforementioned 705 USPC class, for example, corresponds to the “computers and communications” supercategory, so the ’933 Patent was so designated. The USPC designation system has been gradually replaced by the more globally uniform Cooperative Patent Classification System (“CPC”),⁹⁹ and so was not available for a small minority of patents in the dataset. For those, the relevant CPC title was used for supercategory sorting instead.¹⁰⁰

This dataset thus offers a detailed and complete picture of § 101 adjudication at the Federal Circuit level, while attempting to maintain mechanical objectivity in all aspects of coding to the maximum extent feasible. Nevertheless, the author performed intercoder reliability tests with trained research assistants,¹⁰¹ to ensure no systemic biases or errors occurred as a result of the small degree of subjectivity that coding

97. U.S. PAT. & TRADEMARK OFF., CLASSIFICATION DEFINITIONS: CLASS 705 (Jan. 2012), <https://www.uspto.gov/web/patents/classification/uspc705/defs705.pdf> [<https://perma.cc/RSH4-9KWB>].

98. This study uses the same supercategory conversion system first defined by Professors Bronwyn Hall, Adam Jaffe, and Manuel Trajtenberg in their scholarship for the National Bureau of Economic Research. See Bronwyn H. Hall, Adam B. Jaffe & Manuel Trajtenberg, *The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools* 13 (Nat’l Bureau of Econ. Rsch., Working Paper No. 8498, 2001). The conversion system was thereafter updated and refined by Professor Lucy Wang. See Lucy Xiaolu Wang, *Patent Classification Systems and Technological Categorization: An Overview and Data Update* (Aug. 2, 2018), <https://ssrn.com/abstract=3220033> [<https://perma.cc/HRX7-6F39>]. Although this supercategory system is not necessarily unique, it is in particularly common use. See, e.g., Saurabh Vishnubhakat, Arti K. Rai & Jay P. Kesan, *Strategic Decision Making in Dual PTAB and District Court Proceedings*, 31 BERKELEY TECH. L.J. 45, 68 (2016); Gregory F. Nemet & Evan Johnson, *Do Important Inventions Benefit from Knowledge Originating in Other Technological Domains?*, 41 RES. POL’Y 190, 193 (2012); Alberto Galasso & Mark Schankerman, *Patent and Cumulative Innovation: Causal Evidence From the Courts*, 130 Q.J. ECON. 317, 330 (2015); Shawn P. Miller, *Where’s the Innovation: An Analysis of the Quantity and Qualities of Anticipated and Obvious Patents*, 18 VA. J.L. & TECH. 1, 23 n.59 (2013).

99. See generally *Patent Classification*, U.S. PAT. & TRADEMARK OFF., <https://www.uspto.gov/patents/search/classification-standards-and-development> [<https://perma.cc/KY89-22N9>].

100. For example, Patent No. 6,349,291 (entitled “Method and system for analysis, display and dissemination of financial information using resampled statistical methods”) is labeled by the USPTO as within CPC class G06: “Computing; Calculating; Counting.” In turn, this readily matches the “computers and communications” supercategory. U.S. Patent No. 6,349,291 (issued Feb. 19, 2002).

101. Intercoder reliability refers to the extent to which independent coders identically evaluate the same materials. See generally Matthew Lombard, Jennifer Snyder-Duch & Cheryl Campanella Bracken, *Practical Resources for Assessing and Reporting Intercoder Reliability in Content Analysis Research Projects* (June 1, 2010), http://matthewlombard.com/reliability/index_print.html [<https://perma.cc/UQU5-C4Q9>].

required. The author’s previous use of an identical claim-case coding procedure showed no subjectivity issues even after extensive testing.¹⁰²

Part III presents the results in detail. One great strength of this study is that the dataset is not a sample, but rather the entire population of relevant Federal Circuit cases. Accordingly, there need not be any concerns about representativeness or skewed sampling at the Federal Circuit level. Moreover, panel assignments are random,¹⁰³ making this a natural experiment in the strict sense for purposes of the core question on panel dependence. At the same time, the results offer only a limited window to the overall universe of § 101 decision-making. Accordingly, readers should bear in mind the possibility of selection effects regarding which § 101 disputes are litigated, which are appealed, and so on. Those limitations and potential critiques are addressed directly in Part IV.

III. ANALYSIS

In total, there are 530 claim-case data points in the set — representing all decisions (majority, concurring, and/or dissenting) on § 101 eligibility that judges in the Federal Circuit have made in its existence, up to January 1, 2023. Decisions predating the *Alice/Mayo* test were included and coded, in hopes of later making comparisons, but turned out to be too few in number to be empirically useful (only twenty-five data

102. See Sipe, *supra* note 67, at 617 (“Agreement with the master dataset overall, measured as a raw percentage of matching data cells, exceeded 99%. Agreement remained above 99% even when restricted to the more substantive data cells: the holding below, the result on appeal, and whether a claim construction was modified on appeal.”).

103. See U.S. STATES CT. OF APPEALS FOR FED. CIR., *Internal Operating Procedures* at 7 (July 22, 2022) <https://cafc.uscourts.gov/wp-content/uploads/RulesProceduresAndForms/InternalOperatingProcedures/InternalOperatingProcedures.pdf> [<https://perma.cc/E425-TZT5>] (“The clerk’s office runs a computer program that randomly generates three-judge panels for each month, subject to the judges’ availability.”). There are some exceptions, but none would skew the results presented herein. Exceptions include: (1) a maximum of one senior judge per panel, (2) cases remanded back from the Supreme Court or returning after a remand to district court go back to the original panel if possible, and (3) “[a]ssignment of cases to panels will be made so as to provide each judge with a representative cross-section of the fields of law within the jurisdiction of the court.” *Id.*; see also FED. CIR. R. 47.2 (providing that “[a]ssignment of cases to panels will be made so as to provide each judge with a representative cross-section of the fields of law within the jurisdiction of the court”). There is literature challenging the assumption of randomness with respect to other circuit courts, but the available evidence suggests that panel assignments at the Federal Circuit can be safely treated as random with respect to patent cases. Compare Adam S. Chilton & Marin K. Levy, *Challenging the Randomness of Panel Assignment in the Federal Courts of Appeals*, 101 CORNELL L. REV. 1, 5, 24 (2015) (finding “several of the circuit courts [though not all] have panels that are nonrandom in ways that impact the ideological balance of panels,” but not including the Federal Circuit in its study), with Jason Reinecke, *Decisionmaking in Patent Cases at the Federal Circuit*, 81 WASH. & LEE L. REV. at 13–14 (forthcoming 2024), <https://ssrn.com/abstract=4396912> [<https://perma.cc/H6NV-LEKK>] (concluding “nothing about the Federal Circuit’s case assignment procedure would appear to cause some judges to systematically hear cases more strongly favoring either the patentee or patent challenger/accused infringer”).

points in the set). Accordingly, those data points are cut for purposes of the analysis, leaving 505 data points explicitly applying the *Alice/Mayo* test. Starting at the highest level, the raw proportion of § 101 outcomes on appeal is presented below, broken down by various case characteristics: the categorical exception at issue (natural laws/phenomena or abstract ideas), the § 101 outcome below; the tribunal below (USPTO or district court); the technology classes at issue; and the precedential status of the opinion.

Table 1: *Alice/Mayo* Eligibility Rates at the Federal Circuit, by Case Characteristics

	Total Decisions	§ 101-Eligible Rate	Pearson Chi-Square
Categorical Exception at Issue			
Natural Laws / Phenomena	42	40.5%	<0.001**
Abstract Ideas	463	9.1%	
§ 101 Outcome Below			
§ 101-Eligible Below	38	42.1%	<0.001**
§ 101-Ineligible Below	467	9.2%	
Tribunal Below			
USPTO Origin	93	1.1%	<0.001**
D. Ct. Origin	412	14.1%	
Technology Class			
Chemical	16	18.8%	0.371
Comp. & Comm.	404	8.7%	<0.001**
Drugs & Med.	49	32.7%	<0.001**
Elec. & Elecs.	44	6.8%	0.293
Mechanical	30	10.0%	0.767
Precedential Status			
Precedential Opinion	164	29.3%	<0.001**

Non-Precedential Opinion	341	3.2%	
Total			
Total	505	11.7%	-

Not surprisingly, most of these variables bear a strong relationship to § 101 outcomes on appeal. The vast majority of decisions involve the abstract ideas exception, and overwhelmingly find ineligibility; a much smaller number of decisions involve the natural laws and phenomena exceptions, where eligibility seems closer to a tossup. Likewise, most appellate decisions are confirming findings of ineligibility already made below — although subject matter found eligible below still faces worse than coin-flip odds on appeal. Cases coming from district courts (i.e., cases involving a patent already granted by the USPTO) are naturally a bit more likely to result in eligibility on appeal. Two technology classes also appear particularly relevant, in opposite directions: computers and communication (pointing away from eligibility) and drugs and medical (pointing towards eligibility). Finally, there is a large gap related to precedential status — with precedential opinions much more likely to find the given subject matter eligible — but with any potential causation, of course, flowing in the opposite direction. That is, the court’s decision on whether or not to make an opinion precedential is made based on the outcome and rationale, not vice versa.

Next, the table below presents § 101 outcomes on appeal by judge — offering an initial, though very raw look at panel dependence.

Table 2: *Alice/Mayo* Eligibility Rates at the Federal Circuit, by Judge

	Total Decisions	§ 101-Eligible Rate	Pearson Chi-Square
Plager	14	42.9%	<0.001**
Rader	8	37.5%	0.022*
Moore	113	20.4%	0.001**
Linn	30	20.0%	0.144
Bryson	40	17.5%	0.233
O'Malley	80	15.0%	0.314
Stoll	103	14.6%	0.308
Newman	87	12.6%	0.759
Lourie	120	10.8%	0.740
Reyna	121	8.3%	0.179
Hughes	108	7.4%	0.119
Wallach	117	6.8%	0.063
Schall	31	6.5%	0.349
Dyk	103	5.8%	0.038*
Prost	102	4.9%	0.017*
Taranto	131	4.6%	0.003*
Clevenger	29	3.4%	0.155
Chen	95	3.2%	0.004*
Mayer	21	0%	0.089

Without controlling for any other case characteristics, these figures naturally risk over-interpretation. Even so, it is worth noting the sheer spread of eligibility rates, despite random judge assignment to cases. Ignoring the senior and retired judges with relatively few observations (and hence, somewhat outlier rates) still shows the most “lenient” judge (Moore) finding eligibility at more than six times the rate of the most “strict” judge (Chen).

Several binary logistic regressions follow below. The dependent variable of interest is binary: the Federal Circuit’s determination of § 101 eligibility (denoted “1”) or ineligibility (denoted “0”). In the first model, the only independent variables are a series of binaries, one for each judge with at least thirty *Alice/Mayo* data points in the set, indicating whether they wrote or joined the § 101 decision in question (“1”) or not (“0”). This cutoff excludes Judges Plager, Rader, Clevenger, and Mayer — all having taken senior status or fully retired by the time the *Alice* opinion came down in 2014, and all with somewhat outlier eligibility rates on either end above. For comparative purposes, the second model omits any judges, and instead incorporates a number of independent variables capturing case characteristics likely to impact § 101 eligibility on appeal, per Table 1:

- (1) A binary variable for the § 101 determination made by the tribunal below — eligible (1) or ineligible (0);
- (2) A binary variable for the categorical exception at issue — abstract ideas (1) or natural laws or phenomena (0);
- (3) A binary variable for whether the decision below came from the USPTO (1) or a district court (0);
- (4) A series of dummy variables, one for each of the NBER patent technology class supercategories; and
- (5) A continuous variable for the year of the Federal Circuit’s opinion.

The third model merges the previous two, including both the judges and case characteristics alike.

Table 3: Logit Estimation of § 101 Eligibility Under *Alice/Mayo* at the Federal Circuit

	Model 1: Judges Only	Model 2: Case Info Only	Model 3: Combined
Moore	0.145 (0.704)	-	0.769 (0.086)
Linn	-0.621 (0.291)	-	-0.068 (0.909)
Bryson	-0.075 (0.884)	-	0.288 (0.671)
O'Malley	-0.513 (0.222)	-	-0.130 (0.784)
Stoll	-0.186 (0.643)	-	0.271 (0.561)
Newman	-0.788 (0.092)	-	-0.007 (0.988)
Lourie	-1.215 (0.003)**	-	-1.013 (0.028)*
Reyna	-1.482 (<0.001)**	-	-1.080 (0.030)*
Hughes	-1.469 (0.002)**	-	-1.252 (0.015)*
Wallach	-1.609 (<0.001)**	-	-1.419 (0.008)**
Schall	-1.490 (0.064)	-	-1.579 (0.097)
Dyk	-1.572 (0.002)**	-	-1.381 (0.013)*
Prost	-2.182 (<0.001)**	-	-1.792 (0.004)**
Taranto	-2.041 (<0.001)**	-	-1.308 (0.015)*
Chen	-2.545 (<0.001)**	-	-1.813 (0.008)**
Eligibility Below	-	2.069 (<0.001)**	1.946 (<0.001)**
Abstract Idea	-	-1.180 (0.036)*	-1.072 (0.124)
USPTO	-	-2.765 (0.007)**	-2.818 (0.008)**
Chemical	-	-1.495 (0.098)	-1.205 (0.260)
Comp. & Comm.	-	-2.138 (0.014)*	-1.549 (0.138)
Drugs & Med.	-	-1.094 (0.198)	-0.805 (0.412)
Elec. & Elecs.	-	-1.626 (0.051)	-1.356 (0.176)
Mechanical	-	-1.831 (0.071)	-1.291 (0.281)
Other	-	-2.359 (0.049)*	-1.475 (0.291)

Year	-	0.040 (0.559)	0.085 (0.272)
Constant	-16.855 (<0.001)	-91.854 (0.505)	-189.823 (0.223)

The first model, though clearly underinclusive in terms of independent variables, suggests that more than half the included judges exhibit a significant relationship with § 101 eligibility outcomes on appeal. The second model, meanwhile, indicates that the outcome below, its tribunal of origin, the type of § 101 exception at issue, and certain patent technology classes do as well. Turning to the third model, one sees that these results are generally robust with respect to each other, especially regarding the judges. That is, including the most critical case characteristics does not eliminate the significance of *any* of the judges, whereas including the judges eliminates the significance of the patent technology classes.

The pseudo- R^2 statistics for these models further suggest the importance of panel composition. In brief, pseudo- R^2 statistics offer a picture of how much variation in the dependent variable is explained by the independent variables included; a higher statistic indicates that more of the variation has been accounted for.¹⁰⁴ Though vulnerable to critique when viewed in isolation, these statistics remain highly useful for comparative purposes:

Table 4: Explained Variation in § 101 Eligibility Under *Alice/Mayo* at the Federal Circuit

	Cox & Snell R^2	Nagelkerke R^2
Model 1: Judges Only	0.146	0.284
Model 2: Case Information Only	0.140	0.272
Model 3: Combined	0.226	0.440

Naturally, the third model has the highest figures, simply because it includes the most variables — a comparison between the first and second models is more useful. There, one sees that slightly more variation in § 101 outcomes is explained by the judges alone (14.6% to

104. See generally FRED C. PAMPEL, *Estimation and Model Fit, in* LOGISTIC REGRESSION: A PRIMER 51–68 (2000); FAQ: *What are Pseudo R-Squareds?*, UCLA STAT. METHODS & DATA ANALYTICS (Oct. 20, 2011), <https://stats.oarc.ucla.edu/other/mult-pkg/faq/general/faq-what-are-pseudo-r-squareds/> [<https://perma.cc/9CJZ-6TKJ>] (“Thus, this ratio is the proportion of the total variability unexplained by the model. Subtracting this ratio from one results in the proportion of the total variability explained by the model. The more variability explained, the better the model.”).

28.4%) than the case characteristics alone (14% to 27.2%). That is to say, it appears equally useful for outcome-predictive purposes to know: (1) only the Federal Circuit judges involved, or instead (2) the result below, which exception was applied, what tribunal it came from, and the type of invention at issue *combined*. In short, these results would all seem to confirm a substantial degree of panel dependency with respect to § 101 eligibility.

These cross-tabulations and regressions likely underestimate panel dependence, if anything, simply due to the nature of three-judge panels. A judge's binary variable may be "0" for a given decision because they dissented from the majority on the merits — or instead because they simply weren't assigned to the case. Put differently, even a hypothetical judge who decided against § 101 eligibility in every single case on which they sat would still not be counted on a tremendous number of other § 101-ineligible decisions. Moreover, there are likely compromises made and moderating forces felt between judges as they sit together on a panel, reducing observable individual effects. The attempt to isolate judges individually thus sheds much light but, at bottom, the inquiry is about *panel* dependence.

One potential approach would therefore be cross-tabulations or regressions looking at all possible judge pairs. Two judges are all that is needed for a majority opinion, and so pairs of judges reflect the smallest unit of true decision-making power. At the same time, such an approach would create hundreds of judge-pair variables across the fifteen judges used. This seriously risks creating spurious statistical results from sheer random chance alone — and looking at full judge trios would only exacerbate the problem exponentially.

To better approximate the cumulative, rather than individual, effects of the judges, the author thus offers an approach similar to that of Professors Wagner and Petherbridge in their research on claim construction,¹⁰⁵ and Jason Reinecke in his research on pro-patent versus pro-access ideology.¹⁰⁶ The judges are first sorted into two categories based on their observed ideology with respect to § 101 eligibility. "Strict" judges are those with coefficients less than -1 in Table 3, corresponding to roughly the bottom half of Table 2 (again excluding Judges Clevenger and Mayer): Judges Chen, Taranto, Prost, Dyk, Schall, Wallach, Hughes, Reyna, and Lourie. "Lenient" judges are the remaining top half (again excluding Judges Plager and Rader): Judges Moore, Linn, Bryson, O'Malley, Stoll, and Newman. This division corresponds to a break point in terms of significance in Table 3 as well, while keeping the observations in either category sufficiently large for analysis. Moreover, this division appears to match the observable

105. See Wagner & Petherbridge, *supra* note 58, at 1160–68.

106. See Reinecke, *supra* note 103.

ideology from dissents and en bancs. Defined this way, the strict category contains all judges who have dissented exclusively away from § 101 eligibility, and the lenient category contains all judges who have dissented exclusively towards § 101 eligibility.¹⁰⁷ The strict category also excludes any judges who took a position in favor of eligibility in the *Bilski* en banc,¹⁰⁸ the *Alice* en banc,¹⁰⁹ or the more recent *American Axle* denial of en banc.¹¹⁰ Regardless, alternative approaches (e.g., sorting judges into the top-five, middle-five, and bottom-five by strictness) were tested — and did not appreciably change the results.¹¹¹

Using this lenient–strict breakdown, panel compositions are then calculated for each majority decision regarding § 101, and their relationship to § 101 outcomes is presented below.

Table 5: *Alice/Mayo* Eligibility Rates at the Federal Circuit, by Panel Ideology

	§ 101-Ineligible Decisions	§ 101-Eligible Decisions	Pearson Chi-Square
Lenient-Strict Breakdown			
Lenient/Lenient/Lenient	28 (77.8%)	8 (22.2%)	<0.001**
Lenient/Lenient/Strict	125 (82.2%)	27 (17.8%)	
Lenient/Strict/Strict	219 (94.8%)	12 (5.2%)	
Strict/Strict/Strict	59 (98.3%)	1 (1.7%)	
Majority Breakdown			
Majority Lenient	153 (81.4%)	35 (18.6%)	<0.001**

107. In this dataset, Judges Mayer, Reyna, Prost, Lourie, and Dyk exclusively dissented away from eligibility; Judges Stoll, Rader, Linn, Newman, Bryson, and Moore exclusively dissented towards eligibility.

108. *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc).

109. *CLS Bank Int'l v. Alice Corp.*, 717 F.3d 1269 (Fed. Cir. 2013) (en banc).

110. *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 966 F.3d 1347 (Fed. Cir. 2020). Judge Reyna's position in this case is somewhat of an exception; he joins some — but notably, not all — of the dissents urging the court to take the case en banc.

111. For example, chi-square statistics for the number of top-five judges on the panel ($p = 0.005$) or the number of bottom-five judges on the panel ($p < 0.001$) would both seem to indicate significance at a level comparable to the approach ultimately used in Table 5. This breakdown, however, seems relatively arbitrary compared to the one based on observable break points in the overall data, dissents, and en bancs.

Majority Strict	278 (95.5%)	13 (4.5%)	
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The pattern is unambiguous: as panel composition tilts towards judges with strict § 101 views, the rate of § 101-eligible decisions drops sharply. Consolidating the categories, one sees that majority-lenient panels issue § 101-eligible decisions at more than four times the rate of majority-strict panels. Likewise, chi-square statistics for either panel composition breakdown strongly suggest a significant relationship with § 101 eligibility.

These results may be directly contrasted against two other judicial characteristics that are frequently believed to influence decision-making. In the literature on panel dependence in general, the political party of the judge's appointing President is commonly examined;¹¹² in the literature on panel dependence at the Federal Circuit specifically, whether or not the judge possesses a technical background is also commonly examined.¹¹³ In short, no comparably strong pattern emerges from either breakdown in this dataset.

112. See Joshua B. Fischman & David S. Law, *What Is Judicial Ideology and How Should We Measure It?*, 29 J.L. & POL'Y 133, 155 (2009) ("Such proxy variables have traditionally included the party of the President who appointed the judge . . .").

113. Taking the same approach as other scholarship, this analysis defines "technical background" narrowly as a degree in science and/or engineering. See, e.g., Banks Miller & Brett Curry, *Expertise, Experience, and Ideology on Specialized Courts: The Case of the Court of Appeals for the Federal Circuit*, 43 L. & Soc. Rev. 839, 848 (2009) (additionally requiring patent bar membership); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 15 Harv. J.L. & Tech. 1, 19 (2001); Sapna Kumar, *Judging Patents*, 62 Wm. & Mary L. Rev. 871, 875 (2021) (measuring technical expertise based on a judge's holding a science-related degree). Under such a definition, there are six technical-background judges at issue in the dataset. Judges Gajarsa, Linn, Moore, and Chen have undergraduate degrees in electrical engineering; Judges Lourie and Newman have Ph.D.s in chemistry. A broader definition might also include judges with substantial patent experience prior to Federal Circuit appointment. See, e.g., Reinecke, *supra* note 103, at 23–25. This definition would count three additional judges as possessing a technical background. Judge Rader was counsel to the Senate subcommittee on patents, copyrights, and trademarks; Judges O'Malley and Stoll had considerable careers in patent litigation, with Judge O'Malley additionally serving as a district court judge on numerous patent cases before elevation to the Federal Circuit. Defining "technical background" more broadly in this way improves the chi-square statistic relative to Table 6, but still fails to suggest a significant relationship on par with observed ideology ($p = 0.131$).

Table 6: *Alice/Mayo* Eligibility Rates at the Federal Circuit, by Political Party and Technical Background

	§ 101-Ineligible Decisions	§ 101-Eligible Decisions	Pearson Chi-Square
Political Party			
Majority Republican	112 (87.5%)	16 (12.5%)	0.275
Majority Democrat	319 (90.9%)	32 (9.1%)	
Technical Background			
Majority Technical	74 (91.4%)	7 (8.6%)	0.368
Majority Non-Technical	336 (92.6%)	27 (7.4%)	

Note that, despite their dominance in the panel-dependence literature, these breakdowns exhibit only marginal § 101 eligibility differentials. Statistically, neither a chi-square test for political party nor one for technical background would appear to support a significant relationship with § 101 eligibility.

To reiterate, without controlling for any other case characteristics, the cross-tabulations on § 101 panel ideology can be over-interpreted despite their probative value. Accordingly, more regressions follow below. In particular, with the fifteen binary variables for judges now condensed into a single variable representing majority panel ideology, it is possible to fairly compare how economical different models are — that is, how well they explain the variation in the independent variable, relative to the number of dependent variables used.

To best facilitate this kind of comparison, the first model only includes the variables that have thus far appeared most significant: (1) the participating judges (now captured by the panel's majority ideology); (2) the § 101 outcome below (eligible or ineligible); (3) which categorical exception was at issue (abstract ideas or natural laws/phenomena); and (4) the tribunal below (USPTO or district court). To numerically convey the aforementioned tradeoff between goodness of fit and simplicity, the Akaike Information Criterion ("AIC") and Bayesian

Information Criterion (“BIC”)¹¹⁴ for each potential reduced model is presented below.

Table 7: Logit Estimation of § 101 Eligibility Under *Alice/Mayo* at the Federal Circuit

	Model 4	AIC / BIC of Reduced Model
Majority Strict	-1.970 (<0.001)**	63.630 / 80.316
Eligibility Below	3.134 (<0.001)**	71.144 / 87.831
Abstract Idea	-2.417 (<0.001)**	59.297 / 75.984
USPTO	-2.716 (0.010)*	49.917 / 66.604
Constant	-3.103 (0.005)	37.511 / 58.370

Observe that these dependent variables have all remained significant, despite the changes to the data structure — and their significance remains robust with respect to each other. In particular, even after controlling for the most critical case characteristics, a majority-strict panel appears roughly twice as likely to find a given patent ineligible under § 101 compared to a majority-lenient one. With respect to the AIC and BIC figures, a lower number generally suggests a more economical model. Accordingly, the reduced-model figures suggest that including panel ideology is more important for reaching an economical model than including the exception at issue or tribunal below; omitting the latter variables causes less of a loss in explanatory power. For the sake of completeness, one last model is presented below — adding back in the dependent variables for technology class and year — to ensure that panel composition remains significant.

114. See Edward K. Cheng, *A Practical Solution to the Reference Class Problem*, 109 COLUM. L. REV. 2081, 2094 (2009) (“[BIC is] a heuristic for accuracy.”). See generally David W. Hosmer Jr., Stanley Lemeshow & Rodney X. Sturdivant, APPLIED LOGISTIC REGRESSION, Chapter 4.2 (3d ed. 2013); Kenneth P. Burnham & David R. Anderson, *Multimodel Inference: Understanding AIC and BIC in Model Selection*, 33 SOCIO. METHODS & RSCH. 261 (2004), http://www.sortie-nd.org/lme/Statistical%20Papers/Burnham_and_Anderson_2004_Multimodel_Inference.pdf [<https://perma.cc/7225-J383>]; Charles Lindsey & Simon Sheather, *Best Subsets Variable Selection in Nonnormal Regression Models*, 15 STATA J. 1046 (2015), <https://ageconsearch.umn.edu/record/281327/?ln=en> [<https://perma.cc/8HPC-P8YR>].

Table 8: Logit Estimation of § 101 Eligibility Under *Alice/Mayo* at the Federal Circuit

	Model 5
Majority Strict	-1.929 (<0.001)**
Eligibility Below	3.105 (<0.001)**
Abstract Idea	-1.831 (0.008)**
USPTO	-3.016 (0.005)**
Chemical	-0.963 (0.336)
Comp. & Comm.	-2.437 (0.042)*
Drugs & Med.	-1.596 (0.158)
Elec. & Elecs.	-1.962 (0.105)
Mechanical	-2.635 (0.090)
Other	-1.760 (0.236)
Year	0.091 (0.271)
Constant	-196.752 (0.241)

The baseline AIC and BIC are, naturally, much higher than the previous models due to the large increase in variables used: 141.464 and 191.525, respectively. More importantly, one sees a bottom-line result identical to the combination model from Table 3. That is, including the most critical case characteristics does not eliminate the significance of panel composition — or appreciably reduce the magnitude of its effect.

To provide some sense of context, the significance and magnitude of these results are comparable to other findings of judge-dependent outcomes.¹¹⁵ For example, in relating political party to asylum petition adjudication, coefficient estimates appear to reach as high as 1.63.¹¹⁶ One may also contrast the preceding results regarding § 101 to other

115. See *infra* notes 124–25 and accompanying text (comparing these results to another recent study of Federal Circuit panel dependence).

116. Joshua B. Fischman & David S. Law, *What Is Judicial Ideology, and How Should We Measure It?*, 29 J.L. & POL'Y 133, 196-98 (2009) (comparing multiple methods of relating politics to judicial decision-making and finding a coefficient estimate of 1.63). *But see* GOV'T ACCOUNTABILITY OFF., *Significant Variation Existed in Asylum Outcomes Across Immigration Courts and Judges* 120 (Sept. 2008), <https://www.gao.gov/assets/gao-08-940.pdf> [<https://perma.cc/B96D-47XE>] (finding a smaller coefficient estimate of 1.13).

questions of patentability, like obviousness under § 103.¹¹⁷ The author's prior study of patent appeals in 2015–16 used an identical claim-case coding method,¹¹⁸ and provides 487 data points on obviousness adjudication. The analysis performed above for Table 2, Table 3, and Table 4 can be repeated on this dataset — and tellingly, no similar pattern emerges.

Table 9: Obviousness Rates at the Federal Circuit by Judge, 2015–16

	Total § 103 Decisions	Non-Obvious Rate	Pearson Chi-Square
O'Malley	95	35.8%	<0.001**
Hughes	115	30.4%	0.018*
Taranto	98	29.6%	0.055
Plager	23	26.1%	0.662
Moore	81	25.9%	0.402
Newman	90	25.6%	0.424
Lourie	100	24.0%	0.663
Linn	26	23.1%	0.930
Chen	97	22.7%	0.937
Wallach	122	20.5%	0.563
Stoll	107	18.7%	0.300
Dyk	115	16.5%	0.085
Clevenger	38	15.8%	0.310
Reyna	92	15.2%	0.067
Bryson	40	15.0%	0.242
Prost	124	13.7%	0.007**
Schall	25	12.0%	0.201
Mayer	46	6.5%	0.007**

117. 35 U.S.C. § 103 (“A patent for a claimed invention may not be obtained . . . if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.”).

118. Sipe, *supra* note 67, at 592–596.

Table 10: Logit Estimation of Obviousness at the Federal Circuit, 2015–16

	Model 1: Judges Only	Model 2: Case Info Only	Model 3: Combined
O'Malley	0.444 (0.193)	-	1.610 (0.024)*
Hughes	0.359 (0.297)	-	1.186 (0.103)
Taranto	0.203 (0.579)	-	0.600 (0.441)
Moore	-0.144 (0.697)	-	0.207 (0.805)
Newman	0.308 (0.690)	-	0.793 (0.285)
Lourie	-0.460 (0.168)	-	-0.648 (0.368)
Chen	-0.267 (0.450)	-	0.327 (0.660)
Wallach	-0.523 (0.126)	-	-0.149 (0.823)
Stoll	-0.613 (0.108)	-	-0.091 (0.904)
Dyk	-0.899 (0.012)*	-	-1.698 (0.023)*
Clevenger	0.521 (0.043)*	-	-0.338 (0.681)
Reyna	-0.454 (0.259)	-	0.685 (0.405)
Bryson	-0.840 (0.106)	-	-2.469 (0.046)*
Prost	-0.846 (0.026)*	-	-1.418 (0.083)
Mayer	-1.962 (0.003)**	-	-2.462 (0.037)*
Eligibility Below	-	5.087 (<0.001)**	5.993 (<0.001)**
USPTO	-	-0.764 (0.169)	-1.482 (0.037)*
Chemical	-	-0.154 (0.864)	0.444 (0.656)
Comp. & Comm.	-	-0.261 (0.716)	0.668 (0.416)
Drugs & Med.	-	0.020 (0.981)	0.793 (0.406)
Elec. & El- ecs.	-	-0.335 (0.705)	-0.281 (0.789)
Mechanical	-	0.510 (0.514)	0.986 (0.260)
Year	-	0.347 (0.384)	0.739 (0.100)
Constant	-0.411 (0.535)	-2.342 (0.005)	-2.969 (0.075)

Table 11: Explained Variation in Obviousness at the Federal Circuit, 2015–16

	Cox & Snell R ²	Nagelkerke R ²
Model 1: Judges Only	0.092	0.141
Model 2: Case Info Only	0.462	0.708
Model 3: Combined	0.508	0.776

To summarize, these metrics suggest that subject-matter eligibility under § 101 is much more panel dependent than obviousness under § 103. The spread of obviousness rates (~three times, excluding outliers) is narrower than the spread of subject-matter eligibility rates (~six times, excluding outliers), and fewer judges immediately exhibit significant chi-square statistics. A binary logistic regression likewise indicates that half as many judges exhibit significant relationships to § 103 outcomes (4) than § 101 outcomes (8). Finally, the difference in explained variation is particularly stark. Recall that slightly *more* variation in § 101 outcomes is explained by the judges alone (14.6% to 28.4%) than the case characteristics alone (14% to 27.2%). For obviousness, the judges alone (9.2% to 14.1%) do not come close to explaining the variation in outcomes as well as basic case characteristics (46.2% to 70.8%). In fact, adding all fifteen judge variables back in barely improves the model at all.

Altogether, these results indicate that panel composition is a uniquely important determinant of § 101 eligibility outcomes on appeal at the Federal Circuit.

IV. INTERPRETIVE CRITIQUES

A reasonable critique of the data presented is the possibility of selection effects as explaining some or all of the observed patterns. This critique has essentially two forms. First, one might argue that the problem of panel dependence is actually larger than this analysis suggests. That is, perhaps § 101 is not unique in this regard, and similar results would be found across many patent doctrines if they were examined in a similar way. Second, one might argue that the problem of panel dependence is actually smaller than this analysis suggests. That is, perhaps § 101 is mostly functioning well, with only the small minority of disputes that are litigated and appealed exhibiting this kind of uncertainty. Each is worth examining in turn.

Are these § 101 results simply part of a broader pattern of Federal Circuit panel dependence on patents? The available literature and data strongly suggest that the answer is no. Early studies — preceding *Alice/Mayo* — rejected entirely a general theory of Federal Circuit panel dependence with respect to patent validity.¹¹⁹ Later studies examining the specific issue of claim construction are inconclusive, and seem to vary over time.¹²⁰ Jason Reinecke’s recent analysis — looking at all Federal Circuit patent decisions between 2014 and 2021 — does find a broad pattern of Federal Circuit panel dependence across all patent validity issues as a whole, but that pattern appears to be markedly different from the one described in this Article. In brief, Reinecke’s analysis finds certain judges to be either “pro-patentee” or “pro-challenger” across all issues;¹²¹ for the specific issue of § 101 eligibility, those terms would map onto the “lenient” and “strict” labels used earlier. Nevertheless, many of the judges do not seem to match up. Some judges fit neatly (e.g., Judges O’Malley, Newman, and Moore are both lenient and pro-patentee), but there are a number of radical inversions (e.g., Judges Wallach, Taranto, and Chen are among the strictest here, and yet pro-patentee).¹²² Other judges — like Lourie and Newman — are neighbors in the middle of the pack here, but occupy opposite extremes in Reinecke’s list (among the most pro-challenger and pro-patentee respectively).¹²³ In other words, judges that may be pro-patentee or pro-challenger as a general matter behave differently when it comes to the specific doctrine of § 101, creating a conceptually distinct sphere of panel dependence.

Although a direct comparison between these two analyses is imperfect at best, it is also worth noting that the magnitude and significance of panel effects appear similar despite the differences in judge categorization. For example, Reinecke finds that panels with zero to three pro-access judges reach pro-access decisions at rates of 55.7%, 63.2%, 67.2%, and 70.8%, respectively¹²⁴ — differentials of up to 7.5 percentage points. Here, recall Table 5, showing that panels with zero

119. See, e.g., Ted Sichelman, *Myths of (Un)Certainty at the Federal Circuit*, 43 LOY. L.A. L. REV. 1161, 1184–93 (2010) (rejecting a theory of panel dependence for patent cases at the Federal Circuit — other than the specific issue of claim construction); John R. Allison & Mark A. Lemley, *How Federal Circuit Judges Vote in Patent Cases*, 27 FLA. ST. U. L. REV. 745, 746 (2000) (“While there are some interesting differences in voting patterns, our overall conclusion is that the votes of Federal Circuit judges during this period defied easy description. Judges do not fit easily into ‘pro-patent’ or ‘anti-patent’ categories, or into ‘affirmers’ and ‘reversers.’ We think this is a good thing for the court system.”); see generally Ryan G. Vacca, *The Federal Circuit as an Institution*, in 2 RSCH. HANDBOOK ECON. INTELL. PROP. L. 104 (Peter S. Menell & David L. Schwartz eds., 2019) (collecting and comparing studies).

120. See *supra* note 58 (collecting studies from different years that reach different conclusions).

121. Reinecke, *supra* note 103, at 39.

122. *Id.* at 38–39.

123. *Id.* at 38.

124. *Id.* at 40.

to three strict judges reach ineligible decisions at rates of 77.8%, 82.2%, 94.8%, and 98.3% — differentials of up to 12.6 percentage points. Likewise, the best single-variable measure of ideological panel effects that Reinecke finds in regressions, as indicated by coefficient estimates, is 1.47.¹²⁵ The preceding analysis tends to match in scale, particularly when examining the judges that were found significant in the models of Table 3, or the condensed panel-composition variable in the models of Table 7 and Table 8 (1.970 and 1.929, respectively).

The views of judges and practitioners further confirm that § 101 is a genuine outlier in terms of uncertainty, rather than just one facet of a larger, systemic patent problem. Again, this author's 2019 judicial survey revealed that federal district court judges "consider subject-matter eligibility to be the least settled area of [patent] law," and one of the principal sources of difficulty in adjudicating patent disputes.¹²⁶ For example, on a 1–7 scale, district court judges rated the core patent validity doctrines of anticipation (4.66), obviousness (4.44), definiteness (4.45), and written description (4.44) as markedly more clear than subject-matter eligibility (3.59).¹²⁷ Little surprise then that critiques of § 101 doctrine from Federal Circuit judges,¹²⁸ USPTO officials,¹²⁹ and practitioners¹³⁰ are exceptional in frequency and timbre; one is simply unable to find a comparable attitude expressed towards any other issue of patent validity to such a degree.

Much of this also undercuts the second potential critique — that there is no real § 101 problem, because the foregoing demonstration of panel dependence only reveals uncertainty with respect to the small minority of § 101 edge cases that are actually litigated and appealed. If this were indeed the case, with the doctrine working just fine in most instances, one would not expect such widespread criticism from judges, administrators, and practitioners at all levels. In particular, one would not expect commentators to report significant ground-level effects, like inconsistent results in patent prosecution,¹³¹ inconsistent results across

125. *Id.*

126. Sipe, *supra* note 47, at 28–30.

127. *Id.* at 29; *see also supra* tbls. 10–12 and accompanying text.

128. *See supra* notes 2, 20.

129. *See supra* notes 18–19.

130. *See supra* notes 41–47.

131. U.S. PAT. & TRADEMARK OFF., *supra* note 40, at 29–31; Critharis et al., *supra* note 49, at 12 ("Although the USPTO study narrowly focused on uncertainty in the patent examination process, it provided systematic evidence that the *Alice* decision increased uncertainty for innovators using the patent system."); Hannah Mehrle, Note, *Forum Shopping Within the United States Patent and Trademark Office*, 70 CASE W. RESV. L. REV. 791, 794–96 (2020) ("This phenomenon shows that [due to *Alice/Mayo*] there are discrepancies in whether a patent is eventually issued based solely on the art unit in which the application is initially classified.");

district courts,¹³² decreased investment in certain technology sectors,¹³³ increased concentration in certain industries as patent-driven startups disappear,¹³⁴ and greater reliance on alternative forms of protection like trade secret law.¹³⁵ The points on investment and trade secrets are particularly compelling, suggesting that the results presented herein may actually understate § 101's overall unpredictability. If would-be innovators abandon ideas or make inventions secret that seem likely to provoke § 101 challenges because they are not confident in their ability to

132. See, e.g., DOCKET NAVIGATOR, ALICE THROUGH THE LOOKING GLASS 7 (2019) (finding an over eighty percent success rate for § 101 challenges in S.D.N.Y. and E.D. Va., compared to success rates under fifty percent in E.D. Tex. and W.D. Tex.); Warren, *supra* note 36 (finding discrepancies as large as fifty-eight percentage points in success rates for Rule 12(b)(6) motions based on § 101 between various district courts post-*Alice*).

133. U.S. PAT. & TRADEMARK OFF., *supra* note 40, at 32–33 (suggesting that “the uncertainty brought about by the current jurisprudence . . . will likely diminish the incentive to innovate”); Critharis et al., *supra* note 49, at 22–23 (“[I]nnovation requires investment, which, in turn, requires certainty and predictability in patent protection and enforcement, without which capital will not be risked, thus leading to decreased innovation.”); A. Sasha Hoyt, Note, *The Impact of Uncertainty Regarding Patent Eligible Subject Matter for Investment in U.S. Medical Diagnostic Technologies*, 79 WASH. & LEE L. REV. 397, 445–46 (2022) (“In essence, in the four years following *Mayo*, investment in disease diagnostic technologies was nearly \$9.3 billion dollars lower than it would have been absent *Mayo*.”); David O. Taylor, *Patent Eligibility and Investment*, 41 CARDOZO L. REV. 2019, 2028–29 (2020) (“Almost 40% of the investors who knew about at least one of the Court’s eligibility cases indicated that the Court’s decisions had somewhat negative or very negative effects on their firms’ existing investments On a going-forward basis, moreover, almost 33% of the investors who knew about at least one of the Court’s eligibility cases indicated . . . shifting of investments out of the biotechnology, medical device, pharmaceutical, and software and Internet industries.”); NAT’L SEC. COMM’N ON A.I., FINAL REPORT 201 (2021), https://cybercemetery.unt.edu/nscai/20211005231038mp_/https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf [<https://perma.cc/RN26-272M>] (“The U.S. has not developed comprehensive IP policies to incentivize investments in and protect the creation of artificial intelligence (AI) and other emerging technologies [T]his policy void . . . includes legal uncertainties created by current U.S. patent eligibility and patentability doctrine.”); see generally 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 (as updated Dec. 2019).

134. U.S. PAT. & TRADEMARK OFF., *supra* note 40, at 32 (“A representative from a startup company asserted that the *Alice* decision ‘tilt[ed] the playing field toward large, incumbent entities and restrict[ed] the ability of new innovators in technologies reliant on software to receive patent protection.’”); Critharis et al., *supra* note 49, at 23–24 (“[T]he current jurisprudence is actually stifling competition by making it harder for startups and [small and medium-sized enterprises] to attract much-needed investment, which has led to increased concentration of key technologies in the hands of a few large, well-resourced incumbents.”); see generally Joan Farre-Mensa, Deepak Hegde & Alexander Ljungqvist, *What is a Patent Worth? Evidence from the U.S. Patent “Lottery,”* 75 J. FIN. 639, 642 (2020) (“Empirically, we find that the first patent increases a startup’s chances of securing funding from VCs over the next three years by 47%, of securing a loan by pledging the patent as collateral by 76%, and of raising funding from public investors through an IPO by 128%.”).

135. U.S. PAT. & TRADEMARK OFF., *supra* note 40, at 33, 36 (suggesting that, post-*Mayo/Alice*, “innovators have begun to consider trade secrets in lieu of patents to protect inventions they had not traditionally protected by trade secrets”); Critharis et al., *supra* note 49, at 28–29 (describing how “researchers and innovators frustrated with the state of patent eligibility” may be “turning to trade secrets to protect their innovations in lieu of seeking patent protection”).

predict the eventual outcome, those potential patent applications, litigation, and appeals never manifest. As a result, there are some additional § 101 disputes with unpredictable results that have been chilled out of existence in the first place.

More fundamentally, this critique is difficult to reconcile with the longstanding, accepted view of circuit splits. The Framers,¹³⁶ the Supreme Court,¹³⁷ Congress,¹³⁸ and legal scholars¹³⁹ are in rare consensus: when circuits split in their interpretation of federal law (and assuming that split fails to resolve on its own), some kind of

136. See, e.g., THE FEDERALIST NO. 80, at 1 (Alexander Hamilton) (“The mere necessity of uniformity in the interpretation of the national laws, decides the question. Thirteen independent courts of final jurisdiction over the same causes, arising upon the same laws, is a hydra in government, from which nothing but contradiction and confusion can proceed.”).

137. See SUP. CT. R. 10 (“The following, although neither controlling nor fully measuring the Court’s discretion, indicate the character of the reasons the Court considers [in granting a writ of certiorari]: (a) a United States court of appeals has entered a decision in conflict with the decision of another United States court of appeals on the same important matter”); see also *Intercircuit Panel of the United States Act: Hearings on S. 704 Before the Subcomm. on Courts of the S. Comm. on the Judiciary*, 99th Cong., 1st Sess. 147 (1985) (statement of A. Leo Levin quoting Justice Byron White) (“[D]enying review of decisions that conflict with other decisions of Courts of Appeals . . . results in the federal law being enforced differently in different parts of the country. What is a crime, an unfair labor practice or an unreasonable search and seizure in one place is not a crime, unfair practice or illegal search in another jurisdiction . . . [T]hey invite prompt resolution in this Court, which now is the only forum that can provide nationwide uniformity.”); Einer Elhauge, *Preference-Estimating Statutory Default Rules*, 102 COLUM. L. REV. 2027, 2159 (2002) (“Statistical studies . . . indicate that Supreme Court decisions over whether to grant certiorari are mainly influenced by legal factors like circuit splits rather than ideology.”).

138. See, e.g., U.S. COMM. ON REVISION OF THE FED. COURT APPELLATE SYSTEM, STRUCTURE AND INTERNAL PROCS.: RECOMMENDATIONS FOR CHANGE, 67 F.R.D. 195, 208 (1975) (recommending the creation of a national court of appeals to “assure consistency and uniformity by resolving conflicts between circuits”); Federal Courts Study Committee Implementation Act of 1990, Pub. L. No. 101-650, § 302, 104 Stat. 5089, 5104 (“The Board of the Federal Judicial Center is requested to conduct a study and submit to the Congress a report by January 1, 1992, on the number and frequency of conflicts among the judicial circuits in interpreting the law that remain unresolved”); see also *supra* note 56 (observing that the Federal Circuit was created specifically to unify patent law, which had become heavily fractured across the circuits). For another example, the Congressional Research Service tracks “Appellate Decisions of Interest to Lawmakers,” specifically highlighting “cases in which the appellate court’s controlling opinion recognizes a split among the federal appellate courts . . . , contributing to a non-uniform application of the law” See, e.g., *Congressional Court Watcher: Recent Appellate Decisions of Interest to Lawmakers* (Apr. 24–Apr. 30, 2023), CONG. RSCH. SERV., 2 (May 1, 2023), <https://www.everycrsreport.com/reports/LSB10957.html> [<https://perma.cc/497A-QLTQ>].

139. See, e.g., Amanda Frost, *Overvaluing Uniformity*, 94 VA. L. REV. 1567, 1579–80 (2008) (although adopting a more skeptical stance, recognizing that “most federal court treatises and scholarly articles . . . assert that uniformity is good and nonuniformity is bad,” with only “a few exceptions”); Thomas E. Baker & Douglas D. McFarland, *The Need for a New National Court*, 100 HARV. L. REV. 1400, 1409 (1987) (“Conflicts threaten the very purpose of the establishment of one supreme national court: ‘to secure the national rights & Uniformity of Judgments’ contemplated under one national government.” (quoting Vinson, *Work of the U.S. Supreme Court*, 12 TEX. B.J. 551, 551–52 (1949))). Cf. J. Clifford Wallace, *The Nature and Extent of Intercircuit Conflicts: A Solution Needed for a Mountain or a Molehill?*, 71 CAL. L. REV. 913, 923 (1983) (“Ideally the federal Constitution and the federal laws should be applied consistently and uniformly by all the lower courts . . . throughout the nation.”).

intervention is needed. But a circuit split offers only a limited window into the realities of the underlying doctrine, because it reveals divergent results only among the small minority of disputes that are actually litigated and appealed. Put differently, even where a circuit split exists, the overwhelming majority of questions arising under that law might still be perfectly uniform and clear; as a signal for intervention, circuit splits intrinsically exhibit selection effects. Nevertheless, circuit splits are well recognized as threatening the legitimacy of courts and law,¹⁴⁰ as engendering uncertainty and unpredictability in outcomes,¹⁴¹ and as encouraging forum-shopping behavior amongst litigants.¹⁴² Some percolation and experimentation may be desirable in the short run,¹⁴³ but few would disagree that enduring circuit splits require some kind of resolution.

Of course, the exclusive appellate patent jurisdiction of the Federal Circuit¹⁴⁴ forecloses the possibility of any true circuit splits on patent

140. See, e.g., Evan H. Caminker, *Precedent and Prediction: The Forward-Looking Aspects of Inferior Court Decisionmaking*, 73 TEX. L. REV. 1, 40 (1994) (“[T]he public might presume that one or both [splitting] circuit courts are (1) unprincipled in their interpretative process, (2) in error due to incompetence, or (3) in error due to the indeterminate nature of legal reasoning. Each of these alternatives subverts the courts’ efforts to be seen as oracles of exogenous, objective, and determinant legal principles.”).

141. See, e.g., Julian W. Smith, *Evidence of Ambiguity: The Effect of Circuit Splits on the Interpretation of Federal Criminal Law*, 16 SUFFOLK J. TRIAL & APP. ADVOC. 79, 89 (2011) (“Circuit splits create ambiguity and uncertainty, especially for ‘officers, prosecutors, defendants, and courts.’”) (quoting Christopher Lieb Nybo, Comment, *Dialing M for Murder: Assessing the Interstate Commerce Requirement for Federal Murder-for-Hire*, 2001 U. CHI. LEGAL F. 579, 584 (2001)); Deborah Beim & Kelly Rader, *Evolution of Conflict in the Courts of Appeals* (June 25, 2015), <https://ssrn.com/abstract=2623304> [<https://perma.cc/M98D-AH3P>] (“[C]ircuit splits have other potentially undesirable consequences: they make it difficult for lawyers to advise their clients, invite additional litigation, [and] circumscribe potentially legal conduct”); Todd E. Thompson, *Increasing Uniformity and Capacity in the Federal Appellate System*, 11 HASTINGS CONST. L.Q. 457, 468–69 (1984) (acknowledging the advantages of temporary conflicts among the circuits but noting “that persistent conflicts will rarely be advantageous” because “the costs of conflict will soon outweigh the marginal value of further experimentation”).

142. See, e.g., Wallace, *supra* note 139, at 930 (“The drawbacks of intercircuit conflicts, on the other hand, are much easier to identify, and could include such factors as: delaying the definitive resolution of questions of national importance; encouraging tactical ploys designed to avoid the unfavorable approach of one circuit or take advantage of the favorable approach of another circuit; and permitting unnecessary uncertainty over which interpretation of a federal law will be applied”); Frost, *supra* note 139, at 1601–05 (“[A]dvocates for uniformity complain that unresolved lower court conflicts will lead to forum shopping because each litigant will seek to bring the case in the circuit most favorably disposed to its position.”).

143. See, e.g., Frost, *supra* note 139, at 1610 (“Intercircuit stare decisis would prevent issues from percolating in the lower courts, which arguably assists the Supreme Court in reaching the best conclusion about the meaning of federal law.”); Wallace, *supra* note 139, at 929 (“When circuits differ, they provide the reasoned alternatives from which the resolver of the conflict can derive a more informed analysis. The many circuit courts act as the ‘laboratories’ of new or refined legal principles”).

144. 28 U.S.C. § 1295 (“The United States Court of Appeals for the Federal Circuit shall have exclusive jurisdiction . . . of an appeal from a final decision of a district court of the

law. Panel dependence is thus the Federal Circuit's equivalent red flag, demonstrating irreconcilable divergence in interpretation amongst the judges. Although the specific harm of forum shopping does not accompany this kind of "split," the values of legitimacy, certainty, and predictability are undermined year after year while panel dependence persists (for a decade now, in the case of § 101). If circuit splits are worthy of attention and resolution, panel-dependent dynamics at the Federal Circuit — such as those under § 101 demonstrated by this analysis — should be as well.

V. IMPROVING SUBJECT-MATTER ELIGIBILITY

As noted at the outset, the dialogue over § 101 reform has been steadily building since *Alice* and *Mayo* to its current peak. This dialogue has included varying proposals for amended statutory language or modified judicial tests, from stakeholders with different forms of expertise and points of view. Senators Thom Tillis (R-NC) and Chris Coons (D-DE) have reintroduced bipartisan legislation.¹⁴⁵ The American Bar Association,¹⁴⁶ Intellectual Property Owners Association,¹⁴⁷ and American Intellectual Property Law Association¹⁴⁸ each provided suggestions to the USPTO during public comment periods and, more recently, released a joint statement.¹⁴⁹ Prominent individuals — from

United States . . . in any civil action arising under, or in any civil action in which a party has asserted a compulsory counterclaim arising under, any Act of Congress relating to patents”).

145. Press Release, Off. of Sen. Thom Tillis, *Tillis, Coons Introduce Landmark Legislation to Restore American Innovation*, SEN. THOM TILLIS (June 22, 2023), <https://www.tillis.senate.gov/2023/6/tillis-coons-introduce-landmark-legislation-to-restore-american-innovation> [<https://perma.cc/7K4Q-MDNA>]. They released a draft bill with somewhat different language in 2019, but it did not ultimately move forward. See Press Release, Off. of Sen. Thom Tillis, *Sens. Tillis and Coons and Reps. Collins, Johnson, and Stivers Release Draft Bill Text to Reform Section 101 of the Patent Act* (May 22, 2019), <https://www.tillis.senate.gov/2019/5/sens-tillis-and-coons-and-reps-collins-johnson-and-stivers-release-draft-bill-text-to-reform-section-101-of-the-patent-act> [<https://perma.cc/CNG3-9MBX>].

146. Letter from Donna P. Suchy, Section Chair, American Bar Association – Section of Intellectual Property Law, to the Honorable Michelle K. Lee, Undersec'y of Com. for Intell. Prop. & Dir. U.S. Pat. & Trademark Off. (Mar. 28, 2017), <https://patentdocs.typepad.com/files/letter-5.pdf> [<https://perma.cc/D2EA-MCMF>].

147. INTELL. PROP. OWNERS ASS'N, *Proposed Amendments to Patent Eligible Subject Matter Under 35 U.S.C. § 101* (Feb. 7, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20IPO.pdf> [<https://perma.cc/LRD4-ZTSM>].

148. Letter from Mark L. Whitaker, President, Am. Intell. Prop. L. Ass'n, to the Honorable Michelle K. Lee, Undersec'y of Com. for Intell. Prop. & Dir. U.S. Pat. & Trademark Off. (Jan. 18, 2017), <https://www.uspto.gov/sites/default/files/documents/RT2%20Comments%20Marqeta.pdf> [<https://perma.cc/3VS9-FC67>].

149. AIPLA/IPO/ABA — *IPL Joint Principles Paper on Section 101*, AIPLA, <https://www.aipla.org/advocacy/legislative/aipla-ipo-aba---ipl-joint-principles-paper-on-section-101> [<https://perma.cc/56ZS-V5QD>] [hereinafter *AIPLA Proposal*]; *Joint AIPLA-IPO Proposal on Patent Eligibility*, AIPLA (May 2018), <https://www.aipla.org/advocacy/legislative/joint-aipla-ipo-proposal-on-patent-eligibility> [<https://perma.cc/6HKL-364U>] [hereinafter *AIPLA-IPO Proposal*].

former government officials¹⁵⁰ to litigators¹⁵¹ to law professors¹⁵² — have made their own proposals as well. The preceding analysis can help to inform this dialogue.

Currently, subject-matter eligibility under § 101 appears to accomplish two separate tasks. First, it precludes patentability for certain kinds of inventions that the other requirements do not — that is, it has at least some unique substantive force.¹⁵³ For example, a newly derived mathematical formula that is practically useful and clearly specified would only be blocked by § 101.¹⁵⁴ The same would be true for a newly discovered natural phenomenon with lucrative commercial uses, such as the non-inhibiting properties of certain bacterial strains.¹⁵⁵ Second, subject-matter eligibility under § 101 allows for relatively fast and cheap screening of facially weak patents when disputes arise, because it is often a question of pure law that can be resolved at an early procedural stage, without resort to costly and time-consuming discovery.¹⁵⁶

150. See, e.g., Ryan Davis, *Kappos Calls for Abolition of Section 101 of Patent Act*, LAW360 (Apr. 12, 2016), <https://www.law360.com/articles/783604/kappos-calls-for-abolition-of-section-101-of-patent-act> [<https://perma.cc/N8AX-KGCW>] (quoting David Kappos, former Director of the U.S. Patent & Trademark Office).

151. See, e.g., Robert Sachs, *Twenty-Two Ways Congress Can Save Section 101*, BILSKI-BLOG (Feb. 12, 2015), <https://www.fenwick.com/bilski-blog/twenty-two-ways-congress-can-save-section-101> [<https://perma.cc/6LJY-WYE3>].

152. See, e.g., Kristen Osenga, *Institutional Design for Innovation: A Radical Proposal for Addressing § 101 Patent-Eligible Subject Matter*, 68 AM. U. L. REV. 1191 (2019) (proposing that only courts should decide § 101 issues, not the USPTO, in order to improve certainty and clarity).

153. See *Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc.*, 566 U.S. 66, 90 (2012) (“We recognize that, in evaluating the significance of additional steps, the § 101 patent-eligibility inquiry and, say, the § 102 novelty inquiry might sometimes overlap. But that need not always be so. And to shift the patent-eligibility inquiry entirely to these later sections risks creating significantly greater legal uncertainty, while assuming that those sections can do work that they are not equipped to do.”); J. Jonas Anderson, *Applying Patent-Eligible Subject Matter Restrictions*, 17 VAND. J. ENT. & TECH. L. 267, 281 (2015) (“The majority of scholars . . . suggest that Section 101 plays some independent role in patent-eligibility — some subset of patent applications that are otherwise novel, non-obvious, and fully described are nevertheless ineligible for patenting under Section 101.”); Emily Michiko Morris, *Intuitive Patenting*, 66 S.C. L. REV. 61, 85 (2014) (“To the extent that patent law excludes phenomena of nature, laws of nature, and abstract ideas from patentability — and perhaps more importantly, for whatever reasons that patent law does so — only patentable subject matter does the actual work.”); Mark A. Lemley, Michael Risch, Ted Sichelman & R. Polk Wager, *Life After Bilski*, 63 STAN. L. REV. 1315, 1329–32 (2011) (distinguishing the inquiry under § 101 from questions of enablement and definiteness under § 112).

154. See *Parker v. Flook*, 437 U.S. 584, 585 (1978) (“The only novel feature of the method is a mathematical formula . . . [T]he discovery of a novel and useful mathematical formula may not be patented.”).

155. See *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 131–32 (1948) (“[A] product must be more than new and useful to be patented; it must also satisfy the requirements of invention or discovery The application of this newly-discovered natural principle to the problem of packaging of inoculants may well have been an important commercial advance Even though it may have been the product of skill, it certainly was not the product of invention. There is no way in which we could call it such unless we borrowed invention from the discovery of the natural principle itself.”) (citations omitted).

156. See *supra* notes 32–34 and accompanying text.

Indeed, these savings can be enormous; for the litigants alone, reaching discovery in a patent case typically increases litigation costs five- to tenfold.¹⁵⁷

Some have suggested that the subject-matter exclusions read into § 101 could be abolished outright, eliminating the need for *Alice/Mayo*'s two-step test (or any improvement thereupon) entirely.¹⁵⁸ Former USPTO Director David Kappos, for example, has observed that “Europe doesn’t have 101 and Asia doesn’t have 101 and they seem to be doing just fine”¹⁵⁹ Abolishing the judicially created exclusions (whether by precedent or legislation) would, of course, fix clarity and predictability in an absolute sense. Without any exclusions to police, the two-step test is simply passed in all cases.

But still, the twin functions of § 101 seem desirable, and perhaps even inevitable within the patent system. In terms of desirability, “monopolization of those tools” — of the abstract ideas and natural phenomenon uniquely excluded by § 101 — “might tend to impede innovation more than it would tend to promote it.”¹⁶⁰ The Court’s § 101 jurisprudence is suffused with precisely this fear:

Laws of nature, natural phenomena, and abstract ideas are “the basic tools of scientific and technological work.” . . . We have “repeatedly emphasized this . . . concern that patent law not inhibit further discovery by improperly tying up the future use of” these building blocks of human ingenuity Accordingly, in 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 The former “would risk disproportionately tying up

157. See AM. INTELL. PROP. ASS’N, REPORT OF THE ECONOMIC SURVEY 50–52 (2019), <https://ipwatchdog.com/wp-content/uploads/2021/08/AIPLA-Report-of-the-Economic-Survey-Relevant-Excerpts.pdf> [<https://perma.cc/5E7S-A6WK>] (relying on 2013, 2015, 2017, and 2019 data).

158. See, e.g., Shahrokh Falati, *To Promote Innovation, Congress Should Abolish the Supreme Court Created Exceptions to 35 U.S. Code § 101*, 28 TEX. INT. PROP. L.J. 1, 2 (2019) (“I here argue that Congress should abolish the Supreme Court-promulgated, non-statutory exceptions to 35 U.S.C. § 101, in toto”); David O. Taylor, *Confusing Patent Eligibility*, 84 TENN. L. REV. 157, 175 (2016) (“[T]here is no need to twist the language of § 101 for policy reasons to ensure that unmeritorious inventions are not patentable”).

159. Davis, *supra* note 150 (quoting David Kappos, former Director of the U.S. Patent & Trademark Office).

160. *Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 71 (2012); see Anderson, *supra* note 153, at 282–85 (collecting sources on preemption and innovation-harm theories for the § 101 exclusions).

the use of the underlying” ideas . . . , and are therefore ineligible for patent protection.¹⁶¹

Available scholarship provides some support for this view. For one, the basic research that leads to the discovery of broad, fundamental principles (as compared to more narrow, applied research) may be less responsive to and reliant on external financial incentives (like patent royalties) in the first place.¹⁶² For another, the inherent breadth of these types of discoveries engenders unclear boundaries, and hence disproportionately costly litigation rates.¹⁶³ Moreover, the specific areas most heavily affected by the § 101 exceptions in practice — genes,¹⁶⁴ software,¹⁶⁵ and business methods¹⁶⁶ — appear to be areas where broad patentability would be particularly costly, and with comparatively low

161. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216–17 (2014) (citations omitted).

162. See Alan Devlin & Neel Sukhatme, *Self-Realizing Inventions and the Utilitarian Foundation of Patent Law*, 51 WM. & MARY L. REV. 897, 925–26 (2009) (“A second category of ‘inevitable’ innovation involves discoveries spurred by reputational or institutional incentives to invent that exist independent of proprietary control of any resulting invention. The paradigmatic example of this kind of invention includes discoveries by professors and researchers in academic settings, where the need to publish is a prerequisite to achieving success and tenure and where pecuniary incentives are thought to play a diminished role.”); WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY* 306–07 (2003).

163. See JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BU-REAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 150–55 (2008); Gerard N. Magliocca, *Patenting the Curve Ball: Business Methods and Industry Norms*, 2009 BYU L. REV. 875, 888 (2009).

164. See Laurie L. Hill, *The Race to Patent the Genome: Free Riders, Hold Ups, and the Future of Medical Breakthroughs*, 11 TEX. INTELL. PROP. L.J. 221, 241–46 (2003) (explaining the arguments against and the significance of gene patents); see also Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698, 698–99 (1998) (discussing impact of patents on biomedical research).

165. See Jason M. Schultz & Brian J. Love, *Brief of Amici Curiae Law, Business, and Economics Scholars in Support of Respondents in Alice Corp. Pty. Ltd., v. CLS Bank International, et al.*, 4 N.Y.U. J. INTELL. PROP. & ENT. L. 358, 361–74 (2015) (linking changes in § 101 caselaw to the number of software patents granted and litigated); Pamela Samuelson, *Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1041 (1990) (“Thereafter, patent examiners increasingly began rejecting software patent applications on the ground that they failed to claim patentable subject matter.”); see also James Bessen & Robert M. Hunt, *An Empirical Look at Software Patents*, 16 J. ECON. & MGMT. STRATEGY 157 (2007) (discussing impact of patents on software development broadly).

166. See David S. Olson, *Taking the Utilitarian Basis for Patent Law Seriously: The Case for Restricting Patentable Subject Matter*, 82 TEMPLE L. REV. 181, 228 (2009) (“There is strong reason to believe that business methods lie on Figure 2 where patenting is never efficient [T]he level of incentive to invent new and useful business methods is quite high without any patent protection [I]n the short run . . . the inventing firm receives exclusive benefits of the new method [which] will be enough to make the invention worthwhile”).

returns.¹⁶⁷ To be sure, this position has been challenged,¹⁶⁸ but there is a general consensus that patents directed squarely at abstract ideas, natural laws, and products of nature offer less than others in terms of net social benefits. Screening out patents on these kinds of discoveries may even be constitutionally required to some degree,¹⁶⁹ although no court has yet taken that position explicitly.

In terms of inevitability, the emergence of § 101 challenges as a cheap and early screening mechanism may reflect something like a “desire path” in law.¹⁷⁰ The paved road to invalidation — claim construction, discovery, experts, and granular factfinding — is long and arduous, whereas distilling an entire patent into a general gist and eyeballing it is short and easy. Everyone involved in patent litigation or prosecution is busy, time is money, and dockets need to keep moving; little wonder that a popular shortcut has arisen judicially. For that reason, even if “§ 101 is tightly cabined through reform so as to prevent such a sorting function, observers ought to be wary of other doctrines

167. Yuqing Cui, *A Quantitative Approach to Determining Patentable Subject Matter*, 30 HARV. J.L. & TECH. 629, 647–652 (2017) (modeling all three industries, and finding patentability thereof to be, at best, a break-even proposition); see also Jorge L. Contreras, *Pathogen Genomes as Global Public Goods (And Why They Should Not Be Patented)*, 55 N.Y.U. J. INT’L L. & POL. 533, 538 (2023) (“It is probable that the unavailability of patent protection for pathogenic sequences motivated researchers in China to share SARS-CoV-2 sequence data so rapidly.”).

168. See, e.g., Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977) (arguing that broad patents granted at early stages can be socially beneficial by ending rivalry over the domain and thereby encouraging efficient development, akin to other forms of property); John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 445 (2004) (building on Kitch’s theory, suggesting that “[a] prospect patent system fosters competition” by awarding patents to “the competitor willing to dedicate the innovation to the public domain at the earliest time”).

169. See, e.g., Wesley D. Markham, *How to Explain the “Implicit Exceptions” to Patent-Eligible Subject Matter*, 16 VAND. J. ENT. & TECH. L. 353, 356 (2014) (“Although no single explanation for the implicit exceptions is entirely satisfying, the Court’s unanimity on the exceptions’ validity may flow from an aggressive use of the constitutional avoidance doctrine.”); Jorge A. Goldstein, Michelle K. Holoubek & Krishan Y. Thakker, *The Time Has Come to Amend 35 U.S.C. § 101*, 44 AIPLA Q.J. 171, 198–99 (2016) (“[T]he Court’s main rationale for the Exceptions has been that of avoiding preemption[.] . . . a constitutional doctrine.”); Andrew Michaels, *How Congress Could Abolish Patent Eligibility Exceptions*, LAW360 (July 1, 2019), <https://www.law360.com/articles/1174493/how-congress-could-abolish-patent-eligibility-exceptions> [<https://perma.cc/2CX2-W77E>] (“Thus, although that the [Supreme Court] has not gone so far as to decide that the exceptions are absolutely required by the Constitution (or that their abrogation would definitely be unconstitutional) it has certainly alluded to that possibility.”).

170. See generally Kurt Kohlstedt, *Least Resistance: How Desire Paths Can Lead to Better Design*, 99% INVISIBLE (Jan. 25, 2016), <https://99percentinvisible.org/article/least-resistance-desire-paths-can-lead-better-design/> [<https://perma.cc/T8CK-D599>] (“Informal ‘desire paths’ can form with as few as fifteen traversals of an unpaved route, creating spontaneous new trails shaped by pedestrians effectively voting with their feet.”).

taking over the role.”¹⁷¹ Doubtless, some patent claims truly can and should be disposed of on nothing more than a quick look.

It may be possible to keep the best of § 101’s current functions while still improving clarity and predictability. Consider a version of § 101 that operates as a single step, asking whether a patent claim encompasses *solely* an abstract idea, law of nature, or product of nature — nothing more. If so, the claim can be quickly and cheaply held as unpatentable subject matter as a matter of law. But where an abstract idea, natural law, or product of nature is only part of the claim (for example, a mathematical formula implemented as a step in a specific manufacturing process¹⁷²), it passes § 101 without further inquiry. In other words, the question of whether those “additional elements” actually “transform the nature of the claim’ into” something patentable is left to the panoply of other statutory requirements.¹⁷³

In particular, obviousness under § 103 could capture many of the invalidations that currently take place under step two of *Alice/Mayo*, but with greater predictability and clarity. Even when an invention has not been “identically disclosed” in the prior art (which would render the invention anticipated and thus blocked by § 102¹⁷⁴), it may still be unpatentably “obvious” under § 103 if the differences between it and the prior art are sufficiently small.¹⁷⁵ For example, the invention at issue may simply be a modification of an existing reference that would be trivial to one of ordinary skill in the art,¹⁷⁶ or some basic combination of known elements from multiple pieces of separate prior art.¹⁷⁷ The question of obviousness is thus how inventive must an inventor actually be to obtain a patent — how large must the delta be between

171. Sipe, *supra* note 47, at 32; *see id.* (“Discretion behaves hydraulically; if one tool to keep dockets rolling at a reasonable pace is removed, another is nearly guaranteed to take its place.”).

172. *See, e.g.,* Am. Axle & Mfg., Inc. v. Neapco Holdings LLC, 966 F.3d 1347, 1351 (Fed. Cir. 2020) (regarding patent claims covering the use of Hooke’s law in manufacturing vibration-resistant automobile drive shafts).

173. *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 217 (2014) (quoting *Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 78 (2012)).

174. *See* 35 U.S.C. § 102 (explaining that to be patentable, an invention cannot have already been “patented, described in a printed publication, or in public use, on sale, or otherwise available to the public”).

175. 35 U.S.C. § 103 (“A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious . . .”).

176. *See, e.g.,* SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp., 225 F.3d 1349, 1358 (Fed. Cir. 2000) (“Thus, while [the prior art reference] does not expressly suggest that the cells described therein could be used in drug screening methods, the knowledge of those skilled in the art . . . suggests this modification.”).

177. *See, e.g.,* Intercontinental Great Brands LLC v. Kellogg N. Am. Co., 869 F.3d 1336, 1348 (Fed. Cir. 2017) (“[C]ombining the Re-Seal It packaging with familiar cookie-package frames (as in Graham) was a predictable technological solution to the relevant known market problem.”).

what is plainly not patentable (the prior art) and the invention at hand. To answer this question, the leading cases offer the lodestar of “inducement”:

The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge. The grant of an exclusive right to an invention was the creation of society — at odds with the inherent free nature of disclosed ideas — and was not to be freely given. Only inventions and discoveries which furthered human knowledge, and were new and useful, justified the special inducement of a limited private monopoly.

....

“[T]he things which are worth to the public the embarrassment of an exclusive patent,” as Jefferson put it, must outweigh the restrictive effect of the limited patent monopoly. The inherent problem was to develop some means of weeding out those inventions which would not be disclosed or devised but for the inducement of a patent.¹⁷⁸

In other words, the question of obviousness hinges on a single principle: “[I]f the innovation would be created and disclosed even without patent protection, denying a patent on the innovation costs society nothing . . . and saves society from needlessly suffering the . . . restriction on output caused by a patentee’s exclusive rights”¹⁷⁹

Recall that this is the very same utilitarian calculus that led to § 101’s judicially created exclusions in the first place and, in turn, the two-step test in *Alice/Mayo*: the belief that patents coming too close to abstract ideas, natural laws, and products of nature will “impede innovation more than . . . promote it.”¹⁸⁰ Likewise, this is the very same kind of question that the *Alice/Mayo* test asks at step two: how large must the delta be between what is plainly not patentable (abstract ideas, natural laws, products of nature) and the invention at hand? With the reduced version of § 101 suggested above, then, § 103 can naturally step in. Treat the exclusions as “prior art” for purposes of the

178. *Graham v. John Deere Co.*, 383 U.S. 1, 9–11 (1966).

179. Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 *YALE L.J.* 1590, 1594 (2011).

180. *Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 71 (2012); see Matthew G. Sipe, *Patent Law’s Philosophical Fault Line*, 2019 *WIS. L. REV.* 1033, 1058 (“[T]he courts’ principal concern in policing subject-matter eligibility is classic law and economics: the appropriate balance between incentives to innovate and open competition and access.”).

analysis,¹⁸¹ and ask whether the additional elements of the claim — the applications, the implementations, the refinements — would only have come about but for the inducement of a patent.

As others have observed, the inducement standard by itself can be challenging to implement. Judges are naturally hard pressed to answer the empirical question of when “a patent becomes necessary to induce desirable invention” in a given context.¹⁸² Nevertheless, obviousness and its inducement standard offer tremendous improvements over the existing *Alice/Mayo* framework. First, courts adjudicating obviousness must analyze the prior art (and the ease of departures from it) with the perspective of “a person having ordinary skill in the art” pertinent to the invention.¹⁸³ Thus, if the patent claims relate to surgical instrument design, the person of ordinary skill might be “someone who has a Bachelor’s degree in Mechanical Engineering or an equivalent branch of engineering, as well as 3 years of experience in the design and analysis of minimally invasive surgical instruments or comparable surgical devices.”¹⁸⁴ Constructing this hypothetical person is a rich, detailed inquiry¹⁸⁵ that generates a considerable record on which to base review.¹⁸⁶ Under *Alice* and *Mayo*’s version of § 101, step two turns on the strikingly similar question of whether the additional elements of the claims — what are *not* abstract ideas, natural laws, or products of nature — “involve more than performance of ‘well-understood, routine, [and] conventional activities previously known to the industry.’”¹⁸⁷ But

181. Arguably, this should already be true — at minimum, for products of nature. If something already exists in nature, then it is not new, full stop. The same argument holds some force for laws of nature as well; any natural law was operative on the universe long before recognition by humans. The category of abstract ideas, however, would seem to require actual ideation by definition — meaning they only begin to exist when first conceived by an actual person. Regardless, this proposal would resolve any latent legal or philosophical ambiguity by committing all three categories to the prior art for purposes of § 103.

182. Glynn S. Lunney, Jr., *E-Obviousness*, 7 MICH. TELECOMMS. & TECH. L. REV. 363, 416 (2001); see FED. TRADE COMM., TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY Ch. 1, at 11 (2003) (“From a theoretical perspective, the ‘but for’ approach represents the right way to assess whether to grant a patent. It is not usually possible, however, to use a ‘but for’ approach to analyze whether individual patents should be granted.”).

183. 35 U.S.C. § 103; see *Graham*, 383 U.S. at 14 (“Patentability is to depend, in addition to novelty and utility, upon the ‘non-obvious’ nature of the ‘subject matter sought to be patented’ to a person having ordinary skill in the pertinent art.”).

184. *Intuitive Surgical, Inc. v. Ethicon LLC*, 2021 WL 1158290 at *5 (Patent Tr. & App. Bd. Mar. 26, 2021).

185. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (advising courts to consider: (1) the “type of problems encountered in the art”; (2) “prior art solutions to those problems”; (3) “rapidity with which innovations are made”; (4) “sophistication of the technology”; and (5) “educational level of active workers in the field”) (citation omitted).

186. See MANUAL OF PATENT EXAMINING PROCEDURE § 2141(II) (9th ed. 2023) (“Office Personnel as Factfinders”).

187. *Content Extraction & Transmission LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343, 1347–48 (Fed. Cir. 2014) (quoting *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 225 (2014));

bizarrely, there is no inquiry or record making comparable to § 103, allowing courts to “kick the hypothetical person of ordinary skill in the art to the curb in favor of a discretionary analysis”¹⁸⁸

Second, the courts have developed so-called “secondary considerations” under § 103: concrete, practical guideposts in adjudicating specific obviousness cases.¹⁸⁹ Secondary considerations include evidence of “commercial success, long-felt but unsolved need, and failure of others,”¹⁹⁰ as well as “skepticism of experts,” and “copying [of] the invention.”¹⁹¹ These kinds of real-world evidence have proved highly influential in § 103 jurisprudence,¹⁹² helping to further ground the analysis in the real world and guard against the risk of hindsight bias.¹⁹³ Meanwhile, much like the lack of a “person of ordinary skill in the art,” there is no doctrinal analog for secondary considerations in determining subject-matter eligibility under § 101.

These two advantages lead directly to a third: obviousness more clearly requires predicate factual findings than subject-matter eligibility, cabining review and increasing deference to expertise. Although the standards of review for § 101 and § 103 are nominally the same — they are ultimately questions of law, with underlying factual

see Paxton M. Lewis, *The Conflation of Patent Eligibility and Obviousness: Alice’s Substitution of Section 103*, 2017 UTAH L. REV. ONLAW 13, 14 (2017) (discussing how the *Alice* framework for evaluating § 101 necessarily intrudes upon the obviousness analysis under § 103).

188. Timothy R. Holbrook & Mark D. Janis, *Patent-Eligible Processes: An Audience Perspective*, 17 VAND. J. ENT. & TECH. L. 349, 382 (2015); see Emil Malak, *A Plea for Clarity and a New Approach on Section 101 in 2020*, IPWATCHDOG (Jan. 4, 2020), <https://ipwatchdog.com/2020/01/04/plea-clarity-new-approach-section-101-2020/id=117537/> [<https://perma.cc/RXG2-LFDB>] (“Put differently, the analysis of courts under Section 101 lacks a key safeguard built into other areas of patent law, namely, consideration of the viewpoint of the person of ordinary skill in the art Section 101 analysis omits the perspective of the skilled person and substitutes the perspective of judges unskilled in the field of the invention, who often feel empowered by *Alice* to decide scientific and technical questions without expert evidence of record”).

189. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

190. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050 (Fed. Cir. 1988) (citations omitted).

191. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1569 (Fed. Cir. 1987) (citations omitted).

192. See *Abramowicz & Duffy*, *supra* note 179, at 1656 n.201 (“The courts’ weight on secondary considerations is sufficiently great that the label ‘secondary’ can be misleading.”); Kevin Rhodes, Comment, *The Federal Circuit’s Patent Nonobviousness Standards: Theoretical Perspectives on Recent Doctrinal Changes*, 85 NW. U. L. REV. 1051, 1068–76 (1991) (“The Federal Circuit has . . . emphasize[d] that secondary considerations, if present, are always relevant under Section 103, and must always be given evidentiary weight before reaching a decision on the obvious/nonobvious issue.”).

193. See, e.g., *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068 (Fed. Cir. 2018) (“We have observed that ‘the prejudice of hindsight bias’ often overlooks that the ‘genius of invention is often a combination of known elements which in hindsight seems preordained.’”) (quoting *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1368 (Fed. Cir. 2013)); *KSR Int’l. Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.”).

findings¹⁹⁴ — the two are not truly comparable, for at least the reasons given above. Moreover, the Supreme Court has not explicitly supported the Federal Circuit’s characterization of subject-matter eligibility as requiring predicate factual findings at all; neither *Alice* nor *Mayo* featured references to evidence or factfinding on step two.¹⁹⁵ The Federal Circuit itself regularly affirms § 101 decisions made at procedural stages that preclude factfinding despite step-two disputes,¹⁹⁶ and district courts continue to follow suit.¹⁹⁷ The more rigorous framework of § 103 effectively precludes these shortcuts much of the time,¹⁹⁸ forcing greater deference to scientific and technical expertise — whether it be from the USPTO’s corps of administrative patent judges¹⁹⁹ or the experts provided by litigants in district court — rather than unpredictable de novo speculation at the appellate level.²⁰⁰ This also enhances the

194. See *supra* notes 32–34 and accompanying text; see, e.g., *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1326 (Fed. Cir. 2016) (“Obviousness is a question of law based on underlying facts.”) (citation omitted).

195. See *Berkheimer v. HP Inc.*, 890 F.3d 1369, 1379 (Fed. Cir. 2018) (Reyna, J., dissenting from denial of en banc review) (“The Court’s treatment of the ‘inventive concept’ search at step two makes clear that this inquiry is predominately a legal question focused on the claims.”) (emphasis in original).

196. As noted earlier, roughly half the data points in this set — that is, roughly half of all cases involving § 101 ever decided by the Federal Circuit until 2023 — were decided below on motions under Rule 12(b)(6) or 12(c). See *supra* note 33 and accompanying text.

197. See Sunnie Ning, Note, *Stabilizing Alice for Abstract Ideas: A Case for Federal Circuit to Turn to USPTO Guidance*, HARV. J.L. & TECH. DIG., Apr. 3, 2021, <https://jolt.law.harvard.edu/digest/stabilizing-alice-for-abstract-ideas-a-case-for-federal-circuit-to-turn-to-uspto-guidance> [<https://perma.cc/7CL8-AKY7>] (“Following the lead, a host of district court cases also continue to find that no factual inquiry is necessary for their particular case.”).

198. In the aforementioned 2015–16 study, for example, less than three percent of obviousness decisions made by the Federal Circuit were originally decided at the § 12(b)(6) or § 12(c) stage below. See Sipe, *supra* note 67.

199. Administrative patent judges are specifically required by statute to possess “competent . . . scientific ability.” 35 U.S.C. § 6. In practice, “[a]ll of [them] have specialized technical degrees . . . and technical experience” that are brought to bear on their specific case assignments. Gene Quinn, *PTAB Chief Judge Defends APJs as Having Extensive Legal Experience*, IPWATCHDOG (Mar. 8, 2018), <http://www.ipwatchdog.com/2018/03/08/ptab-chief-judge-defends-apjs/id=94528/> [<https://perma.cc/T6XG-72PQ>] (quoting statement by former PTAB Chief Judge David Ruschke); see also Brief Amicus Curiae of the Patent Trial and Appeal Board Bar Ass’n in Support of Neither Party at 6, *Oil States Energy Servs., LLC v. Greene’s Energy Grp., LLC*, 584 U.S. 325 (2018) (No. 16-712) (“These judges have special technical and legal expertise, and at least one of them typically has a technical background and work experience related to the subject matter of the patent in question.”); U.S. PAT. & TRADEMARK OFF., ORGANIZATIONAL STRUCTURE AND ADMINISTRATION OF THE PATENT TRIAL AND APPEAL BOARD 2, <https://www.uspto.gov/sites/default/files/documents/Organizational%20Structure%20of%20the%20Board%20May%202012%202015.pdf> [<https://perma.cc/2XJG-AK8B>] (“The Vice Chief Judges each manage a division consisting of judges and patent attorneys. Currently, there are six sections in each division . . . Each section covers a broad technical focus . . .”).

200. Cf. Paul R. Gugliuzza, *The Federal Circuit as a Federal Court*, 54 WM. & MARY L. REV. 1791, 1830–32 (2013) (arguing that “the Federal Circuit has cast many important issues as questions of law, rather than questions of fact,” circumventing deference and thereby generating concerns around “unpredictability” in litigation); William C. Rooklidge & Matthew

practical force of the stabilizing presumption of validity that follows a patent once granted.²⁰¹ That presumption applies to obviousness²⁰² and subject-matter eligibility²⁰³ challenges alike, but when the latter is treated as a de novo question of law in practice, it is of course without any real meaning.²⁰⁴

Obviousness is likely to take up most of the slack if § 101 is more tightly cabined, but it is not alone. Enablement under § 112²⁰⁵ provides another example of how the other requirements for patentability can block patent claims that are too close to abstract ideas, laws of nature, and natural phenomena. In short, enablement demands that the patent specification include enough information and detail so that one “skilled in the art” can “make and use the invention without undue experimentation.”²⁰⁶ Enablement is, in other words, about the “quid pro quo” of patent law — one can only claim what has actually been taught to the public.²⁰⁷ As a result, enablement intrinsically prevents certain kinds of overbreadth in claiming. Take, for example, the idea that

F. Weil, *Judicial Hyperactivity: The Federal Circuit’s Discomfort with Its Appellate Role*, 15 BERKELEY TECH. L.J. 725, 729 (2000) (“The familiarity and expertise of the Federal Circuit judges with issues common to the court’s specialized jurisdiction may lead them more readily to usurp the fact-finding role. Almost since its inception, the Federal Circuit has been dogged with criticism for straying from the path carefully delineated for appellate tribunals.”).

201. 35 U.S.C. § 282(a) (“A patent shall be presumed valid.”).

202. See *Microsoft Corp. v. i4i Ltd. P’ship.*, 564 U.S. 91, 97 (2011) (“In asserting an invalidity defense, an alleged infringer must contend with the first paragraph of § 282 Under the Federal Circuit’s reading of § 282, a defendant seeking to overcome this presumption must persuade the factfinder of its invalidity defense by clear and convincing evidence.”).

203. See, e.g., *Cellspin Soft, Inc. v. Fitbit, Inc.*, 927 F.3d 1306, 1319 (Fed. Cir. 2019) (“To the extent the district court departed from this principle by concluding that issued patents are presumed *valid* but not presumed *patent eligible*, it was wrong to do so.”) (emphasis in original).

204. See Sachs, *supra* note 151 (“While every court decision states that the presumption of validity applies to Section 101, the behavior of the district courts suggests that the presumption in practice has no weight. This is evidenced by the growing numbers of district court decisions that find a patent invalid on motion to dismiss”); cf. *Microsoft Corp.*, 564 U.S. at 114 (Breyer, J., concurring) (“I believe it worth emphasizing that in this area of law as in others the evidentiary standard of proof applies to questions of fact and not to questions of law Where the ultimate question of patent validity turns on the correct answer to legal questions — what these subsidiary legal standards mean or how they apply to the facts as given — today’s strict standard of proof has no application.”) (citations omitted).

205. 35 U.S.C. § 112 (“The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art . . . to make and use the same”).

206. *In re Wands*, 858 F.2d 731, 735, 737 (Fed. Cir. 1988).

207. See, e.g., *J.E.M. Ag. Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 142 (2001) (“The disclosure required by the Patent Act is ‘the *quid pro quo* of the right to exclude.’”) (quoting *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 484 (1974)); *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1345 (Fed. Cir. 2010) (en banc) (“[A] separate requirement to describe one’s invention is basic to patent law It is part of the *quid pro quo* of a patent; one describes an invention, and, if the law’s other requirements are met, one obtains a patent.”); Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155, 1186 (2002) (“As the *quid pro quo* for her period of exclusive rights over an invention, the inventor must fully disclose the invention to the public.”).

electromagnetic signals can be used to “convey intelligence between two or more places.”²⁰⁸ A patent specification may be able to teach the reader some concrete ways of putting that notion into practice (say, by telegraph wires²⁰⁹) but it could not possibly teach all applications that will eventually come to rely on that notion (say, cellular phone technology). Hence, patent claims hewing too close to impermissible subject matter — even if not solely claiming such matter — will face serious difficulty under § 112.²¹⁰

Although most § 101 reform proposals have focused on Congress, the changes suggested herein could be accomplished by legislation or Supreme Court precedent alike; they only modify judicially created tests and frameworks, and do not contravene any preexisting statutory text. Moreover, although none of the current proposals suggest precisely what is outlined above, many come close, suggesting ground for consensus and compromise. A recurring suggestion, for example, is to explicitly cabin off questions of novelty, obviousness, and enablement when determining subject-matter eligibility.²¹¹ But without also explicitly removing step two of *Alice/Mayo* — the question of whether the additional elements “involve more than performance of ‘well-understood, routine, [and] conventional activities previously known to the industry’”²¹² — this cabining would seem impossible to achieve in practice.²¹³ Another recurring suggestion is to provide narrowing definitions of abstract idea, natural law, and product of nature.²¹⁴ This

208. *O’Reilly v. Morse*, 56 U.S. 62, 76 (1853).

209. *See id.* at 76–77.

210. Indeed, although the *Morse* case is referred to by the Court as a case on subject-matter eligibility akin to that of § 101, the general academic consensus is that it represents an early exploration of enablement principles — the two have always overlapped. *Compare Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 70–72 (2012) (citing *Morse*, 56 U.S. at 42–48, for the principle that “laws of nature” or claims that “pre-empt the use of a natural law” are “not patentable”), with Taylor, *supra* note 158, at 205 (“[I]n modern terms, it is quite clear that the problem with Claim 8 in *Morse*’s patent was based on the enablement and written description requirements located in § 112 and not in § 101.”), and Jeffrey A. Lefstin, *Inventive Application: A History*, 67 FLA. L. REV. 565, 597 (2015) (“*Morse* is about disclosure and scope, not patent-eligible subject matter.”).

211. *See, e.g.*, Patent Eligibility Restoration Act of 2023, S.2140, 118th Cong. § 2(5)(C) (2023) [hereinafter *Tillis-Coons Proposal*] (“Sections 102, 103, and 112 of title 35, United States Code, will continue to prescribe the requirements for obtaining a patent, but no such requirement will be used in determining patent eligibility.”); AIPLA-IPO Proposal, *supra* note 149 (“The eligibility of a claimed invention under [§ 101] shall be determined without regard to . . . the requirements or conditions of sections 102, 103, and 112 of this title . . .”).

212. *Content Extraction & Transmission LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343, 1347–48 (Fed. Cir. 2014) (quoting *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 225 (2014)).

213. *See*, Hickey, *supra* note 46, at 22 (“Issues about what was ‘conventional’ or ‘well-understood’ at the time of the invention . . . are questions usually reserved for novelty or non-obviousness analysis.”).

214. *See, e.g.*, Tillis-Coons Proposal, *supra* note 211 § 2(5)(D)-(E) (effectively subdividing abstract ideas into “mental process[es] performed solely in the mind of a human being” and “process[es] that [are] substantially economic, financial, business, social, cultural, or

would improve the predictability of step one, but once again: if step two is left in place, the real challenge of § 101 remains. That is, how large must the delta be between what is not patentable and the invention at hand? Moving the step-two inquiry to terms like “preemption”²¹⁵ — to take another recurring suggestion — just substitutes one vague concept for another.²¹⁶ On the other hand, some proposals would eliminate step two of *Alice/Mayo*, but they do not make the critical further step of treating abstract ideas, natural laws, and products of nature as prior art for purposes of subsequent analysis under § 103.²¹⁷ As a result, those proposals would appear to permit patents on even trivial advancements over those categories. Assuming that patents on abstract ideas, natural laws, and products of nature are undesirable (if not, then simply abolish the exclusions outright), it is entirely straightforward that negligible improvements thereupon are as well.

VI. CONCLUSION

After ten years, the *Alice/Mayo* framework remains deeply unpopular and controversial, with allegations of unpredictability that appear to have real merit. Specifically, § 101 outcomes at the Federal Circuit level — at the unitary, expert, and specialized court of patent appeals — are heavily influenced by the particular judges randomly assigned to the panel. This intra-circuit split undermines legitimacy and certainty alike, and adds further evidence to support the growing consensus that § 101 doctrine has become hopelessly unpredictable in practice. By reducing *Alice/Mayo* to a single step — reallocating most of the force of *Alice/Mayo*’s step two to the more well-developed and suitable obviousness doctrine under § 103 — it may be possible to improve predictability while retaining the desirable gatekeeping features of § 101. For the last decade, Congress and the Supreme Court have

artistic” — with certain exceptions); Sachs, *supra* note 151 (“An ‘abstract idea’ means a purely mental concept that is incapable of any physical embodiment and excludes any process performed by a computer program.”).

215. See, e.g., ABA-IPL Proposal, *supra* note 146 (“A claim for a useful process, machine, manufacture, or composition of matter, or any useful improvement thereof, may be denied eligibility under this section 101 on the ground that the scope of the exclusive rights under such a claim would preempt the use by others of all practical applications of a law of nature, natural phenomenon, or abstract idea.”).

216. See Osenga, *supra* note 152, at 1228 (“[T]he ABA’s proposal introduces a new area of under-developed (or undeveloped) law that will simply continue the level of confusion about the doctrine: what constitutes and how do we assess preemption?”).

217. See, e.g., Tillis-Coons Proposal, *supra* note 211 § 3(a)(2) (“In determining whether, under this section, a claimed invention is eligible for a patent, eligibility shall be determined . . . without regard to . . . whether a claim element is known, conventional, routine, or naturally occurring . . . [or] the state of the applicable art . . .”); AIPLA-IPO Proposal, *supra* note 149 (defining prohibited subject matter as what “exists in nature independently of and prior to any human activity” and what “is performed solely in the human mind”).

given the Federal Circuit the last word on § 101; the time for intervention from one of the former is now.