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Applying Patent-Eligible Subject Matter Restrictions

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Applying Patent-Eligible Subject Matter Restrictions

*J. Jonas Anderson**

ABSTRACT

The US Supreme Court's difficulty in promulgating a standard for patent-eligibility has not gone unnoticed in the academy. Hundreds of academic conferences, including this one, have been devoted to the topic. The goal of this Article is not to solve the seemingly intractable problem of patent-eligibility doctrine. The goal of this Article is rather more modest. Instead of normatively assessing patent-eligible subject matter doctrine, this Article seeks to identify which foundational theories of patent-eligible subject matter can most readily be applied by courts and the US Patent and Trademark Office via Section 101. In doing so, this Article categorizes the various innovation theories that scholars have applied to Section 101 and analyzes whether the resulting doctrines can be predictably applied by the institutions involved in patent law. Appreciating the applicability of patent-eligible subject matter theories can assist the Supreme Court in shaping doctrine that best achieves the policy goals underlying those theories.

TABLE OF CONTENTS

I.	INTRODUCTION	268
II.	THE ROAD TO <i>ALICE CORP. V. CLS BANK</i>	271
	A. <i>The Trilogy: Benson, Flook & Diehr</i>	271
	1. <i>Gottschalk v. Benson</i>	272
	2. <i>Parker v. Flook</i>	274

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	3. <i>Diamond v. Diehr</i>	275
	B. <i>The Second Trilogy: Bilski, Mayo & CLS Bank</i>	277
	1. <i>Bilski v. Kappos</i>	277
	2. <i>Prometheus v. Mayo</i>	278
	3. <i>Alice Corp. v. CLS Bank</i>	278
III.	SECTION 101 AND INNOVATION	279
	A. <i>Category One: Preemption Theories</i>	282
	B. <i>Category Two: Innovation-Harm Theories</i>	284
	C. <i>Category Three: Over-Reward Theories</i>	285
	D. <i>Category Four: Non-Economic Theories</i>	286
IV.	SECTION 101 AS AN INNOVATION PROMOTING MECHANISM	286
	A. <i>Section 101 and Preemption</i>	287
	B. <i>Section 101 and Innovation-Harm Theories</i>	289
	C. <i>Section 101 and Over-Reward Theories</i>	292
	D. <i>Section 101 and Non-Economic Theories</i>	292
V.	CONCLUSION	292

I. INTRODUCTION

“The concept of patentable subject matter under § 101 is not ‘like a nose of wax which may be turned and twisted in any direction’”¹

— Justice Stevens in *Parker v. Flook* (1978).

The US Supreme Court has long struggled to place meaningful limits on patent law’s scope. Virtually since the inception of the patent system, there have been vigorous debates about which sorts of innovations should be eligible for patent protection and which should not.² Recently, the debate about patent-eligible subject matter has intensified considerably. Over the past three years, the Supreme Court has ruled on four patent-eligibility cases. Those cases have involved various technologies, from diagnostic methods³ to methods of

1. *Parker v. Flook*, 437 U.S. 584, 590 (1978) (quoting *White v. Dunbar*, 119 U.S. 47, 51 (1886)).

2. See Jeffrey A. Lefstin, *Inventive Application: A History*, FLA. L. REV. (forthcoming) (manuscript at 2), available at <http://ssrn.com/abstract=2398696>.

3. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1290 (2012) (finding a process to help doctors treat patients with the correct dosage of thiopurine drugs to be an unpatentable law of nature under Section 101).

hedging risk.⁴ Most recently, the Court decided *Alice Corp. v. CLS Bank*, a case involving the patent-eligibility of software.⁵

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. Hundreds of law review articles have analyzed the topic's doctrinal and theoretical underpinnings.⁶ Hundreds of academic conferences, including this one, have been devoted to the topic.⁷ Academics and industry leaders have written numerous amicus briefs to assist the Supreme Court in defining the scope of patent-eligible subject matter.⁸ Yet the proper scope of patent-eligibility remains elusive.

The goal of this Article is not to solve the seemingly intractable problem of patent-eligibility doctrine. The goal of this Article is more modest. Instead of attempting to define the precise contours of Section 101, this Article seeks to identify which of the diverse set of proposed theories embodied by Section 101 are most workable for courts and the US Patent and Trademark Office (Patent Office).⁹ In doing so, this Article categorizes the various innovation theories that scholars have applied to Section 101 and analyzes whether the resulting doctrines can be predictably applied by the institutions involved in patent law.

It is difficult, if not impossible, to catalog the entire universe of theories purporting to explain Section 101's role in the patent system. Undaunted, however, this Article creates four rough categories of

4. *Bilski v. Kappos*, 561 U.S. 593, 593 (2010) (finding a process to instruct sellers and buyers how to hedge against price fluctuations of commodities in the energy market to be an unpatentable abstract idea under Section 101).

5. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2352 (2014) (finding intermediated settlement to be an abstract idea, and its generic computer implementation unpatentable under Section 101).

6. See, e.g., Christopher Beauchamp, *Patenting Nature: A Problem of History*, 16 STAN. TECH. L. REV. 257 (2013) (analyzing the "murky" theoretical and doctrinal origins of Section 101's law of nature jurisprudence, and citing numerous law review articles throughout that discuss the basis for Section 101).

7. See, e.g., Symposium, *Patentable Subject-Matter Eligibility Today: Software, Genomics & Business Methods*, AM. U. INTELL. PROP. BRIEF (2013), available at <http://www.wcl.american.edu/secle/founders/2013/20130412.cfm> (representing a symposium held specifically to discuss the current debate on Section 101 jurisprudence).

8. See, e.g., Brief for Fifteen Law Professors as Amici Curiae in Support of Petitioners, *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107 (2013) (No. 12-398), 2013 WL 432950 (describing the opinions of fifteen academics on the scope of patentable subject matter); Brief for Amici Curiae Genentech, Inc. et al. in Support of Respondents, *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107 (2013) (No. 12-398), 2013 WL 1098262 (representing the positions of six large pharmaceutical companies on Section 101 as it relates to patenting isolated DNA).

9. The federal agency that reviews patent applications and issues patents has changed names several times throughout its 179-year history. The term "Patent Office" will be used throughout this Article.

patent-eligibility theories. First, scholars have suggested that Section 101 can promote innovation by rejecting patent applications that would effectively “preempt” a field of research: “preemption theories.” Second, some have proposed that Section 101 can promote progress by disallowing patents on whole categories of inventions that, in the aggregate, impose costs on society that exceed the benefits from patenting—“innovation harm theories.” Third, other scholars have suggested that Section 101 can promote the progress of science and the useful arts by denying patentability to inventions that would have been created even without the reward of a patent—“over-reward theories.” Fourth, a smaller group of scholars have suggested that patent-eligibility doctrine is driven not by economic concerns, but by more moralistic or ethical considerations—“non-economic theories.”

This Article argues that of the four broad theoretical categories identified herein, Section 101 is structurally best-equipped to realize the goals of the innovation harm and the non-economic theories. While difficulties certainly exist in doing so, the goals of both the innovation harm and non-economic theorists can be roughly implemented through subject-matter exclusions and are not completely subsumed within other, more doctrinally rigorous areas of patent law. Conversely, enforcement of preemption limitations via Section 101 requires information about a patent’s specific application and scope—inquiries that are not easily achieved via Section 101’s categorical approach. Achieving the goals of the over-reward theorists via Section 101 is similarly limited because of the fact-specific nature of such an inquiry. Furthermore, preemption concerns are likely better suited to another area of already existing patent doctrine: written description.

Thus, this Article argues that the Supreme Court and the Federal Circuit should avoid crafting Section 101 in an attempt to deal with preemption or over-reward concerns. Instead, the doctrine will be most effective if it is directed towards innovation-harm and non-economic goals. Section 101 can, if properly calibrated, serve some, but certainly not all, of the innovation-promoting goals of scholars.

Part II of this Article briefly describes the Supreme Court’s recent foray into patent-eligible subject matter doctrine. Study of the Court’s decisions reveals a lack of a coherent theory for Section 101’s place within patent law and innovation promotion more generally. Part III then analyzes judicial and academic theories for what role Section 101 plays within the patent system. Part III creates a taxonomy of four loose categories of Section 101 theories: preemption theories, innovation-harm theories, over-reward theories, and non-economic theories. Part IV concludes by suggesting that Section

101 is structurally better suited to monitor innovation-harm and non-economic concerns.

II. THE ROAD TO *ALICE CORP. V. CLS BANK*

Whether computer-implemented inventions are patent-eligible is a question that has vexed the Supreme Court for over forty years.¹⁰ In the early 1970s, corporations were beginning to appreciate the value of software innovations. Large companies, like IBM, began filing patent applications at the Patent Office that covered these new advancements.¹¹ In response, the Patent Office adopted a policy to deny patents on computer-based patent applications.¹² The Supreme Court reviewed this policy in a trilogy of cases in the late 1970s.¹³ In doing so, the Court attempted to infuse coherence into the doctrine of patent-eligible subject matter. Instead, these three cases thrust patent law into a state of confusion from which it struggles to extract itself to this day.

A. *The Trilogy: Benson, Flook & Diehr*

In the late 1960s, applications for software patents began arriving at the Patent Office.¹⁴ Evaluating software patents proved particularly difficult because many software claims were untethered to physical restraints.¹⁵ Unlike mechanical process claims, which

10. See Lefstin, *supra* note 2, at 7–15 (detailing how the Court has spent years wrangling over the patentability of computer-implemented process inventions, starting with the 1972 case, *Gottschalk v. Benson*, 409 U.S. 63 (1972)).

11. See Timothy B. Lee, *Will the Supreme Court Save Us from Software Patents?*, WASH. POST (Feb. 26, 2014, 1:13 PM), <http://www.washingtonpost.com/blogs/the-switch/wp/2014/02/26/will-the-supreme-court-save-us-from-software-patents/> (describing IBM's computer method patent applications in the late 1960s and 1970s).

12. See *id.* (describing the Patent Office's rejection of IBM's computer method patent application under Section 101 as an unpatentable mathematical formula); see also Examination of Patent Applications on Computer Programs, 33 Fed. Reg. 15,609, 15,610 (Oct. 22, 1968) ("The basic principle to be applied is that computer programing per se, whether defined in the form of process or apparatus, shall not be patentable.") (providing notice to industry from the Patent Office that a computer program patent application is not patentable when it can be done by pencil and paper).

13. *Diamond v. Diehr*, 450 U.S. 175 (1981); *Parker v. Flook*, 437 U.S. 584 (1978); *Benson*, 409 U.S. 63.

14. See Martin Campbell-Kelly, *Not All Bad: An Historical Perspective on Software Patents*, 11 MICH. TELECOMM. & TECH. L. REV. 191, 211, 214 (2005) (describing the history behind the rise of software patents in the 1960s based on the exponential increase in the use of increasingly faster computers, and highlighting that one of the earliest software patents granted was to Martin Goetz in 1968 for a flow charting software called Autoflow).

15. See Edward R. Hyde, *Legal Protection of Computer Software*, 59 CONN. B.J. 298, 302–03 (1985) (discussing how the Patent Office line of policy on rejecting computer software patents in the 1960s was based on its struggle that software is "mental in character" and merely

were at least limited by the physical output (for instance, cutting sheet metal), early software claims were essentially claims to algorithms performed on a computer. Such claims were generally thought to run afoul of long-standing, albeit muddled, jurisprudence forbidding patenting of processes involving steps that could be performed mentally: the so-called "mental steps doctrine."¹⁶

As software innovations began to reach the Patent Office, the Court of Customs and Patent Appeals (CCPA), the precursor to the Federal Circuit, was tasked with applying the patent statute to this new type of claim. In doing so, the CCPA developed a new approach to the mental steps doctrine that permitted the patenting of software claims. In its 1970 decision, *In re Musgrave*, the CCPA limited the mental steps doctrine in such a way that it no longer policed Section 101 patentability questions.¹⁷ Thus, after *Musgrave*, a patent could not be rejected simply because the innovative process could be performed mentally, or with the aid of a computer.

1. *Gottschalk v. Benson*

Two years after the CCPA's decision in *Musgrave*, the Supreme Court began to grapple with the patentability of software in *Gottschalk v. Benson*.¹⁸ *Benson* involved a method of converting "binary-coded decimal numerals" (BCNs) into pure binary numbers. BCNs are intermediate numerals used in methods of converting conventional decimal numerals, zero through nine, to pure binary numerals, the zeros and ones that computers employ in computations. Benson's conversion method was simple and automatic, resulting in reduced processing and reduced error. Benson's two independent claims were both rejected at the Patent Office under the office's policy of rejecting all patents on computer software.¹⁹

a "tool of the mind" because it can be broken down into a series of mental steps that could be performed by a person with pencil and paper).

16. See *id.* at 302. Under the mental steps doctrine, "a patent will not be granted on a method if an essential feature of the method consists of mental participation." *Id.* Its rationale "appears to be that a mental step is non-technological and not part of the useful arts, but rather an intellectual concept and not subject to exclusive use by a patent grant." *Id.*

17. See *In re Musgrave*, 431 F.2d 882, 893 (C.C.P.A. 1970) (limiting the use of the mental steps doctrine to determinations of definiteness under 35 U.S.C. § 112(b)).

18. *Benson*, 409 U.S. 63.

19. See *In re Benson*, 441 F.2d 682, 686 (C.C.P.A. 1971) (reversing the Patent Office's explicit rejection of independent claims 8 and 13 as unpatentable subject matter under Section 101 as part of its "blanket" policy to deny computer method claims), *cert. granted*, 405 U.S. 915 (1972), *rev'd*, 409 U.S. 63 (1972).

The CCPA reversed, citing *In re Musgrave* for the proposition that machine-implemented processes were patent-eligible.²⁰ The court held that even though claim 13 did not limit itself to machine implementation, “a process having no practical value other than enhancing the internal operation of [a] machine[] is . . . in the . . . useful arts[.]”²¹

Much of the relatively short *Benson* opinion from the Supreme Court simply quotes past Court rulings concerning process patentability.²² The opinion has been roundly criticized by both commentators and lower courts as confusing, illogical, and poorly reasoned.²³ Judge Rich of the CCPA followed *Benson* in a subsequent case, but called the Supreme Court’s reasoning “a mystery.”²⁴ Indeed, Judge Rich’s confusion is understandable. The Supreme Court in *Benson* sets out numerous, and at times conflicting, standards for process patentability.²⁵ The Court does not explain why those standards exist or from where they arise. The Court’s opinion merely provides examples of what subject matter is *not* patent-eligible.

The closest the *Benson* Court comes to providing a test for patent-eligible subject matter occurs when the Court states that “[t]ransformation and reduction of an article ‘to a different state or thing’ is *the clue* to the patentability of a process claim that does not include particular machines.”²⁶ The word “clue” leaves uncertain the Court’s true holding however, and indeed the Court later backs away from this standard: “We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.”²⁷ In reversing the CCPA and invalidating *Benson*’s patent, the Supreme Court cast doubt on the future of software patentability generally,

20. See *id.* (citing *In re Musgrave*, 431 F.2d 882, alongside three other computer method cases).

21. *Id.* at 688.

22. 1 DONALD S. CHISUM, CHISUM ON PATENTS § 1.03[6][c] n.286 (2013) (listing previous Court cases regarding process patentability cited by the *Benson* Court).

23. See, e.g., Donald R. Dunner et al., *Nonstatutory Subject Matter*, 14 JURIMETRICS J. 112 (1973); Michael A. Duggan, *Patents on Programs? The Supreme Court Says No*, 13 JURIMETRICS J. 135 (1973). Judge Rich, then Chief Judge of the CCPA, openly criticized the *Benson* decision in opinions. See, e.g., *In re Christensen*, 478 F.2d 1392, 1396 (C.C.P.A. 1973) (Rich, J., concurring).

24. *Christensen*, 478 F.2d at 1396 (Rich, J., concurring).

25. Lefstin, *supra* note 2, at 7 (“*Benson* invoked multiple rationales for unpatentability without definitively committing to any of them.”).

26. *Benson*, 409 U.S. at 70 (emphasis added) (quoting *Cochrane v. Deener*, 94 U.S. 780, 788 (1896)). The Federal Circuit would pick up on *Benson*’s non-definition nearly thirty years later in the case that reignited the Supreme Court’s interest in the topic. See *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008), *cert. granted*, 556 U.S. 1268 (2009), *aff’d*, 561 U.S. 593 (2010).

27. *Benson*, 409 U.S. at 71.

suggesting that only Congress could protect such technology by amending the patent statute.

In the wake of the *Benson* decision, the CCPA and the Patent Office struggled to implement the case's confusing holding.²⁸ For all of its many limitations, the *Benson* holding does succeed in clearly stating that algorithms, laws of nature, and mathematical formulas were not eligible for patent protection, and both the courts and the Patent Office latched on to this statement in an effort to guide the patenting of software. Software innovators, however, adjusted to the new limitations by drafting their claims in a more concrete fashion. Instead of drafting their software claims as processes, they began drafting them as machines—computers with the capability of performing the steps that the software was designed to implement. The CCPA found that such claiming practices met the limitations of Section 101.²⁹

2. *Parker v. Flook*

The Supreme Court granted certiorari in *Parker v. Flook* to address the issue of software claimed as a machine.³⁰ Flook's patent application covered a method for updating the value of an alarm limit. The limit was based upon a variable involved in the process of catalytic chemical conversion of hydrocarbons. The method consisted of three steps: first, measuring the value of the variable; second, using the algorithm to calculate an updated alarm limit; and third, adjusting the alarm limit to the newly calculated value. The patent office had initially rejected the patent, citing *Benson*.³¹ But the CCPA reversed, distinguishing *Benson* by noting that the applicant claimed more than merely an algorithm. In the eyes of the CCPA, the

28. A number of patent-eligible subject matter cases arose after *Benson* and before *Flook*, many of which were accompanied by strong dissents and concurrences. See, e.g., *In re Chatfield*, 545 F.2d 152 (C.C.P.A. 1976) (reversing rejection of method claims for improving the efficiency of digital computers running multiple programs simultaneously); *In re Noll*, 545 F.2d 141 (C.C.P.A. 1976) (reversing rejection of a system and apparatus claim for the display of text on a cathode ray tube); *In re Johnston*, 502 F.2d 765 (C.C.P.A. 1974) (reversing a rejection of apparatus claims covering a record-keeping machine); *In re Christensen*, 478 F.2d 1392 (affirming rejection of claims to gathering data on subsurface formation and then computing porosity information).

29. See *In re Johnston*, 502 F.2d at 771 (reversing the Patent Office's rejection of a patent application on a computer that could perform certain automatic financial record keeping, in large part because the claims were directed to an apparatus—a computer—and not an algorithmic process). But see *id.* at 773 (Rich, J., dissenting) (finding that the form of claim drafting should not determine the patentability of an invention).

30. See *Parker v. Flook*, 437 U.S. 584, 587–88 (1978).

31. *Id.* at 587.

additional “post-solution activity”—updating the alarm limit—was sufficient to render the application patent-eligible.³²

The Supreme Court reversed, holding that “post-solution activity” did not render otherwise unpatentable algorithms patentable.³³ The Court recognized that claim drafters had adapted to *Benson*’s limits on patenting of non-physical methods by attaching software and other claims to some physical component: “A competent draftsman could attach some form of post-solution activity to almost any mathematical formula.”³⁴ In order to avoid exalting form over substance, the Supreme Court crafted a rule that would consider “algorithms” as prior art, regardless of the novelty of the algorithm itself.³⁵

Flook provided a clarification and extension of *Benson* and was certainly more clearly reasoned. However, the opinion muddled the distinction between the subject-matter eligibility inquiry (Section 101 of the Patent Act) from the previously distinct inquiries into novelty and obviousness (Sections 102 and 103). Under *Flook*, the patent-eligibility inquiry turned on questions of the inventiveness of combining an algorithm with post-solution activity—such inventiveness inquiries have traditionally been the purview of Sections 102 and 103 of the patent statute.³⁶

3. *Diamond v. Diehr*

Finally, in 1980, the Supreme Court examined software patent-eligibility for what would prove to be the last time in nearly thirty years. *Diamond v. Diehr* involved a patent application for an improved method of operating a molding press for rubber manufacture.³⁷ Prior to Diehr’s invention, the Arrhenius equation³⁸ was used to calculate the cure time for rubber articles. Diehr’s method involved repeated temperature measurements and repeated calculations of the Arrhenius equation based on these measurements, as well as automatic opening of the press once the cure time was

32. See *id.*

33. See *id.* at 590.

34. *Id.*

35. See *id.* at 590–91.

36. See *Flook*, 437 U.S. at 600 (Stewart, J., dissenting).

37. See *Diamond v. Diehr*, 450 U.S. 175, 177 (1981).

38. *In re Diehr*, 602 F.2d 982, 983–84 (C.C.P.A. 1979) (describing the applicability of the Arrhenius equation for reacting time during the curing process as $\ln v = CZ + x$, where v is the total required cure time, C is the activation constant based upon the batch of material to be cured, Z is the temperature in the mold, and x is a constant based on the measurements of the mold), *cert. granted*, 445 U.S. 926 (1980), *aff’d*, 450 U.S. 175 (1981).

complete. Diehr claimed the general method, as well as the method used with a digital computer.³⁹

In a five-to-four decision, the Court held that Diehr's invention was patent-eligible.⁴⁰ "Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws."⁴¹ Unlike the situation in *Flook*, the Court reasoned, Diehr's application did not seek to foreclose all uses of an algorithm, but rather was confined to a particular application of that algorithm.⁴² Of course, *Flook*'s application was also limited to an application involving an alarm limit, as the dissent in *Diehr* effectively demonstrates.⁴³ Thus, commentators have noted that it is quite difficult to distinguish the facts in *Diehr* from those in *Flook*.⁴⁴

Ultimately, *Diehr*, in combination with *Flook* and *Benson*, led to confusion among lower courts and the Patent Office regarding the patent-eligibility of software.⁴⁵ Following *Diehr*, patent attorneys adapted by "claiming newly formulated mathematical equations alongside some sort of physical manifestation."⁴⁶ In light of the ongoing confusion, courts adopted a simple presumption of patent-eligibility following *Diehr*.⁴⁷

Indeed, the Federal Circuit (the appellate court created in 1982 to handle patent appeals) modified its Section 101 jurisprudence at various times over the following two decades, but ultimately settled on broad patent-eligibility standards.⁴⁸ In its 1998 decision in *State*

39. *In re Diehr*, 602 F.2d at 985, 987 (evaluating claims 11 and 1, the general mathematical formula claim and the computer process claim respectively).

40. *See Diehr*, 450 U.S. at 193.

41. *Id.* at 184.

42. *See id.* at 187.

43. *See id.* at 209 (Stevens, J., dissenting).

44. *See* Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CALIF. L. REV. 1, 9 (2001) ("*Diehr* seems difficult to distinguish from *Flook*."); Kevin Emerson Collins, *Propertizing Thought*, 60 SMU L. REV. 317, 349 (2007) ("*Flook* and *Diehr* are difficult to reconcile.").

45. The CCPA adopted a two-part test: (1) whether an algorithm was present in the claims and, (2) if so, whether it is "applied in any manner to physical elements or process steps . . ." *In re Abele*, 684 F.2d 902, 905-907 (C.C.P.A. 1982) (quoting *In re Walter*, 618 F.2d 758, 767 (C.C.P.A. 1980)).

46. John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1152 (1999).

47. *See* Collins, *supra* note 44, at 349-50 (describing how *Diehr* led to the "default presumption of a method being applied rather than abstract," in large part because *Diehr* chronologically followed *Flook*).

48. *See* Thomas, *supra* note 46, at 1153 ("Because general purpose computers could be conceived as special purpose computers once instructed by software, virtually any fragment of software code could be viewed as statutory subject matter."); *see also* John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 612 (2009) (noting that

Street Bank and Trust Co. v. Signature Financial Group, Inc., the Federal Circuit held that any method that produced a “useful, concrete, and tangible result” and met the other statutory requirements for patentability could be patented.⁴⁹ The permissive standard enunciated in *State Street Bank* led to a flood of software and business method patents at the Patent Office.⁵⁰

B. The Second Trilogy: *Bilski*, *Mayo* & *CLS Bank*

1. *Bilski v. Kappos*

After *Diehr* was decided in 1980, the Supreme Court took a thirty-year hiatus from patent-eligibility cases. In 2010, the Court renewed its interest in patent-eligibility by deciding *Bilski v. Kappos*, a case involving a patent on a method for “managing . . . consumption risk.”⁵¹ The Court held that the patent was directed to non-eligible abstract ideas. Reiterating its previous holdings in *Benson*, *Flook*, and *Diehr*, the Court excluded three categories from the patent-eligible subject matter inquiry: abstract ideas, laws of nature, and natural phenomenon.⁵² The majority narrowly rejected the call to categorically deny patents to “business methods,” and limited the Federal Circuit’s recently developed “machine or transformation” test to a “useful and important clue” in the eligibility analysis.⁵³

The majority’s analysis in *Bilski* gives little insight into what defines an unpatentable “abstract idea.” The Court merely declared that *Bilski*’s claims were directed to an abstract idea without explaining what distinguishes that idea from any other. Although the patent in *Bilski* contained numerous dependent, narrower claims, the Court found that those claims were simply examples of how to use the unpatentable abstract idea.⁵⁴ Thus, *Bilski* reinvigorated *Diehr*, essentially overturning thirty years of Federal Circuit

the Federal Circuit and the CCPA changed the legal rules of Section 101 patentable subject matter a minimum of three times between 1979 and 2009).

49. See *State St. Bank & Trust v. Signature Fin. Grp.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998) (quoting *In re Alappat*, 33 F.3d 1526, 1544 (Fed. Cir. 1994)).

50. *In re Bilski*, 545 F.3d 943, 1004 (Fed. Cir. 2008) (Mayer, J., dissenting) (describing a “legal tsunami” after *State Street* in which business method applications increased tenfold), *cert. granted*, 556 U.S. 1268 (2009), *aff’d*, 561 U.S. 593 (2010); John R. Allison & Starling D. Hunter, *On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods*, 21 BERKELEY TECH. L.J. 729, 730–31 (2006) (“[*State Street*] was quickly followed by a dramatic increase in the number of applications for and grants of business method patents.”).

51. *Bilski v. Kappos*, 561 U.S. 593, 614–15 (2010).

52. See *id.* at 609–10.

53. See *id.* at 604–06.

54. See *id.* at 611.

experimentation with subject matter doctrine, while providing little guidance about how to fill the doctrinal void.

2. *Prometheus v. Mayo*

Two years after deciding *Bilski*, the Supreme Court decided yet another subject matter eligibility case: *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*⁵⁵ The patent in *Mayo* was directed towards a method of calibrating the dosage of a drug in a patient. The patented method consisted of the steps: (1) “measuring” the levels of 6-Thioguanine in patients who had received a particular drug, (2) “analyzing” whether the level fell within one of three ranges, and (3) increasing, decreasing, or maintaining the dosage level based on that analysis.⁵⁶

According to the Court, the relationship between metabolite level and drug efficacy was simply a law of nature and therefore not eligible for patent protection. Everything else contained in the patent, i.e., taking measurements of blood levels, was nothing more than “well-understood, routine, conventional activity already engaged in by the scientific community.”⁵⁷ For the Court, that conventional scientific activity was insufficient to transform the non-patentable law of nature into a patent-eligible application.

The reasoning of the *Mayo* case focuses on the breadth of the idea sought to be captured by the patent. Justice Breyer explained that in order to patent an application of a law of nature, the patent must “also contain other elements or a combination of elements, sometimes referred to as an ‘inventive concept,’ sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law itself.”⁵⁸ This concern with preempting the use of scientific information harkens back to the Court’s decision in *Flook*.⁵⁹

3. *Alice Corp. v. CLS Bank*

In 2014, the Supreme Court granted certiorari in yet another patent-eligibility case: *Alice Corp. v. CLS Bank*. The patents at issue in *Alice* relate to a computerized trading platform in which a third

55. 132 S. Ct. 1289 (2012).

56. See *id.* at 1295.

57. *Id.* at 1298.

58. *Id.* at 1294.

59. See Lefstin, *supra* note 2, at 12 (noting Justice Breyer is harkening back to *Flook* by requiring an “inventive concept” beyond a mathematical equation to ensure patent-eligibility, such that the invention in practice amounts to more than a monopoly of a law of nature).

party is used to eliminate “settlement risk.”⁶⁰ The *en banc* Federal Circuit held the claims covered non-eligible subject matter, but could not agree on why. The only conclusion that received a majority was a single paragraph of the per curiam opinion:

Upon consideration en banc, a majority of the court affirms the district court’s holding that the asserted method and computer-readable media claims are not directed to eligible subject matter under 35 U.S.C. § 101.⁶¹

Six other opinions were issued by the ten-member panel: one concurrence, two opinions that concurred in some aspects of the decision and dissented from others, one partial dissent, one full dissent, and “additional reflections” by former Chief Judge Rader.

Relying on its holding in *Mayo*, the Supreme Court reiterated its two-part test for determining patent-eligibility. First, one must determine whether the claims were directed to “patent-ineligible concepts,” such as abstract ideas or laws of nature.⁶² Second, if the claim is directed to such concepts, one must determine whether the additional steps of the claim “transform the nature of the claim” into patent-eligible subject matter.⁶³ The *Alice* framework and the excluded concepts under Section 101 are largely driven by preemption concerns.⁶⁴ For the Court, allowing patents covering the “basic tools of scientific and technological work” would tend to impede the progress of science.⁶⁵

III. SECTION 101 AND INNOVATION

The Supreme Court’s patent-eligible subject matter jurisprudence has proven difficult for courts to apply consistently.⁶⁶ As the Court noted in *Bilski*, a textualist reading of Section 101 would permit “any” process that is new, non-obvious, and sufficiently described to be eligible for patent protection.⁶⁷ Yet the Court has looked beyond the statute, consistently holding that certain processes

60. See *CLS Bank Int’l v. Alice Corp. Pty.*, 768 F. Supp. 2d 221, 224 (D.D.C. 2011), *aff’d*, 717 F.3d 1269 (Fed. Cir. 2013) (*en banc*) (per curiam), *cert. granted*, 134 S. Ct. 734 (2013), *aff’d*, 134 S. Ct. 2347.

61. *Id.*

62. See *Alice Corp. Pty. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014).

63. See *id.* (quoting *Mayo*, 132 S. Ct. at 1297).

64. See *id.* at 2354.

65. *Id.* (quoting *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2116 (2013)).

66. See Thomas, *supra* note 46, at 1165 (“[A]rticulation of a useful typology between technology and other aspects of human culture has proven exceptionally difficult.”). Thomas notes that distinguishing human engagement from the artificial has confounded “even epistemologists and the most accomplished of technological observers.” *Id.*

67. See *Bilski v. Kappos*, 561 U.S. 593, 603 (2010).

are outside of the scope of patent law. The current collection of unpatentable subject matter—abstract ideas, laws of nature, and natural phenomena—is difficult to define and thus exclude from patenting.⁶⁸ Part of that difficulty stems from the lack of a consistent theoretical underpinning for the doctrine. Numerous commentators have lamented the lack of purposeful theoretical guidance on Section 101's policy objectives.⁶⁹

Before delving into the literature on the theoretical foundations of patent-eligibility jurisprudence, it should be noted that some commentators—and judges for that matter—dismiss the notion that Section 101 serves any independent function. For instance, Michael Risch has argued that the rigorous application of patent standards such as obviousness, utility, novelty, and written description will invalidate any claim that would be unpatentable under Section 101.⁷⁰ In Risch's view, the subject matter inquiry serves no unique role in separating good patents from bad, and therefore should be abandoned.⁷¹ Scott Kieff has made a similar argument based on economic principles. Kieff views Section 101 as an economically unjustifiable administrative hurdle for the Patent Office, requiring hundreds of examiner man-hours with very little benefit for the innovation system.⁷² Indeed, even a former Chief Judge of the Federal Circuit expressed the view that Section 101 is merely a "coarse eligibility filter."⁷³ In former Chief Judge Rader's view, "[t]he plain language of the statute provides that any new, non-obvious, and fully disclosed technical advance is eligible for protection."⁷⁴

68. See *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124, 134 (2006) ("[T]he category of non-patentable '[p]henomena of nature,' like the categories of 'mental processes,' and 'abstract intellectual concepts,' is not easy to define."); see also *Parker v. Flook*, 437 U.S. 584, 589 (1978) ("The line between a patentable 'process' and an unpatentable 'principle' is not always clear.").

69. See, e.g., Bernard Chao, *Moderating Mayo*, 107 NW. U. L. REV. 423 (2012); Dennis Crouch & Robert P. Merges, *Operating Efficiently Post-Bilski by Ordering Patent Doctrine Decision-Making*, 25 BERKELEY TECH. L.J. 1673 (2010); Pamela Samuelson & Jason Schultz, *Clues for Determining Whether Business Methods and Service Innovations Are Unpatentable Abstract Ideas*, 15 LEWIS & CLARK L. REV. 109 (2011).

70. See Michael Risch, *Everything Is Patentable*, 75 TENN. L. REV. 591, 591 (2008) (arguing for "rigorous patentability" to replace the focus on subject matter eligibility); see also Kristen Osenga, *Ants, Elephant Guns, and Statutory Subject Matter*, 39 ARIZ. ST. L.J. 1087, 1092 (2007) (arguing software should be subject to the same "pro forma" requirements for subject matter eligibility as other inventions).

71. See Risch, *supra* note 70, at 594–95.

72. See F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent Obtaining Rules*, 45 B.C. L. REV. 55, 107–08 (2003).

73. *Ultramercial, Inc. v. Hulu, LLC*, 722 F.3d 1335, 1341 (Fed. Cir. 2013) (quoting *Research Corp. Techs. v. Microsoft Corp.*, 627 F.3d 859, 869 (Fed. Cir. 2010)), *vacated*, *WildTangent, Inc. v. Ultramercial, LLC*, 134 S. Ct. 2870 (2014).

74. *Id.*

The majority of scholars, however, 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 101.⁷⁵ For the sake of this Article's applicability analysis, such an assumption is necessary; thus this Article will follow the suggestion of most scholars that Section 101 plays an independent filtering role in the patent system.

Academic disputes about patent-eligible subject matter usually revolve around what sorts of otherwise eligible applications should be rejected.⁷⁶ Unfortunately, no consensus exists for the theoretical value of the doctrine. This lack of a coherent policy narrative for Section 101 is at the heart of the confused jurisprudence surrounding patentable subject matter.

While there is no consensus regarding the proper role of Section 101, there is general agreement, though not unanimity, among scholars that the doctrine is directed towards the innovation-promoting goals outlined in the Constitution: "[T]o promote the Progress of Science and the useful Arts."⁷⁷ Of course the extent to which a single patent promotes innovation is an extremely complex inquiry.⁷⁸ This empirical gap, however, has not discouraged courts and commentators from looking to Section 101 to further the innovative agenda.

In spite of the wealth of Section 101 literature, significantly less work has been directed towards identifying which innovation-promotion theories are best administered through Section 101.⁷⁹ This Part begins to fill that gap by reviewing the literature on

75. See, e.g., Pamela Samuelson, *Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1033–34 (1990) (arguing that the extent of patentable subject matter should not be read to overlap with the broad meaning of the term "process").

76. As Rob Merges has noted, "no . . . consensus on what patents are meant to protect exists today." Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 586 (1999).

77. U.S. CONST. art. 1, § 8, cl. 8.

78. See, e.g., Thomas F. Cotter, *A Burkean Perspective on Patent Eligibility*, 22 BERKELEY TECH. L.J. 855, 878 n.129 (2007) ("Put another way, no one is sufficiently well-informed to know how to craft the patent eligibility requirement so as to maximize the surplus of social benefits over social costs."); Duffy, *supra* note 48 at 618 ("[T]he ultimate policy judgment—the extent to which the potentially positive effects of patents are outweighed by their potentially negative effects—has long been recognized as unknown given the current state of human knowledge.").

79. See Kevin Emerson Collins, *Claims to Information Qua Information and a Structural Theory of Section 101*, 4 I/S: J.L. & POL'Y FOR INFO. SOC'Y 11, 22–23 (2008) (noting that many theories of Section 101 lack "narrative and policy coherence that serves as a breakwater to prevent the further erosion of the doctrine of subject matter patentability").

Section 101 and creating a loose grouping of four innovation theories from that literature: preemption theories, innovation-harm theories, over-reward theories, and non-economic theories.

A. Category One: Preemption Theories

The first category of patent-eligible subject matter theories that courts and scholars have identified are preemption theories. The basic concern of preemption theorists is that granting overbroad patents or patents that cover fundamental discoveries will severely restrict follow-up innovation. Section 101, the argument goes, should eliminate patent-protection for innovations that would impede progress by propertizing fundamental scientific principles. Preemption language is often employed by courts striking down patents on Section 101 grounds.

The Supreme Court's recent jurisprudence has been largely shaped by preemption rationales. For instance, in *Mayo*, the Court expressed concern that permitting a patent on a diagnostic procedure would result in a patent on the relationship between metabolite levels and drug efficacy. Justice Breyer wrote that patents must be directed to "significantly more than a patent upon the natural law itself."⁸⁰ This concern with the patenting of laws of nature stretches back through the Supreme Court's jurisprudence on patentable subject matter. In *Bilski*, for instance, the Court stated that upholding Bilski's patent would "pre-empt use of this approach in all fields"⁸¹ Similarly, in *Diehr*, the Supreme Court permitted a patent on a method of curing rubber using the Arrhenius equation because it did not "pre-empt use of that equation."⁸²

Preemption theories also inform the Court's concern with patents covering "basic tools of scientific research." If such tools are patentable, it is argued innovation will be harmed because that basic tool is removed from the public domain. Thus, basic research tools should be preserved in the public domain for all to use. It is thought that if such tools were to be patented, it would impede—not promote—innovation because a fundamental tool for a wide variety of research would be exclusively owned by a single entity. As the Court stated in *Alice*, the jurisprudence on Section 101 has been driven by preemption concerns.⁸³

80. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1294 (2012).

81. *Bilski v. Kappos*, 561 U.S. 593, 612 (2010).

82. *Diamond v. Diehr*, 450 U.S. 175, 187 (1981).

83. *See Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2358 (2014).

The Supreme Court has expressed concern over granting patents on basic research tools when discussing the excluded “laws of nature” category for patent-eligible subject matter.⁸⁴ The argument has a compelling narrative heft because in no other patent doctrine is there concern for the degree of fundamentality of the invention. If policy makers are concerned with granting patents that may create a bottleneck for further innovation,⁸⁵ Section 101 provides a superficially attractive policy lever to utilize.

Scholars, as well as courts, have suggested that Section 101 can be explained as a bar on patents that have too great of a scope. For instance, Kevin Collins has argued that any invention in which the information contained in the disclosure is the claimed invention should be invalidated under Section 101.⁸⁶ In other words, the claiming and disclosing duality of the patent statute forecloses the patenting of “information *qua* information” because the invention is merely the information contained in the disclosure.⁸⁷ One could not simultaneously enjoy exclusive rights in the information as well as disclose the information for public consumption. For Collins, Section 101 acts as the protector of the encroachment of the inventor’s right to exclude onto the access of the public.⁸⁸

Collins acknowledges that the lack of a reliable taxonomy to distinguish purely informational claims from allowable claims, which are applications of information, undermines his structural reading of Section 101.⁸⁹ But Collins’ work is a strong jumping-off point for imbuing coherency into the policies behind Section 101. Collins identifies Section 101 as the primary guardian of the distinction that underlies the patent system’s claim as an innovation producer.⁹⁰ Thus, while recognizing the difficulty of the endeavor, Collins’ work must be lauded for conceptualizing Section 101’s unique role in innovation policy.

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

85. Prospect theorists would argue that basic research patents are not something that the patent system should seek to invalidate. Research patents will be licensed to those in position to most efficiently take advantage of potential downstream developments. See, e.g., Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 266 (1977) (arguing that broad, “prospect” patents are socially beneficial because they encourage coordination among technologists).

86. See Collins, *supra* note 79, at 12–13.

87. See *id.* at 24.

88. See *id.*

89. See *id.* at 27.

90. See *id.* at 19–22.

B. Category Two: Innovation-Harm Theories

A second category of theories infuses Section 101 with utilitarian concerns. This group of theories posits that certain patents, or categories of patents, extract a public cost that exceeds the public benefit that the patent provides. While similar to preemption theories, innovation-harm is much broader. Instead of excluding only foundational advances from patenting, as preemption theories would, innovation-harm theories would deny a patent to any application that would reduce social welfare.

Many theorists in this vein propose eliminating patents in certain industries. Over twenty years ago, Pamela Samuelson argued against software patenting, noting predictions “that patents may be harmful to the software industry, computer science, mathematics, or society as a whole have been quite frequent, even from some of the most well-known people in the software and computer science fields.”⁹¹ Jay Thomas has argued that patents in the liberal professions inhibit “the ability of a profession to serve the public good.”⁹² Many scholars have called for the end of business method patents.⁹³

James Bessen and Michael Meurer have empirically demonstrated that software and business method patents have much higher litigation rates than other types of patents.⁹⁴ They attribute this problem, in part, to the “unclear boundaries” that they see as typical of such patents.⁹⁵ While Bessen and Meurer do not propose that such litigation problems be addressed via Section 101, other commentators building on Bessen and Meurer’s work have proposed precisely that.⁹⁶

The reasons that commentators feel that Section 101 is the proper policy lever to weed out the categories of patents that harm the functioning of the patent system are not always clear. There is some

91. Samuelson, *supra* note 75, at 1133.

92. Thomas, *supra* note 46, at 1176.

93. See, e.g., Peter S. Menell, *A Method for Reforming the Patent System*, 13 MICH. TELECOMM. & TECH. L. REV. 487 (2007).

94. See JAMES BESSEN & MICHAEL MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 150–55 (2008) (finding software patents approximately twice as likely and business method patents approximately seven times as likely to be litigated as other patents).

95. *Id.* at 187.

96. See, e.g., Gerard N. Magliocca, *Blackberries and Barnyards: Patent Trolls and the Perils of Innovation*, 82 NOTRE DAME L. REV. 1809, 1819–25 (2007) [hereinafter Magliocca, *Blackberries*]; Gerard N. Magliocca, *Patenting the Curve Ball: Business Methods and Industry Norms*, 2009 BYU L. REV. 875, 891 (2009) [hereinafter Magliocca, *Curve Ball*] (arguing for a modified Section 101 standard that “would be a positive reform because of the poor notice and costly litigation now associated with these [business method] patents”).

sense in the literature that the reason certain classes of methods are litigation-prone is their abstract quality. Particular types of methods, it is argued, have inherently vague boundaries and thus are more easily infringed inadvertently or leveraged in licensing negotiations.⁹⁷ Others point to the relatively low cost of innovation in certain technologies that militates against granting patents on those technologies. For instance, David Olson has proposed that patentable subject matter doctrine be employed as a means of directly evaluating the costs and benefits of individual patents.⁹⁸ According to Olson: “[T]he optimal solution may be to assign an administrative agency the task of conducting explicit utilitarian analysis and rulemaking in determining what types of innovation should be patentable.”⁹⁹

C. Category Three: Over-Reward Theories

Another flavor of the utilitarian foundation of Section 101 views patentable subject matter’s role as policing the line between those ideas that would be created without patent protection, and would thus enter the public domain freely, from those that require a patent in the first place to incentivize the investment into their creation.¹⁰⁰ Many theorists calling for restrictions on patent-eligible subject matter argue that some patent-eligible inventions would have been developed absent any patent system in the first place, and therefore should not be rewarded with an exclusionary right. For example, some have argued that business method innovations flourished before patent protection, indicating that the current levels of patent protection for business methods are unnecessary and wasteful.¹⁰¹ The creation of novel business methods is thought to be sufficiently incentivized by first-mover advantage, complementary

97. See, e.g., BESSEN & MEURER, *supra* note 94, at 23 (noting that software patents are more likely to have claim construction appealed, indicating a “fundamental uncertainty over the boundaries of these patents”); Magliocca, *Curve Ball*, *supra* note 96, at 887–88 (“What makes business method patents so litigation-prone is their abstract quality, which provides weak notice for firms and increases the probability of inadvertent infringement.”).

98. See David Olson, *Taking the Utilitarian Basis for Patent Law Seriously: The Case for Restricting Patentable Subject Matter*, 82 TEMP. L. REV. 181, 200 (2009).

99. *Id.* at 185.

100. See *Bilski v. Kappos*, 561 U.S. 593, 650 (2010) (Stevens, J., dissenting) (“On one side of the balance is whether a patent monopoly is necessary to ‘motivate the innovation’” (quoting *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 63 (1998))); J. Jonas Anderson, *Secret Inventions*, 26 BERKELEY TECH. L.J. 917 (2011).

101. See, e.g., Rochelle C. Dreyfuss, *Are Business Method Patents Bad for Business?*, 16 SANTA CLARA COMPUTER & HIGH TECH. L.J. 263, 264 (2000) (noting that frequent flier miles and junk bonds are business innovations that were developed without patent protection).

assets, and secrecy.¹⁰² Indeed, many of the calls to eliminate software patents rely on the over-reward rationale.¹⁰³ The ultimate goal of over-reward theorists is to identify those patents that would not have been developed absent a patent system and reward those patents—and only those patents—with an exclusive right to make, use, and sell.

D. Category Four: Non-Economic Theories

While most of the writings on Section 101, from both courts and commentators, have focused on the economics of patenting, a smaller group has argued that non-economic rationales also play a doctrinal role. Tun-Jen Chiang has described patentable subject matter doctrine as being “often about non-economic moral values.”¹⁰⁴ Chiang theorizes that courts often use Section 101 to make non-economic decisions, often based on things such as the dignity of the human body, the inviolability of nature, and freedom of thought.¹⁰⁵ While Chiang’s argument is largely descriptive, his argument is that the courts are relying on non-economic rationales in deciding patentable subject matter disputes.¹⁰⁶ Similarly, others have noted that non-economic rationales have played prominent roles in recent high-profile, patent-eligible subject matter disputes such as whether genes are patent-eligible.¹⁰⁷

IV. SECTION 101 AS AN INNOVATION PROMOTING MECHANISM

The previous Part attempted to categorize the various strands of academic theories explaining patent-eligible subject matter doctrine. This Part argues that the doctrine is better equipped to carry the theoretical heft of some of those theories than it is others. First, Section 101 is ill-suited to monitor preemption concerns because

102. See *id.* at 275.

103. See, e.g., Samuelson, *supra* note 75, at 1136 (“The fact that [the software industry’s] growth has occurred without the aid of patent protection is powerful evidence that patent protection is not necessary for the software industry to thrive.”).

104. Tun-Jen Chiang, *Competing Visions of Patentable Subject Matter*, GEO. WASH. L. REV. (forthcoming) (manuscript at 3), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2469415&download=yes.

105. See *id.* (manuscript at 17–28).

106. See *id.*

107. See Jorge L. Contreras, *Narratives of Gene Patenting* 42–45 (Univ. of Utah Coll. of Law, Research Paper No. 90, 2014), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2485681 (describing the “access narrative” of the *Myriad Genetics* case); see also Margo A. Bagley, *Patent First, Ask Questions Later: Morality and Biotechnology in Patent Law*, 45 WM. & MARY L. REV. 469, 517–530 (2003) (describing the role of morality in international patent-eligibility decisions).

preemption theories require decision-makers to compare the scope of a patent claim to the scope of a scientific principle—scope inquiries that decision-makers are incapable of making. Furthermore, scope-of-rights concerns, like preemption, are more effectively monitored by other doctrines, namely Section 112.

Section 101 is more likely to be an effective tool at policing innovation-harm and over-reward theories, but only to the extent that those concerns can be satisfied by categorical exclusions and not case-by-case decisions. Some strands of innovation-harm and over-reward theories are premised on categorical exclusions: for example, calls for the elimination of software, business method, and other types of patents are common. While difficulty remains in making categorical distinctions, those sorts of distinctions could conceivably be monitored by the Patent Office using subject-matter eligibility doctrine.

Lastly, to the extent that non-economic theories are relevant to patent-eligible subject matter doctrine, Section 101 represents a useful tool for making relevant theoretical distinctions. But the doctrine's usefulness in this context may be limited to the courts. Courts are more comfortable than government agencies (like the Patent Office) in making moralistic distinctions. Thus, moralistic concerns can likely be effectively analyzed in litigation, but not during examination.

A. *Section 101 and Preemption*

Virtually all preemption tests require decision-makers to compare the scope of the patent claims to the scope of the scientific principle behind the claims. For instance, in *Mayo*, the Court determined that the claims covering (1) administering a drug, (2) determining the patient's level of T-G, and (3) making an inference as to drug's efficacy based on predetermined metabolite ranges were not sufficiently distinct from the natural law upon which the method was based. Similarly, in *Bilski*, the Court found the patentee's claims covering a method of hedging risk in the energy industry were so broad as to capture the principle of risk hedging in all other fields.

Whatever the merits of a preemption theory—and there are many—the theory is ill-suited to a threshold exclusion test like patent-eligible subject matter. The Patent Office is ill-equipped to properly determine the scope of the claims or the scope of the scientific principle underlying the claims, both of which are necessary for preemption tests. During examination, the Patent Office is concerned exclusively with validity concerns. The agency does not interpret the scope of the claims, other than to determine whether the claims cover

prior art.¹⁰⁸ Indeed, the Patent Office construes patent claims with the “broadest, reasonable interpretation of the claims,” a standard that differs from the one applied by courts when enforcing a patent.¹⁰⁹ Applying the broadest reasonable construction means that the Patent Office never determines the actual scope of the patent. It is therefore unable to compare claim scope for purposes of preemption.

Similarly, the Patent Office does not devote any resources towards determining the scope of the scientific principles underlying a patent. The office does not require patent applicants to identify the principles that underlie a patent application, nor does it require applicants to disclose non-claimed aspects of the scientific principle, unless those unclaimed aspects consist of relevant prior art. Indeed, making such an inquiry would require huge resources, requiring examiners to not only understand and evaluate the new technology in the patent, but also all other potential uses of the science behind the technology. For an office already under severe budget and time constraints, devoting vast numbers of hours towards unclaimed science seems like an inefficient allocation of resources.

Preemption theories are also a poor fit for Section 101 because of confusion about the level of abstraction to be employed. For instance, in *Bilski*, the Court framed the patent claims as covering a method of hedging risk. This claim was thus easily found to be preemptive of risk hedging more broadly. However, many of the claims were much narrower than the Court’s characterization. Some limited the method to particular types of risk,¹¹⁰ others to particular industries,¹¹¹ and others still to the particular calculations required to hedge.¹¹² Had the Court framed the claim as hedging weather-related risk in the energy industry by employing the formula $F_i + [(C_i + T_i + LD_i) \times (\alpha + \beta E(W_i))]$ and performing a Monte Carlo simulation across all transactions from a number of years of historical weather patterns—as required in claim 7—it would seem much less obvious that such a method preempts risk hedging generally. There is

108. See John R. Thomas, *Claim Re-construction: The Doctrine of Equivalents in the Post-Markman Era*, 9 LEWIS & CLARK L. REV. 153, 168 (2005) (“Absent unusual circumstances, [claim] construction will take place many years—sometimes decades—after the claims were initially submitted to the [Patent Office].”).

109. See generally, Dawn-Marie Brady & Christopher A. Cotropia, *The Unreasonableness of the Patent Office’s ‘Broadest Reasonable Interpretation’ Standard*, 37 AIPLA Q.J. 285, 288–98 (2009) (describing the broadest reasonable interpretation standard and arguing that it conflicts with judicial practice).

110. Claim 7 involved weather-related price risk. See *Bilski v. Kappos*, 561 U.S. 593, 599 (2010).

111. Claim 2 involved the energy industry. See *id.*

112. Claim 4 expressed “the concept articulated in claim 1 into a simple mathematical formula.” See *id.*

no test for properly abstracting a claim. This abstraction problem is even more acute for characterizing the scientific principle at risk of being preempted.

Lastly, to the extent that policy makers are concerned about granting patents that are not commensurate with the achievement of the inventor, those concerns are more properly channeled to another section of the patent statute: Section 112. Section 112 requires that patents fully enable one of skill in the art to practice the invention and fully describe the claimed invention. Furthermore, that section requires claims to be clear and definite. While the Federal Circuit's Section 112 jurisprudence has been roundly criticized as overly narrow, there are numerous proposals to strengthen the doctrine and to infuse Section 112 with the power to properly limit the scope of a patent.¹¹³ In contrast to Section 101, Section 112 involves a thorough analysis of the relationship between the scope of the claims and extent of the disclosure. Preemption-based Section 101 tests, on the other hand, involve a comparison of claim scope to scientific knowledge. Patent examiners and judges are much more capable of comparing a patent's claims and disclosure than they are at analyzing the extent that science has been preempted by a patented method.

B. Section 101 and Innovation-Harm Theories

Unlike preemption theories, innovation-harm theories do not rely on scope comparisons between patent claims and science. Instead, most proposals to infuse Section 101 with concerns about the dynamic effects of granting patents suggest categorical exclusions from patent-eligibility.¹¹⁴ Such broad exclusions are easier for a subject matter doctrine, like Section 101, to filter. The Patent Office already assigns every patent to a technological art unit for examination, thus the task of categorizing patents by technology is an activity that already takes place at the Patent Office. Furthermore, distinguishing patentable subject matter through a utilitarian lens does not encounter the same abstraction problem that occurs with preemption. Regardless of the specificity with which one views a patent's claims, the technological industry remains relatively constant.

Of course, categorical distinctions in Section 101 are not without drawbacks. Making broad categorical exclusions based on

113. See, e.g., Sean B. Seymore, *Foresight Bias in Patent Law*, 90 NOTRE DAME L. REV. (forthcoming 2015), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2397466&download=yes.

114. See, e.g., BESSEN & MEURER, *supra* note 94 (proposing elimination of business method patents).

utilitarian policies only works if one can define what technology a patent covers. This seemingly simple task can be maddeningly complex.¹¹⁵ Business method inventions provide a good example of this phenomenon. While generally critical of business method patents, commentators have yet to agree upon just what such patents look like.¹¹⁶ John Allison and Sterling Hunter have concluded that “[a]ll attempts by courts and Congress to arrive at a workable definition for business method patents have encountered intractable difficulties.”¹¹⁷

Singling out software patents encounters many of the same difficulties. Software patents are difficult to distinguish from patents on computer hardware or systems. This is largely due to the *ex ante* nature of any subject matter exclusion—attorneys know the rules beforehand and draft their claims in a way to avoid Section 101 rejections.¹¹⁸ Mark Lemley and Julie Cohen have described the former practice of “magic word” claiming in the software industry. Under that practice, “software was patentable subject matter, but only if the applicant recited the magic words and pretended that she was patenting something else entirely.”¹¹⁹

But despite the limitations of categorical distinctions, it is possible to make clear distinctions in many cases. For instance, a categorical prohibition on tangible objects, like DNA, would likely be enforceable. Similarly, John Thomas has argued that the “industrial application” requirement found in Europe and Japan is a “concise, proven” standard for eliminating problematic patent subject matter categories, like software.¹²⁰

Michael Risch has argued that subject matter restrictions on specific industries are likely fated to include subject matter not intended to be precluded from patent protection.¹²¹ Similarly, in his *Bilski* opinion, Justice Kennedy noted that a categorical exclusion of

115. Olson, *supra* note 98, at 61–63.

116. See Magliocca, *Curve Ball*, *supra* note 96, at 884.

117. Allison & Hunter, *supra* note 50, at 765; see also Dan L. Burk & Brett H. McDonnell, *Patents, Tax Shelters, and the Firm*, 26 VA. TAX REV. 981, 1001–02 (2007) (arguing that a business method exception would be futile because it could be evaded through claim drafting).

118. John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 Berkeley Tech. L.J. 987, 1021 (2003) (“[T]reating different technologies differently places too great a premium on *ex ante* definitions, such that the definitional scheme will be at least partially defeated because of the significant transaction costs associated with attorney efforts to opt into or out of a definition by carefully tailoring invention descriptions and patent claims.”).

119. Cohen & Lemley, *supra* note 44, at 9.

120. See Thomas, *supra* note 46, at 1178.

121. See Risch, *supra* note 70, at 648 (“Like any bright line rule, fixed subject matter rules will lead to both over and under-allowance of bad or good patents respectively.”).

business method patents would inevitably eliminate patent protection for some innovations that are in need of patent protection.¹²² While undoubtedly true, the question that innovation-harm theorists would ask is whether granting patents on an entire category of patents—as a whole—would lead to increased or decreased innovation. Thus, concerns about whether an individual patent contributes to the progress of science or not would be outside the scope of Section 101 for such theorists. Instead, such questions would be left to the other validity doctrines. Any bright-line rule will be a crude filter for subject matter eligibility.¹²³ Despite this under- or over-inclusiveness, such rules may be beneficial for promoting innovation broadly.

Some scholars have argued that the categorical elimination of entire categories of patents is the only effective way to reduce rent-seeking behavior, such as that exhibited by patent trolls. Gerard Magliocca relies on the nineteenth century example of “patent sharks,” a group of businessmen that acquired patents on widely used agricultural products, to support the imposition of unpatentability rules by the technology sector.¹²⁴ He argues that the lesson of the patent sharks is that “opportunistic litigation cannot be stemmed through substantive changes in patent rights,” and suggests that abolition of business method and software patents “may be the only solution for modern trolls.”¹²⁵ However, as Rob Merges points out, other examples exist of the Supreme Court solving rent-seeking problems with more “surgical” interventions.¹²⁶ While Merges’ surgical option is clearly preferable, surgical interventions—like preemption—are ill-suited to a sledge-hammer-like doctrine like patent-eligibility.

122. See *Bilski v. Kappos*, 561 U.S. 593, 607 (2010).

123. BESSEN & MEURER, *supra* note 94, at 244 (“Inevitably, any policy to restrict abstract patents amounts to drawing a line between what is patentable and what is not, and, unfortunately, such lines are drawn in the shifting sands of words. . . . We thus do not know what it will take to appropriately restrict abstract patents in general or software patents in particular.”); Michael W. Carroll, *One for All: The Problem of Uniformity Cost in Intellectual Property Law*, 55 AM. U. L. REV. 845, 893 (2006) (“The courts have resisted using discretion to sustain categorical exclusions from patentable subject matter, finding this to be too crude a filter.”).

124. See Magliocca, *Blackberries*, *supra* note 96, at 1811.

125. *Id.* at 1812–13.

126. See Robert P. Merges, *The Trouble with Trolls*, 24 BERKELEY TECH. L.J. 1583, 1598 (2009) (describing the Supreme Court’s “surgical” solution to the patent problem in the railroad industry); Robert P. Merges, *The Uninvited Guest: Patents on Wall Street*, 88 FED. RES. BANK ATLANTA ECON. REV. 1, 7–8 (2003) (describing the disruptive effect of patents in the nineteenth century on the railroad industry).

C. Section 101 and Over-Reward Theories

There is no consensus among over-reward theorists as to how Section 101 should police the incentive structure of the patent system. Individualized assessments of the incentives operating on individual patentees are obviously impractical. Neither the Patent Office nor the courts have sufficient resources to determine whether each alleged invention would have been produced without the possibility of patenting. Thus, Section 101 is incapable of furthering the goals of over-reward theorists to the extent that those goals require individualized assessment.

It is possible, however, to imagine over-reward goals operating on a less granular level. Categorical exclusions could potentially further these goals. For example, if it were determined that there were sufficient incentives to innovate—beyond the patent system—across an entire category of inventions, then categorical exclusions would be possible for the same reasons mentioned in Part IV.B. Courts and the Patent Office have the ability to distinguish between subject matter categories, once those categories have been identified.

D. Section 101 and Non-Economic Theories

The applicability of non-economic moral theories via Section 101 appears to be more appropriate at one level of patent enforcement than another. Courts are accustomed to making moral, ethical, and other non-economic distinctions. Thus, filtering patents by their implication on such a non-utilitarian basis would seem to be a workable, if unenviable, task for judges. Indeed, Tun-Jen Chiang has argued that judges have done precisely that in handling recent patentable subject matter cases.

On the other hand, such non-economic decisions are an awkward fit for a governmental agency like the Patent Office. The Patent Office is ill-equipped to make ethical and moral distinctions. Furthermore, the agency's position within the executive branch means that the standards by which the agency would review patents would be subject to change with the change of administration.

V. CONCLUSION

John Duffy has suggested that patentable subject matter rules "always fail" because of the dynamic nature of innovation.¹²⁷ Duffy

127. Duffy, *supra* note 48, at 614.

cites to the general models that predict standards to be more durable than rules when faced with changing circumstances, a definitional element of innovation.¹²⁸ The Supreme Court's uneasy history with the doctrine of patent-eligible subject matter supports Duffy's claim.

But, this Article argues the Supreme Court should consider applicability when it modifies the standards for patent-eligibility under 35 U.S.C. § 101. In particular, Section 101 is more likely to be successfully applied by courts and the Patent Office when seeking to fulfill the goals of "innovation-harm" and "over-reward" theorists. This is because both of these theories have strands that rely on categorical exclusions. Adjudging categorical exclusions is more practicable for resource-limited institutions like the federal courts and the Patent Office than other types of exclusionary tests that require patent-scope-based inquiries. While far from perfect, subject matter exclusions would be applicable by patent examiners and courts, and understandable to those in the relevant industry. Preemption concerns, on the other hand, while laudable, are better-governed through the doctrines of enablement and written description.

128. See *id.*; see also Isaac Ehrlich & Richard A. Posner, *An Economic Analysis of Legal Rulemaking*, 3 J. LEGAL STUD. 257, 277 (1974) (noting the costs of altering rules to keep pace with technological change).

