WAKE FOREST JOURNAL OF BUSINESS AND INTELLECTUAL PROPERTY LAW

VOLUME 15 FALL 2014 NUMBER 1

QUANTIFYING PATENT ELIGIBILITY JUDGMENTS

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[†] With many thanks to Rani Cordova, Logan Foos, and Jasmeet Khela for outstanding research assistance.

I. EXECUTIVE SUMMARY

Predicting whether an invention including software[1] is eligible for patent protection is notoriously difficult due to rapid changes in law and technology.[2] Analysis of patent litigation data, according to the model proposed in this article, implies that a claim appearing invalid for lack of patent eligibility is likely invalid. In an analysis of 48 relevant patent assertions at district court, including substantive challenges for patent eligibility, results show a greater than 70 percent likelihood of invalidation at the summary judgment stage.[3] Understanding this lopsided nature of patent eligibility rulings could illuminate patent quality, drive clearer valuation, and reduce the uncertainty of enforcement through litigation.

Here, we describe a model that quantifies litigation outcomes for patent eligibility. This quantitative model focuses on the likelihood of invalidity resulting from ineligibility for patent protection,[4] and can evolve with the continually changing judicial consensus on patent eligibility. More recent patent eligibility decisions[5] can also be incorporated into the model, creating a flexible and responsive framework. Because it can incorporate new court judgments into the existing body of litigation data, this model can illuminate patent eligibility judicial outcomes based on the most up-to-date judicial consensus.

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[1] Simply identifying software claims can be complex. *See* RPX CORP., THE PREVALENCE OF SOFTWARE PATENT ASSERTION (2014) (on file with author), *available at* http://www.rpxcorp.com/wp-content/uploads/2014/01/RPXAnalysisThePrevalenceofSoftwarePatentAssertion1.pdf.

[2] *See, e.g.*, Nancy T. Gallini, *The Economics of Patents: Lessons from Recent U.S. Patent Reform*, J. ECON. PERSP., Spring 2002 131, 139, 147.

[3] *See infra* Table 4.

[4] 35 U.S.C. § 101 (2012) ("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 therefor, subject to the conditions and requirements of this title.").

[5] The Supreme Court in 2014 considered in Alice Corp. v. CLS Bank Int'l, No. 13-298 (U.S. June 19, 2014), petitioner's question presented of "[w]hether claims to computer-implemented inventions . . . are directed to patent-eligible subject matter within the meaning of 35 U.S.C. § 101 as interpreted by this Court?" Brief for Petitioner at (i), Alice Corp Pty. Ltd. v. CLS Bank Int'l, 2014 WL 262088 (U.S. 2014) (No. 13-298). However, the Court declined to create a bright-line rule for software patent eligibility. Alice Corp Pty. Ltd. v. CLS Bank Int'l, No. 13-298, slip op. at 7 (U.S. June 19, 2014).

II. ABSTRACT

The model presented here includes subjective and objective components for quantifying the likelihood that a particular claim is invalid under 35 U.S.C. § 101 for patent ineligibility.[6] This analysis rests on four quantifiable metrics derived from current Supreme Court and Federal Circuit patent eligibility jurisprudence.[7] The Supreme Court theory is built on two judicial exceptions of "preempting the formula" and "insignificant post-solution activity."[8] The Federal Circuit has developed its own nonbinding exceptions of "particular machine" and "transforming an article," commonly referred to as the "machine-or-transformation test."[9] A subjective analysis of relevant district court litigation at the summary judgment stage determines whether any of the metrics are observed and result in a rule for or against patent eligibility. This subjective analysis drives objective litigation analytics through aggregation of the individually observed metrics into invalidation frequencies, on a rule-by-rule basis.

The model incorporates invalidation frequencies for related groups of rules into statistically-modeled likelihoods of invalidity for the different patent eligibility legal theories. In application, each patent eligibility rule and theory is respectively associated with an invalidation frequency or invalidation likelihood. By associating a rule or theory with an invalidation percentage, the likelihood that a particular claim is invalid can be estimated without a detailed analysis of the merits of a particular case. Our results show that district courts invalidate claims at a high rate of over fifty percent. Once an argument on patent eligibility is made, it is adjudicated at a rate of over seventy-five percent. These results suggest that a claim appearing vulnerable to patent eligibility challenge is at a high risk of invalidation on those grounds.

[6] 35 U.S.C. § 101.

[7] *See infra* The Supreme Court Patent Eligibility Theories, Figure 1; The Federal Circuit Patent Eligibility Theories, Figure 2.

[8] Bilski v. Kappos, 130 S. Ct. 3218, 3230 (2010).

[9] *Id.* at 3225.

III. BACKGROUND

Current jurisprudence surrounding patent eligibility is unclear[10] and conflicting,[11] though the doctrine's legal foundation is well established.[12] Drawing from a constitutional mandate encouraging broad exclusive rights for inventors to their "discoveries,"[13] Congress authorized statutory protection across four expansive categories[14] of invention. The Supreme Court has historically endorsed this expansive scope for patent protection by defining only three categorical exceptions to patent protection.[15]

Of these three, the prohibition on patents covering abstract ideas most affects software patents.[16] These concepts form the bedrock of patent eligibility rules.

The relatively recent Supreme Court ruling in *Bilski v. Kappos*[17] marks the beginning of a new era in which courts at multiple levels wrestle with defining boundaries for software patents. Patent eligibility opinions in the post-*Bilski* era sometimes reveal strong disagreement between jurists of different courts,[18] or even the same court.[19] These legal splits create uncertainty over the true scope of patent protection and complicate reliable patent asset valuation.

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[10] Accenture Global Servs., GMBH v. Guidewire Software, Inc., 728 F.3d 1336, 1348 (Fed. Cir. 2013) ("[N]o one understands what makes an idea abstract.") (quoting CLS Bank Int'l v. Alice Corp., 685 F.3d 1341, 1349 (Fed. Cir. 2012)).

[11] *See, e.g.*, CLS Bank Int'l v. Alice Corp., 717 F.3d 1269 (Fed. Cir. 2013) (holding patent ineligible a method claim related to credit obligations, but through a fractured set of concurring opinions).

[12] *See Bilski*, 130 S. Ct. at 3225 (Stephens, J., concurring) (tracing the development of patent law).

[13] U.S. CONST. art. I, § 8, cl. 8 ("To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries").

[14] *Bilski*, 130 S. Ct. at 3225.

[15] *Id.* ("The Court's precedents provide three specific exceptions to §101's broad principles: laws of nature, physical phenomena, and abstract ideas.") (quoting Diamond v. Chakrabarty, 447 U.S. 308,309 (1980)) (internal quotations omitted).

[16] Dina Roumiantseva, *The Eye of the Storm: Software Patents and the Abstract Idea Doctrine in CLS Bank v. Alice*, 28 BERKELEY TECH. L.J. 569, 570 (2013) (stating that "recent cases demonstrate a fundamental divide in the courts about which computer-implemented inventions should be eligible for patent protection.").

[17] *Bilski*, 130 S. Ct. at 3225.

[18] *See* Ultramercial, LLC v. Hulu, LLC, 657 F.3d 1323, 1330 (Fed. Cir. 2011) and Ultramercial, LLC v. Hulu, LLC, 722 F.3d 1335, 1354 (Fed. Cir. 2013) (holding patentable a method of advertising); Wildtangent Inc. v. Ultramercial, LLC, 132 S. Ct. 2431, 2431 (2012) (vacating to Fed. Cir. for a second look in view of the intervening Supreme Court ruling in Mayo v. Prometheus, 566 U.S. 10 (2012)).

[19] *See supra* text accompanying note 12.

A framework describing patent eligibility litigation could create certainty as to the risk existing patents pose to companies.[20] An accurate framework could reduce costly litigation[21] of software patents in particular, especially by non-practicing entities ("NPEs").[22]

IV. PROPOSITION

Can quantitative patent eligibility metrics based on previously-litigated claims imply patent eligibility quality for a nonlitigated claim? A model for testing this proposition includes both subjective and objective factors. Subjective human input is critical to correctly identifying complex issues governing patent eligibility.

Objective metrics tied to each identified rule frame a given claim within the larger context of claims litigated under similar theories.[23] These objective metrics are drawn from early-stage litigation data at the district court level, the forum of first resort for determining patent eligibility.[24]

V. METHODOLOGY

This model creates a shorthand of pre-scored rules derived from the current framework governing judicial exceptions to patent eligibility. Each rule is a component of either the Supreme Court's or the Federal Circuit's legal reasoning process, and a score associated with each rule indicates how often a district court invalidated a patent claim in view of that rule. Statistical models combine related rules to create invalidation likelihoods for each court's theory.

Application of the model to a target claim requires only identifying whether any of the rules or theories apply; only the rule identification process remains subjective. Invalidation frequencies indicating the

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[20] *See generally* Colleen Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297 (2010).

[21] *See, e.g.* Letter from Jeffrey I.D. Lewis, President of the American Intellectual Property Law Association, to Teresa S. Rea, Acting Under Secretary of Commerce for Intellectual Property and Acting Director of the United States Patent and Trademark Office (Apr. 30, 2013), *available at* http://admin.aipla.org/advocacy/executive/Documents/AIPLACommentstoUSPTOonSmallPatentClaims-4.30.13.pdf (stating that patent litigation costs can reach $3,000,000 through discovery, and $5,000,000 through trial).

[22] RPX Corporation, 2013 NPE Litigation Report, Table 50 (2014) (on file with author), *available at* http://www.rpxcorp.com/wp-content/uploads/2014/05/The-full-2013-NPE-Litigation-Report.pdf.

[23] *See infra* Appendix A.

[24] *See infra* Appendix A.

vulnerability of a target claim are drawn from district court litigation judgments, not anecdotal experience. Each percentage associated with an identified theory indicates the historical likelihood of invalidating the non-litigated claim. As the number of theories applicable to a claim increases, and as the percentages associated with those applicable theories increase, the likelihood of invalidity for a given claim also increases.[25]

A. Identifying Patent Eligibility Rules

This semi-objective model eliminates the need to predict any particular patent eligibility outcome on the merits. The model simply asks whether any theory is germane to a given claim. This model identifies and distills four foundational patent eligibility theories into a simplified set of yes-or-no decision points. A holistic consideration of legal theory, claim drafting, and underlying technology required to adjudicate the issue fully can be replaced with lighter claim analysis limited to identifying relevant patent eligibility issues.

Four patent eligibility rules drawn from Supreme Court and Federal Circuit jurisprudence are elementary components of this model. The two rules forming the Supreme Court theory, "preempting the formula" and "insignificant post-solution activity," have been useful signposts for patent eligibility determinations for decades.[26] The two more modern Federal Circuit rules, which form the "machine-or-transformation" test, are also useful but not alone conclusive of eligibility or ineligibility.[27]

B. The Supreme Court Patent Eligibility Theory

The Supreme Court theory takes the form of a two-step analysis[28] for determining patent eligibility. A claim is analyzed first for "preempting the formula" and subsequently for "insignificant post-solution activity."[29] A claim is eligible for patent protection only if it passes both of these tests.[30]

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[25] *See infra* Figure 1.

[26] *See* Parker v. Flook, 437 U.S. 584, 590 (1978); Gottschalk v. Benson, 409 U.S. 64, 72 (1972).

[27] *Bilski*, 130 S. Ct. at 3227 ("The machine-or-transformation test is not the sole test for deciding whether an invention is a patent-eligible 'process.'").

[28] *See Flook*, 437 U.S. at 590; *Gottschalk*, 409 U.S. at 72.

[29] *See Flook*, 437 U.S. at 590; *Gottschalk*, 409 U.S. at 72.

[30] *See, e.g.*, Diamond v. Diehr, 450 U.S. 175, 191 (1981).

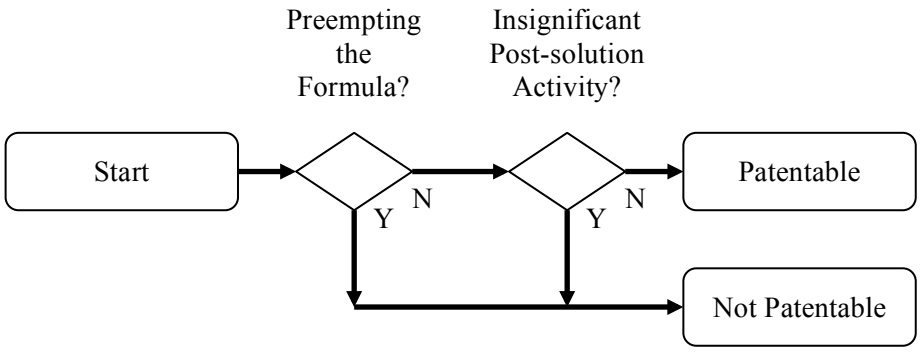

Figure 1: Supreme Court Patent Eligibility Theory

A claim that describes a concept alone, without applying that concept, preempts the formula.[31] Examples of concepts not eligible for patent protection include pure mathematics (e.g. converting numbers)[32] and purely mental activity (e.g. understanding a market and making a transaction).[33] Only applications of a concept related to the invention will make a claim patent eligible.[34] Applications unrelated to an inventive concept, like displaying results of a mathematical calculation or creating a trivial effect from calculation (e.g. updating an alarm),[35] are insignificant post-solution activities.[36] In general, patent invalidation for insignificant post-solution activity has recently become more common.[37] The Supreme Court in *CLS Bank v. Alice* gives examples of computer-implemented activity that should pass[38] and fail[39] *Flook*'s post-solution activity test, without

[31] *Gottschalk*, 409 U.S. at 67 (1972) ("Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.").

[32] *See id.* at 71–72 (denying a patent to a computer algorithm that the court deemed to be purely a mathematical formula).

[33] *See id.* at 67. *See also Bilski*, 130 S. Ct. at 3229–30 (2010).

[34] *See Flook*, 437 U.S. at 584; *see also* Mackay Radio & Tel. Corp. v. Radio Corp. of Am., 59 S. Ct. 427, 431 (1939) ("While a scientific truth, or the mathematical expression of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.").

[35] *See Flook*, 437 U.S. at 584 (denying a patent for a mathematical formula used to update alarm limits on laboratory testing equipment).

[36] *Id.* at 591 ("[T]he process itself, not merely the mathematical algorithm, must be new and useful. Indeed, the novelty of the mathematical algorithm is not a determining factor at all.").

[37] Dennis Crouch, *The Revival of Parker v. Flook* (Oct. 5, 2012), http://www.patentlyo.com/patent/2012/10/the-revival-of-parker-v-flook.html.

[38] *See* Alice Corp. v. CLS Bank Int'l, No. 13-298, slip op. at 15 (U.S. June 19,

continued . . .

materially changing the Supreme Court's longstanding two-step patent eligibility inquiry.[40]

C. The Federal Circuit Patent Eligibility Theory

The Federal Circuit theory includes two independent tests that indicate whether a claim is likely or likely not patent eligible. A claim is likely patentable if it recites a "particular machine" or "transforms an article."[41] Inversely, a claim that fails both prongs is likely not patent eligible. Unlike the Supreme Court theories, failing one or both of the Federal Circuit tests is not definitive proof that a claim is ineligible for patent protection.[42] These theories nonetheless inform whether a claim is patent eligible, especially for close cases.

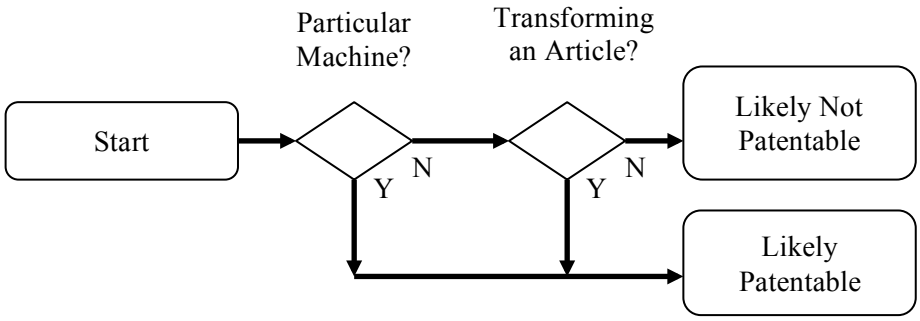

Figure 2: Federal Circuit Patent Eligibility Theory

A software claim failing to recite a particular machine is likely not eligible for patent protection.[43] Reciting a programmed computer or specific computing hardware usually satisfies the particular machine

2014) ("Using a computer to create and maintain shadow accounts amounts to electronic recordkeeping—one of the most basic functions of a computer.") (internal quotations omitted).

[39] *See id.* ("The method claims do not, for example, purport to improve the functioning of the computer itself . . . . Nor do they effect an improvement in any other technology or technical field.").

[40] *See Bilski*, 130 S. Ct. at 3227.

[41] *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008) ("A claimed process is surely patent-eligible under §101 if: '(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing.'").

[42] *See Bilski*, 130 S. Ct. at 3227 ("The machine-or-transformation test is not the sole test for deciding whether an invention is a patent-eligible 'process.'").

[43] *See supra* note 35.

prong. If the claim recites no computer[44] or is only incidentally[45] "computer aided,"[46] the particular machine prong is not satisfied.

A software claim that fails to transform an article is also likely not eligible for patent protection. If, "the method could not, as a practical matter, be performed entirely in a human's mind" then a transformation has likely occurred.[47] "The mere manipulation or reorganization of data, however, does not satisfy the transformation prong."[48] In general, applications of data manipulation historically tend toward the patent eligible. Similar to "preempting the formula,"[49] pure mathematics and purely mental steps indicate patent-ineligible subject matter.[50]

D. Scoring Patent Eligibility Rules

Litigation data at the district court level allows visibility into judicial reasoning at a relatively early and lower cost stage of litigation.[51] Summary judgment is particularly interesting because it is the earliest opportunity for litigants to address patent eligibility.[52] In addition, defendants are more likely to defeat claims initiated by NPE plaintiffs than operating company plaintiffs at summary judgment.[53] Even where a claim may be a strong candidate for invalidation at higher courts, the time and cost to litigate in these higher courts, as well as the willingness of the Supreme Court to hear a given patent dispute, may be prohibitive.[54]

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[44] *See* CLS Bank Int'l v. Alice Corp., 717 F.3d at 1330 ("[T]he claim lacks *any* express language to define the computer's participation.").

[45] CyberSource Corp. v. Retail Decisions, Inc., 654 F.3d 1366, 1375 (Fed. Cir. 2011) ("[T]he incidental use of a computer to perform the mental process of claim 3 does not impose a sufficiently meaningful limit on the claim's scope.").

[46] Dealertrack, Inc. v. Huber, 674 F.3d 1315, 1334 (Fed. Cir. 2012) ("[T]he claims here recite only that the method is "computer aided" without specifying any level of involvement or detail.") .

[47] *CyberSource*, 654 F.3d at 1376.

[48] *Id.* at 1375.

[49] *See infra*, Table 1.

[50] *See CyberSource*, 654 F.3d at 1375 (holding that "the incidental use of a computer to perform the mental process of claim 3 does not impose a sufficiently meaningful limit on the claim's scope").

[51] Chris Barry et al., PricewaterhouseCoopers, 2013 Patent Litigation Study, 5, http://www.pwc.com/en_us/us/forensic-services/publications/assets/2013-patent-litigation-study.pdf (last visited Sept. 17, 2014).

[52] *Id.* at 13.

[53] *Id.* at 5 ("NPEs have been successful 24% of the time overall versus 34% for practicing entities, due to the relative lack of success for NPEs at summary judgment.").

[54] *Id.* at 25.

District court patent litigation data can paint a more complete picture of the current judicial consensus surrounding patent eligibility, and therefore illuminate patent strength and value.

VI. EXAMPLE MODEL

The model for patent eligibility presented here creates quantifiable litigation metrics based on current legal frameworks. Here, we use (1) summary judgment rulings (2) issued by any Federal District Court (3) after the Supreme Court's ruling in *Bilski v. Kappos*. The resulting metric tracks both how often a particular patent eligibility rule supports a particular outcome, and how often a claim was held ineligible under a particular rule. The more often a particular rule invalidates a claim, the higher the invalidation frequency for that rule.

A. Patent Eligibility Outcomes by Individual Rule

Applying this model can approximate the likelihood that a given claim is patent eligible in view of a particular patent eligibility rule. The model, shown in Figure 3, operates in two sequential steps, with a first subjective step and a second objective step. First, a claim is subjectively analyzed for relevance to a particular patent eligibility rule. Second, the invalidation frequency associated with a relevant rule is considered to estimate the claim's vulnerability to invalidation. Relevance to a rule with a greater invalidation frequency implies a greater chance of invalidity.

Broad categories indicating a likelihood of patent eligibility guide the model. If no rules are applicable to a claim, then that claim has a low invalidation likelihood. If only a rule with a low invalidation percentage is relevant to a claim, that claim has a medium likelihood of invalidation, though a strong possibility might remain that the claim would be found valid. If, however, a rule with a high invalidation frequency is relevant to a claim, then that claim would have a high likelihood of invalidation. Experimental results indicate that all identified eligibility rules have invalidation frequencies over fifty percent, implying a high level of invalidation risk.[55]

[55] *See infra* Observed Invalidation Frequency for Individual Rules.

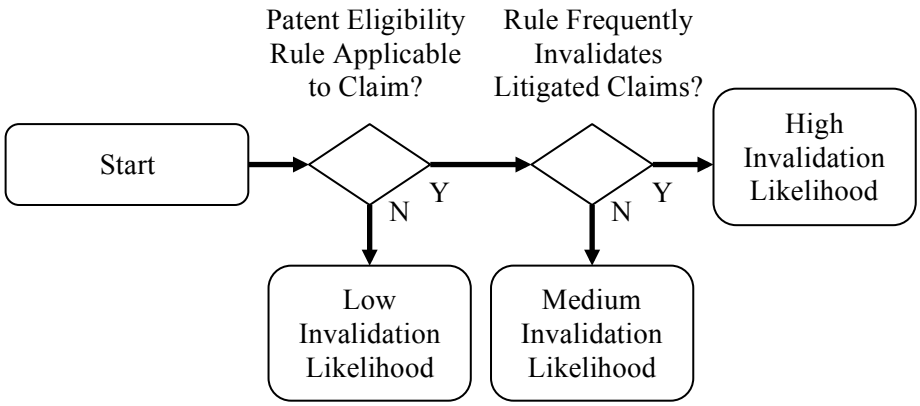

Figure 3: Patent Eligibility Model by Individual Rule

B. Patent Eligibility Outcomes by Aggregated Rules

This model, shown in Figure 4, considers multiple rules and their corresponding litigation outcomes. Aggregating multiple metrics into a single resulting invalidation likelihood describes with better clarity the patent eligibility of any given claim.[56] Identifying the number of theories applicable to a target claim can inform the susceptibility of the claim to an eligibility challenge.[57] If one or none of the Supreme Court or Federal Circuit theories apply, the likelihood that the claim is invalid is lower.[58] However, if both theories apply, the invalidation likelihood would naturally be higher.

Aggregating invalidation frequencies can indicate an overall likelihood that a claim will be invalidated across all potential issues. The particular aggregation technique can vary to emphasize relative importance of different factors.[59] A simple aggregation technique could be the sum of each percentage associated with an applicable

[56] *Compare supra* Figure 3 (charting invalidation likelihood by individual rules), *and infra* Table 1 (showing invalidation percentages for each rule), *with infra* Figure 4 (charting invalidation likelihood by aggregate percentages), *and infra* Table 2 (showing aggregate invalidation percentages for each theory).

[57] *See infra* Figure 4; *infra* Appendix B, Table 5 (analyzing litigation by charting ineligibility rulings with appearances of individual eligibility rules).

[58] *See supra* Patent Eligibility Outcomes by Individual Rule; *supra* Figure 3; *infra* Figure 4.

[59] *Compare infra* Equation 1 (designing the aggregate Supreme Court Theory model to reflect the necessary dependence of the second rule on application of the first rule), *with infra* Equation 2 (designing the aggregate Federal Circuit Theory model to reflect the independence of each rule). *See generally* ROGER C. PFAFFENBERGER & JAMES H. PATTERSON, STATISTICAL METHODS FOR BUSINESS AND ECONOMICS 92–97 (Richard D. Irwin, Inc. ed., 1977) (explaining event relationships and comparing conditional, additive, and multiplicative probabilities).

rule. If a first rule has a low percentage (ten percent) and a second rule has a higher percentage (sixty percent), then each rule could influence an eligibility implication in line with its likelihood of invalidating litigated claims.[60] Alternative techniques could include weighting or other quantitative methods.[61] Experimental results indicate that all rules have a high invalidation frequency,[62] implying that the lower two regions for low and medium invalidation likelihoods would not be applicable.

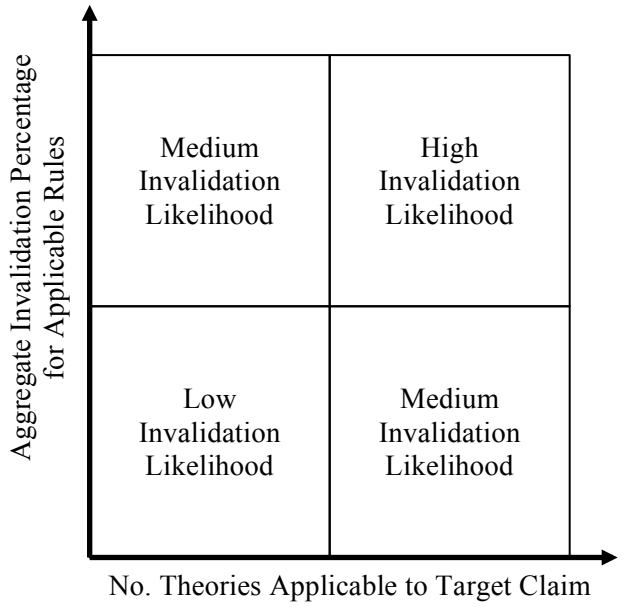

Figure 4: Mapping Patent Eligibility Metrics to Quality

Though the model defines some metrics, particular thresholds and dividing lines for understanding eligibility can vary from model to model. Different models may emphasize different metrics, resulting in varying quality assessment against a target claim dependent on the weighting of those metrics. A preferred quantitative model would output one eligibility score for a target claim and define score ranges implying whether target claims would have a low, medium, or high risk of invalidation based on patent eligibility.

[60] *See* PFAFFENBERGER, *supra* note 59, at 92–97.

[61] *See generally* Michael O. Finkelstein & Bruce Levin, Statistics for Lawyers 4–5 (2d ed. 2001) (discussing weighting and other quantitative methods for manipulating averages to reflect variability in observed populations).

[62] *See infra* Statistical Likelihood of Ineligibility by Theory.

VII. EXPERIMENTAL RESULTS

Results from this model, shown in Figure 2, show that claims appearing vulnerable to challenge under patent eligibility would be invalidated at the district court with high frequency. All rules are observed to invalidate litigated claims at a rate of over 50 percent.[63] Statistical models, including these observed results, show invalidity likelihood between 64 and 78 percent for vulnerable claims.[64] These results strongly imply that claims appearing to raise patent eligibility concerns are at severe risk of invalidity due to patent ineligibility.

Litigants raise, and courts decide, patent eligibility relatively rarely. An automated search on metadata[65] for patent litigation documents filed after June 28, 2010[66] revealed 210 cases matching keywords commonly associated with patent eligibility. Manual analysis of the search results revealed 41 cases discussing 48 instances of patent eligibility exceptions.[67] Of those cases, district courts publicly adjudicated the patent eligibility rules 27 times at summary judgment.[68] Aside from adjudicated cases, 11 settled before summary judgment, three remain open with summary judgment motions pending, and two are stayed pending reexamination.[69] District courts ruled on patent eligibility at summary judgment in 74 percent of instances raised.[70]

A. Observed Invalidation Frequency for Individual Rules

Claims failed the Federal Circuit "particular machine" and "transforming an article" rules more frequently than the Supreme Court rules. Invalidation frequencies under the Supreme Court rules of "preempting the formula" and "insignificant post-solution activity" are, respectively, 53 and 52 percent.[71] Invalidation frequencies are

[63] *See infra* Table 1.

[64] *See infra* Table 2.

[65] Automated searches of litigation data were restricted to docket text and other document 'metadata,' and involved no searching over the content of litigation documents. *See infra*, 'Limitations and Concerns' for a fuller discussion of potential effects of searches limited to docket text.

[66] *Bilski v. Kappos* was decided on June 28, 2010. Only patent eligibility adjudications made after this date are incorporated into this exemplary model, as *Bilski* could be considered a contemporary benchmark for current patent eligibility jurisprudence.

[67] *See generally infra* Appendix A–B.

[68] *See infra* Table 4.

[69] *Id.*

[70] *Id.*

[71] *See infra* Appendix B, Tables 6-7.

higher for the nonbinding[72] Federal Circuit rules of Particular Machine and Transforming an Article, respectively at 84 and 76 percent.[73]

Table 1: Observed Patent Eligibility Invalidation Frequency by Rule

Patent Eligibility Rule (Court)	Adjudications	Invalidations	Invalidation Frequency
Preempting the Formula (SCOTUS)	32	17	**53%**
Insignificant Post-Solution Activity (SCOTUS)	25	13	**52%**
Particular Machine (CAFC)	19	16	**84%**
Transforming an Article (CAFC)	17	13	**76%**

B. Statistical Likelihood of Ineligibility by Theory

A likelihood of ineligibility for each theory can be constructed from the observed invalidation frequencies and simplified patent eligibility models for the Supreme Court theory[74] and Federal Circuit theory.[75] Statistical models for each theory indicate a high likelihood of invalidity for claims appearing vulnerable to challenge under 35 USC § 101. Vulnerable claims have approximately a 78 percent likelihood of invalidity under the Supreme Court theory and a 64 percent likelihood of invalidity under the Federal Circuit theory.[76]

Table 2: Statistical Invalidation Frequency by Theory

Patent Eligibility Theory	Invalidation Likelihood
Supreme Court Theory	**78%**
Federal Circuit Theory	**64%**

The statistical model for the Supreme Court theory reflects the two-step process for determining patent eligibility. Courts consider

[72] *See Bilski*, 130 S. Ct. at 3218 ("The machine-or-transformation test is not the sole test for deciding whether an invention is a patent-eligible 'process.'").
[73] *See infra* Appendix B, Tables 6-7.
[74] *See supra* The Supreme Court Patent Eligibility Theories, Figure 1.
[75] *See supra* The Federal Circuit Patent Eligibility Theories, Figure 2.
[76] *See infra* Equations 1-2.

"insignificant post-solution activity" ("$P_{i,A}$") only where a claim appears valid under "preempting the formula" ("$P_{i,F}$").[77] The model combines probabilities for both alternatives under which a claim may be eligible or ineligible under "preempting the formula." A calculated probability of invalidity under "insignificant post-solution activity" approximates a likelihood of invalidity only when a claim is first found valid under "preempting the formula." The model assumes that courts do not address post-solution activity where a claim preempts the formula. However, the observed frequencies incorporate data showing that some courts rule on post-solution activity even after finding a claim to preempt the formula.[78]

$$P_{i,SCOTUS} = P_{i,F} + \left(1 - P_{i,F}\right)P_{i,A} = 0.53 + (1 - 0.53)(0.52) = 0.78$$

Equation 1: Invalidation Likelihood, Supreme Court Theory

Modeling invalidation frequency for the Federal Circuit theories is less complex. Each prong of the "machine-or-transformation" test is independent of the other, and a claim need pass only one prong to satisfy the entire test.[79]

$$P_{i,CAFC} = \left(P_{i,M}\right)\left(P_{i,T}\right) = (0.84)(0.76) = 0.64$$

Equation 2: Invalidation Likelihood, Federal Circuit Theory

Application of each theory to a target claim differs. The Supreme Court theory functions as a grouping of individual rules, where individual rules of the Federal Circuit theory can be applied separately. A claim can be considered to have a seventy-eight percent likelihood of invalidity under the Supreme Court theory if either of the "preempting the formula" or "insignificant post-solution activity" rules appear relevant.[80] Under the Federal Circuit theory, a claim can be considered to have an invalidation likelihood of 84 percent if the "particular machine" prong applies, or 76 percent if the "transformation" prong applies.[81] All independent patent eligibility rules indicate that any relevant rule indicates invalidation likelihood over 75 percent.[82]

[77] *See infra* Appendix B, Tables 6-7.
[78] *See infra* Appendix B, Tables 6-7.
[79] *See supra* The Federal Circuit Patent Eligibility Theories.
[80] *See supra* Table 2.
[81] *See supra* Table 3.
[82] *See infra* Table 3 and accompanying text.

These statistical models and the invalidation frequencies they incorporate show a high risk of invalidity for a target claim based on patent eligibility. No combined statistical model for all four rules appears useful for understanding patent eligibility outcomes, because the Supreme Court theory and the Federal Circuit theory are independent and separate. Separating the binding Supreme Court theory from the nonbinding but "useful tool"[83] of the Federal Circuit theory increases confidence in quality assessments based solely on binding authority.

VIII. MODEL FLEXIBILITY

This model is intended as a starting point for understanding patent quality as a function of eligibility. The model can adapt to changes in judicial thought on patent eligibility across sources of authority. Critical to the model, however, is reasoned identification of patentability issues. Quantitative metrics derived from the legal corpus are individually tailored to each rule. Considering these model aspects can result in more accurate assessments of patent eligibility.

A. Adaptability to New Judicial Guidance and Consensus

The model can incorporate new judicial outcomes based on current law. Even though the case law surrounding § 101 is anything but settled,[84] the model will continue to receive new cases and new rules as input. If a new foundational rule governing software patentability emerges,[85] that rule can be added to or replace the current patent eligibility theories. The courts would presumably apply any new patent eligibility rule where appropriate and an invalidation frequency for that new rule could be determined in the same manner as for the existing rules. Even existing rules can evolve through analysis of more recent cases and modification of the associated frequencies.[86] Incorporating new rules and new applications of rules allows the model to maintain visibility into current judicial consensus on patent eligibility.

[83] *See Bilski*, 130 S. Ct. at 3227.
[84] *Id.* at 3232.
[85] *Id.* at 3227.
[86] *Id.* at 3228.

B. Applying, Not Automating, Legal Reasoning

This model is designed to encourage identification of rules applicable to a particular claim by requiring reasoned (i.e. human) analysis of individual patent claims. Reasonable minds can differ on whether a claim is valid under a particular rule, and on whether a particular rule even applies to any given claim. Because so many minds can differ on this topic, this model leaves identifying these issues to reason, not automation. The model limits inaccuracies from extrapolation by limiting quantitative analysis only to the effectiveness of the identified rule at invalidating a claim.

IX. LIMITATIONS AND CONCERNS

This model is tailored to quantify effectiveness of particular patent eligibility exceptions based on limited available data. The model assumes that a claim passes the low threshold of satisfying the terms of 35 USC § 101 and only queries whether that claim is patent ineligible based on a judicially-created exception.

The manner of identifying and analyzing litigation data introduces concerns regarding bias, granularity, and completeness. A nontrivial number of cases settle before patent eligibility rulings on summary judgment,[87] and the relationships of those settlements to patent quality is unclear due to the nonpublic nature of settlement negotiations and agreements.[88]

Because relevant court decisions are few in number, the model requires a tradeoff between specificity with respect to technology area against providing a sample set large enough to support patent quality determinations. In effect, this model leans heavily toward the latter; it extrapolates a technology and venue-agnostic patent eligibility outcome for a target claim from existing judicial opinions. To achieve this result, automated metadata searches on extensive litigation data were conducted. Human searching of the same litigation data yielded more relevant cases. However, potential missing data may not change the implication that patents are invalidated in litigation for patent ineligibility with high frequency.

[87] *See infra* Appendix A, Tables 4-5.
[88] *See infra* Appendix A, Tables 4-5.

A. Intervening Settlement Activity May Introduce Bias

Selection bias through settlement activity may affect the quality of claims ultimately adjudicated at summary judgment, and could distort the statistical effectiveness of particular patent eligibility arguments. As noted above, settlement activity indicates that 74 percent of relevant patent eligibility issues reached summary judgment, based on 27 cases raising patent eligibility reaching judgment and eleven settling before judgment.[89]

Drawing inferences of patent quality from settled cases may be difficult. As speculation, defendants might have settled these matters due at least in part to a perceived increased danger from claims more likely to survive summary judgment. However, defendants might also have promptly settled assertions of low quality patents to minimize cost of defense. Invalidation frequencies could change notably under alternate assumptions that all settled cases would have either resulted in rulings of patent eligibility or ineligibility.

A confidence range for settlement bias, based on the above noted assumptions, suggests that settlement activity may distort the observed invalidation frequencies. If all potential settled cases had resulted in rulings of patent eligibility, a floor for invalidation frequencies would be between 30 and 32 percent[90] for the Federal Circuit rules, and between 19 and 37 percent for the Supreme Court rules.[91] If, however, all potential settled cases would have resulted in rulings of patent ineligibility, the invalidation frequencies would be between 88 and 89 percent for the Federal Circuit rules, and between 76 and 84 percent for the Supreme Court rules.[92]

[89] *See infra* Table 4.

[90] The formula for determining the hypothetical percentages is as follows: (Invalidation Frequency Result for a Particular Test) (1 – Number of Adjudicated Litigations / Number of Settled Litigations) + (0 for All Patents Ruled Eligible OR 1 for All Patents Ruled Ineligible)(Number of Adjudicated Litigations / Number of Settled Litigations) = Hypothetical Floor/Ceiling Percentage for Patent Eligibility Likelihood.

[91] *See supra* text accompanying note 90.

[92] *See supra* text accompanying note 90.

Table 3: Estimated Invalidation Frequency Range for Settlement Bias by Rule

Patent Eligibility Rule	Estimated Min. Freq.	Observed Frequency	Estimated Max. Freq.
Preempting the Formula (SCOTUS)	39%	**53%**	66%
Insignificant Post-solution Activity (SCOTUS)	38%	**52%**	65%
Particular Machine (CAFC)	62%	**84%**	89%
Transforming an Article (CAFC)	56%	**76%**	82%

Testing for this type of selection bias is difficult, because attaining public data for patent settlements is difficult. This paper incorporates no data regarding reasons for settlement. Guidance from settling defendants regarding settlement drivers may indicate whether settlement activity, in aggregate, correlates with perceived patent quality.

B. Automated Docket Text Searching May Not Identify all Relevant Litigations

The set of litigations identified as relevant may be incomplete. Most relevant litigations may nonetheless have been identified and analyzed, assuming that human analysis would reveal 100 percent of all relevant data. Manual document identification revealed 47 cases addressing patent eligibility, of which one relevant litigation[93] did not appear in automated searches for the relevant post-*Bilski* time period. It appears plausible that automated searching retrieved the vast majority of relevant litigations.

Both automated and manual identification of relevant litigations draw from the same pool of RPX-developed litigation data. A "production" data set generated by automated database queries is the sole source for the experimental results discussed above. A "control" group generated by human analysis allows some validation of the completeness of the larger set. The smaller "control" data is sourced from a two-stage human analysis in which individual coders read and identify relevant documents, and a separate group of individuals

[93] Digitech Info. Sys., Inc. v. BMW Auto Leasing, LLC, 864 F.Supp.2d 1289 (M.D. Fl. 2012).

performs a quality control review. Larger "production" data is sourced from automated searches of docket text summarizing individual litigation documents, without searching content of those documents.

C. Limited Available Data May Affect Reliability of Patentability Implications

Because patent eligibility rulings are relatively rare at the district court level,[94] dividing the source data into small buckets may reduce reliability of the model. Creating distinct quality likelihood metrics by technology area (e.g. semiconductor, software) or claim type (e.g. method, system) may result in outsized influence of a single data point over a small set. If, hypothetically, only three rulings exist for method claims directed to authentication, then a single future ruling could affect the percentage for that case dramatically. On the other hand, if a dozen or more cases address a particular patent eligibility rule, then a single decision would be less likely to distort the model away from an overall judicial consensus. The model proposed here sacrifices narrowly tailored metrics for a model with higher stability.

The model requires a similar balance between removing older decisions that may distort it and including enough cases to make reliable quality assessments. Selecting only the most recent cases can mitigate distortion in the model by decisions based on outdated law, in view of the rapidly changing case law on this topic.[95] As with claim-specific restrictions, removing too many older data points from the model could increase volatility.

X. CONCLUSION

Patent eligibility can be the difference between validity and invalidity for patents in key technology areas and can be notoriously difficult to predict. The results presented here imply that patent eligibility cannot as convincingly inform patent quality. These results rest on a model that distills the nuanced question of patent eligibility into a semi-objective framework, by simplifying legal issues and generalizing from a finite set of judicial opinions.

This model estimates the likelihood that a litigated claim is valid under 35 U.S.C. § 101, which can imply quality of a similarly-situated nonlitigated claim without requiring a prediction of the outcome of any particular case. The model can provide a lower cost alternative to

[94] *See infra* Table 6.
[95] *See supra* Background.

judicial or administrative adjudication of patent validity on the basis of eligibility. This paper ultimately suggests a more efficient determination of patent quality and patent value without adjudication, especially where the cost is outsized compared to its benefit.

XI. ADDENDUM : SHIFTING SANDS ON PATENT ELIGIBILITY AFTER *ALICE*?

Since the completion of the main body of this research, the *Alice* Court subtly but substantially strengthened 35 U.S.C. § 101 as a weapon in patent litigation.[96] Substantively, the Supreme Court in *Alice* held invalid a patent directed to an electronic technique for mitigating settlement risk[97] as an unpatentable abstract idea.[98] Those claims[99] faced invalidation under the Supreme Court's traditional two-step patent eligibility inquiry.[100] The Court, notably, also revisited its recent comments on patent eligibility in the pharmaceutical space[101] to hold that conventional wisdom[102] qualifies as an unpatentable abstract idea outside the pharmaceutical space.

But the ruling raises, perhaps, more questions than it settles. *Alice* not only reaffirms the Court's historical[103] and consistent[104] refusal to

[96] 35 U.S.C. § 101 (2012) ("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 therefor, subject to the conditions and requirements of this title.").

[97] *Alice Corp Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2348 (2014).

[98] *Id.* at 2349.

[99] *See Id*. at 2348 (quoting as representative claim 33 of U.S. Patent No. 5,970,479).

[100] *See supra* The Supreme Court Patent Eligibility Theories, Figure 1.

[101] *Mayo Collaborative Serv's. v. Prometheus Laboratories, Inc.*, 132 S. Ct. 1289, 1291 (2011) (holding that the patented subject matter at issue "involve[s] well-understood, routine, conventional activity previously engaged in by researchers in the field.").

[102] *See Alice*, 134 S. Ct. at 2359 ("Using a computer to create and maintain 'shadow' accounts amounts to electronic recordkeeping—one of the most basic functions of a computer.").

[103] The Court hews to the broad scope of patent eligibility defined by the legislature. *See Diamond v. Chakrabarty*, 447 U.S. 303, 318 (1980):

> Congress is free to amend 101 so as to exclude from patent protection organisms produced by genetic engineering. Cf. 42 U.S.C. 2181 (a), exempting from patent protection inventions 'useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon.' Or it may choose to craft a statute specifically designed for such living things. But, until Congress takes such action, this Court must construe the language of 101 as it is.

Diamond v. Chakrabarty, 447 U.S. 303, 318 (1980).

create a bright-line rule regarding patent eligibility, but blurs the existing line between patent eligibility and prior art considerations. With its reliance on determining whether a claim recites conventional wisdom, the ruling invites an analysis that can vary widely based on the field of technology in question and that field's historical development. Raised, but left unanswered, by *Alice* is the length of time required to make a technique conventional wisdom.[105] Certain aspects of computer technology may become conventional in a few years' time. Other technologies in the same field, or slower-moving technologies as a whole, may require much longer to become conventional.

The ruling leaves these substantial inquiries open to speculation (and adjudication). Unpatentable "conventional" ideas begin to fade into the unpatentable "generic" computer.[106] The modern mobile device is an instructive illustration of this ambiguity: when does functionality related to touchscreen or accelerometer hardware, or media or messaging software for a mobile phone become generic, if ever? Clear guidance may be out of reach, because to answer this question definitively would be to create just the bright line the Court hopes to avoid.

The proposed model can absorb this jurisprudential shift to at least reduce aggregate uncertainty of this nuanced issue, if aggregate judgments remain lopsided. Because the ruling is primarily concerned with abstract ideas, this model would show any distortion by that ruling as a substantial difference in "preempting the formula" along the "$P_{i,A}$" metric[107] between pre- and post-*Alice* district court rulings. Ultimately, *Alice* itself will become the conventional wisdom it hopes to command.

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[104] *See Bilski v. Kappos*, 561 U.S. 593, 606 (2010) ("in deciding whether previously unforeseen inventions qualify as patentable process[es], it may not make sense to require courts to confine themselves to asking the questions posed by the machine-or-transformation test. Section 101's terms suggest that new technologies may call for new inquiries.") (internal quotations omitted).

[105] The Court in *Mayo* contemplates a version of this question. *See Mayo*, 132 S. Ct. at 1297 ("To put the matter more precisely, so the patent claims add *enough* to their statements of the correlations to allow the processes they describe to qualify as patent-eligible processes that *apply* natural laws?") (emphasis in original).

[106] *See Alice Corp Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. at 2359 ("each step does no more than require a generic computer to perform generic computer functions.").

[107] *See supra* Equation 1 ("$P_{i,A}$").

XII. APPENDIX A: RELEVANT LITIGATIONS

All litigations analyzed for this paper appear below. For each relevant litigation, the below table includes the case name; the docket entry, including the district court's summary judgment reasoning; the date of the relevant summary judgment; and the status of the case ("S"). The case status may be one of four entries: settled before summary judgment ("S"); publicly adjudicated on the merits of patent eligibility at summary judgment ("J"); open litigation with summary judgment adjudication pending ("O"); or litigation stayed, pending reexamination ("R"). Cases in which district courts adjudicated patent eligibility under seal are not included.

Table 4: Relevant Litigations Analyzed

Case Name	Dkt	SJ Filed	S
AAIPharma Litig. LLC. v. Kremers Urban, Co.[108]	204	11/16/12	S
Accenture Global Serv. v. Guidewire Software, Inc.[109]	527	05/31/11	J
Advanced Software Design et al. v. Fed. Reserve Bank St. Louis[110]	296	05/15/12	J
Ariosa Diagnostics, Inc. v. Sequenom, Inc.[111]	254	10/30/13	J
Bancorp Serv. v. Sun Life Assurance[112]	396	02/14/11	J
Big Baboon Corp. v. Dell[113]	384	02/08/11	J
Chamberlain Grp., Inc. v. Lear Corp.[114]	810	11/24/10	J
Checkfree Corp. v. Metavante Corp.[115]	210	08/13/13	R
CLS Bank Int'l v. Alice Corp.[116]	104	03/09/11	J

[108] AAIPharma Litig. LLC v. Kremers Urban Dev., Co., No. 02 Civ. 9628, 2013 U.S. Dist. LEXIS 36319 (S.D.N.Y. Mar. 14, 2013).

[109] Accenture Global Serv. v. Guidewire Software, Inc., 800 F. Supp. 2d 613 (D. Del. 2011), *cert. denied*, 134 S. Ct. 2871 (2014).

[110] Advanced Software Design v. Fed. Reserve Bank St Louis, 583 F.3d 1371 (Fed. Cir. 2009), *aff'd*, 641 F.3d 1368 (Fed. Cir. 2011).

[111] Ariosa Diagnostics, Inc. v. Sequenom, Inc., No. C 11-06391, 2013 U.S. Dist. LEXIS 156554 (N.D. Cal. Civ. Oct. 30, 2013).

[112] Bancorp Serv. v. Sun Life Assurance, 771 F. Supp. 2d 1054 (E.D. Mo. 2011), *aff'd*, 687 F.3d 1266 (Fed. Cir. 2012), *cert. denied*, 134 S. Ct. 2870 (2014).

[113] Big Baboon, Inc. v. Dell, Inc., CV 09-1198 SVW, 2011 U.S. Dist. LEXIS 155536 (C.D. Cal. Feb. 8, 2011).

[114] Chamberlain Grp., Inc. v. Lear Corp., 758 F. Supp. 2d 542 (N.D. Ill. 2010).

[115] Checkfree Corp. v. Metavante Corp., No. 3:12-cv-15-J-34JBT, 2014 U.S. Dist. LEXIS 17320 (M.D. Fla. Jan. 17, 2014).

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

Case Name	Dkt	SJ Filed	S
Codepro Innovations, LLC v. Blockbuster Inc.[117]	75	08/08/12	S
CyberFone Sys. LLC v. Charter Commc'n Holding Co.[118]	19	05/22/12	S
CyberFone Sys. LLC v. CNN Interactive Grp. Inc.[119]	195	08/16/12	J
DietGoal Innovations LLC v. Bravo Media LLC[120]	128	03/19/14	O
Digitech Image Tech. LLC v. Electronics For Imaging Inc.[121]	88	07/31/13	J
Every Penny Counts, Inc. v. Wells Fargo Bank, N.A.[122]	68	07/12/13	J
Exergen Corp. v. Brooklands Inc.[123]	47	02/26/14	O
Fed Home Loan Mort. Corp. v. Graff/Ross Holdings, LLP[124]	25	05/21/12	J
Fed. Home Loan Mortg. Corp. v. Graff/Ross Holdings, LLP[125]	44	09/27/12	J
France Telecom S.A. v. Marvell Semiconductor, Inc[126]	159	04/14/14	J
Fuzzysharp Tech., Inc. v. Intel Corp.[127]	76	11/07/13	J
Intellectual Ventures I LLC v. Capital One Fin. Corp.[128]	371	04/16/14	J
Island Intellectual Prop., LLC v. Promontory Interfinancial[129]	265	02/06/12	J
Kingsdown, Inc. v. King Koil Licensing Co.[130]	50	05/30/12	S

[117] Codepro Innovations, LLC v. Blockbuster Inc., No. 3:11-CV-01171 (N.D. Tex. June 2, 2011).

[118] CyberFone Sys. LLC v. Charter Commc'n Holding Co., No. 1:12-CV-00113 (D. Del. Aug. 15, 2012).

[119] CyberFone Sys. LLC v. CNN Interactive Grp., Inc., 558 Fed. Appx. 988 (Fed. Cir. 2014).

[120] DietGoal Innovations LLC v. Bravo Media LLC, No. 13 Civ. 8391, 2014 U.S. Dist. LEXIS 92484 (S.D.N.Y. 2014).

[121] Digitech Image Tech. LLC v. Elec. for Imaging, Inc., No. 8:12-cv-1324-ODW, 2013 U.S. Dist. LEXIS 108008 (C.D. Cal. July 31, 2013), *aff'd*, 758 F.3d 1344 (Fed. Cir. 2014).

[122] Every Penny Counts, Inc. v. Wells Fargo Bank, N.A., No. 8:11-cv-2826-T-23TBM, 2014 U.S. Dist. LEXIS 127369 (M.D. Fla. Sept. 11, 2014).

[123] Exergen Corp. v. Brooklands, Inc., No. 12-12243-DPW, 2014 WL 4049879 (D. Mass. Aug. 15, 2014).

[124] Fed. Home Loan Mortg. v. Graff/Ross Holdings, 893 F. Supp. 2d 28 (D.D.C. 2012).

[125] Fed. Home Loan Mortg. Corp. v. Graff/Ross Holdings LLP, 893 F. Supp. 2d 28 (D.D.C. 2012).

[126] France Telecom S.A. v. Marvell Semiconductor, Inc., No. 12-cv-04967-WHO, 2014 U.S. Dist. LEXIS 52564 (N.D. Cal. Apr. 14, 2014).

[127] Fuzzysharp Techs., Inc. v. Intel Corp., 2013 U.S. Dist. LEXIS 160689 (N.D. Cal. Nov. 7, 2013).

[128] Intellectual Ventures I LLC v. Capital One Fin. Corp., No. 1:13-cv-00740, 2014 U.S. Dist. LEXIS 53001 (E.D. Va. Apr. 16, 2014).

[129] Island Intellectual Prop. LLC v. Promontory Interfinancial Network, LLC, 658 F. Supp. 2d 615 (S.D.N.Y. 2009).

[130] Kingsdown, Inc. v. King Koil Licensing Co., No. 1:11-CV-00220 (M.D.N.C. dismissed Apr. 10, 2013).

Case Name	Dkt	SJ Filed	S
Leveraged Innovations, LLC v. NASDAQ.[131]	90	05/14/12	S
Lincoln Nat'l Life Ins. Co. v. Transamerica Fin. Life Ins. Co.[132]	256	08/09/10	S
Lincoln Nat'l Life Ins. Co. v. Transamerica Fin. Life Ins. Co.[133]	74	08/09/10	S
LML Patent Corp. v. JP Morgan[134]	650	11/03/10	J
CyberFone Systems LLC v. ZTE (USA) Inc.[135]	274	08/16/12	J
CyberFone Systems LLC v. American Airlines Inc.[136]	167	08/16/12	J
CyberFone Sys. LLC v. Knology Inc.[137]	18	05/22/12	S
Nazomi Commc'n. Inc v. Samsung Telecomm.[138]	161	03/21/12	J
Netview Tech., Inc. v. Microsoft Corp.[139]	28	08/03/10	R
Oleksy v. General Electric Co.[140]	382	06/26/13	J
Oplus Tech., Ltd. v. Sears Holdings Corp.[141]	113	03/04/13	J
Perkinelmer, Inc. v. Intema Ltd[142]	277	08/12/11	J
Planet Bingo LLC v. VKGS LLC[143]	73	08/19/13	J
Prompt Med. Sys., L.P. v. Allscriptsmisys Healthcare Solutions, Inc.[144]	410	02/13/12	J

[131] Leveraged Innovations, LLC v. NASDAQ, No. 11 Civ. 3203, 2013 U.S. Dist. LEXIS 12613 (S.D.N.Y. Jan. 28, 2013).

[132] Lincoln Nat'l Life Ins. Co. v. Transamerica Fin. Life Ins. Co., No. 1:04-CV-396, 2010 U.S. Dist. LEXIS 103744 (N.D. Ind. Sep. 30, 2010).

[133] *Id.*

[134] LML Patent Corp. v. JP Morgan, No. 2:08-CV-448, 2010 U.S. Dist. LEXIS 144649 (E.D. Tex. Sep. 20, 2010).

[135] CyberFone Sys. LLC v. ZTE (USA) Inc., No. 11-827-SLR, 2014 U.S. Dist. LEXIS 13478 (D. Del. Feb. 4, 2014).

[136] CyberFone Sys. LLC v. Cellco P'ship, No. 11-cv-00831, 2012 U.S. Dist. LEXIS 60045 (D. Del. Apr. 30, 2012) (including American Airlines as a co-defendant).

[137] CyberFone Sys. LLC v. Knology Inc., No. 12-cv-00116 (D. Del. Aug. 13, 2012).

[138] Nazomi Commc'n Inc. v. Samsung Telecomm., No. C-10-05545, 2013 U.S. Dist. LEXIS 122869 (N.D. Cal. Aug. 28, 2013) *aff'd*, 739 F.3d 1339 (Fed. Cir. 2014).

[139] Netview Tech., Inc. v. Microsoft Corp., No. 1:09-cv-12072 (D. Mass. Sep. 10, 2012).

[140] Oleksy v. Gen. Elec. Co., No. 06 C 01245, 2013 WL 3233259 (N.D. Ill. June 26, 2013).

[141] Oplus Techs., Inc. v. Sears Holdings Corp., No. 12-cv-5707-MRP, 2013 WL 1003632 (C.D. Cal. Mar. 4, 2013).

[142] PerkinElmer, Inc. v. Intema Ltd., No. 09-10176-FDS, 2011 U.S. Dist. LEXIS 156612 (Fed. Cir. Aug. 12, 2011), *aff'd in part, rev'd in part,* 496 Fed. Appx. 65 (Fed. Cir. 2012), *and cert. denied* 134 S. Ct. 102 (2013).

[143] Planet Bingo, LLC v. VKGS, LLC, 961 F. Supp. 2d 840 (W.D. Mich. 2013), *aff'd*, No. 2013-1663, 2014 U.S. App. LEXIS 16412 (Fed. Cir. Aug. 26, 2014).

Case Name	Dkt	SJ Filed	S
Shire LLC v. Amneal Pharm., LLC[145]	517	02/21/14	O
Smartgene, Inc. v. Advanced Bio. Labs., SA[146]	66	03/30/12	J
Software Tree, LLC v. Red Hat Inc.[147]	272	07/14/10	S
Tessenderlo Kerley, Inc v. Or-Cal, Inc.[148]	101	06/05/12	S
Touchscreen Gestures LLC v. HTC Corp.[149]	82	11/06/13	S
TQP Dev., LLC v. Intuit Inc.[150]	150	02/19/14	J

Table 5: Relevant Litigations, Legend

Legend	
Code	**Field Type**
S	Case Status
S	Settled before summary judgment
J	District court publicly adjudicated patent eligibility rule(s) at summary judgment
O	Litigation open with summary judgment adjudication pending
R	Litigation stayed pending reexamination

[144] Prompt Med. Sys., L.P. v. Allscriptsmysis Healthcare Solutions, Inc., No. 6:10-CV-71, 2012 WL 678216 (E.D. Tex. Feb. 13, 2012).

[145] Shire, LLC v. Amneal Pharm., LLC, No. 11-3781, 2014 U.S. Dist. LEXIS 85369 (D.N.J. June 23, 2014), *aff'd*, 2014 U.S. Dist. LEXIS 64760 (D.N.J. May 12, 2014).

[146] Smartgene, Inc. v. Advanced Biological Labs., SA, 852 F.Sup.2d 42 (D.D.C. 2012), *aff'd,* No. 08-00642 (BAH), 2014 U.S. App. LEXIS 1357 (D.C. Cir. Jan. 24, 2014).

[147] Software Tree, LLC v. Red Hat, Inc., No. 6:09-CV-097, 2010 U.S. Dist. LEXIS 70542 (E.D. Tex. June 24, 2010).

[148] Tesserlando Kerley, Inc. v. Or-Cal, Inc., No. C 11-04100, 2012 U.S. Dist. LEXIS 78044 (N.D. Cal. June 5, 2012) *patent interpreted by* 2012 U.S. Dist. LEXIS 112310 (N.D. Cal. Aug. 9, 2012).

[149]Touchscreen Gestures, LLC v. HTC Corp., No. 3:2013-cv-01772 (N.D. Cal. Apr. 19, 2013).

[150] TQP Dev., LLC v. Intuit Inc., No. 2:12-CV-180-WCB, 2014 U.S. Dist. LEXIS 20077 (E.D. Tex. Feb. 19, 2014).

XIII. APPENDIX B: LITIGATION ANALYSIS

Analysis of all relevant litigations appears below. For each analyzed litigation the below table includes the case name, the patent eligibility ruling ("E"), and the appearance of the four patent eligibility rules. The four rules analyzed are preempting the formula ("F"); insignificant post-solution activity ("A"); particular machine ("M"); and transforming an article ("T"). For each category, symbols indicate adjudication for patent eligibility ("Y"); adjudication against patent eligibility ("N"); or a properly raised but not adjudicated argument for or against patent eligibility ("X").

Table 6: Litigation Analysis

Case Name	E	F	A	M	T
AAIPharma Litig. LLC. v. Kremers Urban, Co.[151]		X	X		
Accenture Global Serv. v. Guidewire Software, Inc.[152]	N	N	N	N	N
Advanced Software Design v. Fed. Reserve Bank St Louis[153]	Y	Y	Y	Y	
Ariosa Diagnostics, Inc. v. Sequenom, Inc.[154]	N	N	N		
Bancorp Serv. v. Sun Life Assurance[155]	N	N	N	N	N
Big Baboon Corp. v. Dell[156]	Y	Y	Y		
Chamberlain Group, Inc.v. Lear Corp.[157]	Y	Y	Y	Y	
Checkfree Corp. v. Metavante Corp.[158]	X	X		X	X
CLS Bank Int'l v. Alice Corp.[159]	N	N			
CLS Bank Int'l v. Alice Corp.[160]	N	N	N	N	

[151] AAIPharma Litig. LLC v. Kremers Urban, Co., No. 02 Civ. 9628, 2013 U.S. Dist. LEXIS 36319 (S.D.N.Y. Mar. 14, 2013).

[152] Accenture Global Serv. v. Guidewire Software, Inc., 800 F. Supp. 2d 613 (D. Del., 2011), *cert. denied*, 134 S. Ct. 2871 (2014).

[153] Advanced Software Design v. Fed. Reserve Bank St Louis, 583 F.3d 1371 (Fed. Cir. 2009), *aff'd*, 641 F.3d 1368 (Fed. Cir. 2011).

[154] Ariosa Diagnostics, Inc. v. Sequenom, Inc., No. C 11-06391, 2013 U.S. Dist. LEXIS 156554 (N.D. Cal. Civ. Oct. 30, 2013).

[155] Bancorp Serv. v. Sun Life Assurance, Co., 771 F. Supp. 2d 1054 (E.D. Mo. 2011), *aff'd*, 687 F.3d 1266 (Fed. Cir. 2012), *cert. denied*, 134 S. Ct. 2870 (2014).

[156] Big Baboon Corp. v. Dell, CV 09-1198, 2011 U.S. Dist. LEXIS 155536 (C.D. Cal. 2011).

[157] Chamberlain Group, Inc.v. Lear Corp., 758 F. Supp. 2d 542 (N.D. Ill. 2010).

[158] Checkfree Corp. v. Metavante Corp., No. 3:12-cv-15-J-34JBT, 2014 U.S. Dist. LEXIS 17320 (M.D. Fla. Jan. 17, 2014).

[159] CLS Bank Int'l v. Alice Corp. 768 F. Supp. 2d 221 (D.D.C. 2011), *rev'd* 685 F.3d 1341 (Fed. Cir. 2012) , *aff'd*, 134 S. Ct. 2347 (2014).

[160] *Id.*

Case Name	E	F	A	M	T
Codepro Innovations, LLC v. Blockbuster Inc.[161]		X			
CyberFone Sys. LLC v. Charter Commc'n Holding Co.[162]		X	X	X	X
CyberFone Sys. LLC v. CNN Interactive Grp. Inc.[163]	N	N		N	N
DietGoal Innovations LLC v. Bravo Media LLC[164]		X	X		
Digitech Image Tech. LLC v. Electronics For Imaging Inc.[165]	N	N		N	N
Every Penny Counts, Inc. v. Wells Fargo Bank, N.A.[166]	N	N	N	N	N
Exergen Corp. v. Brooklands Inc.[167]		X	X	X	X
Fed. Home Loan Mortg. v. Graff/Ross Holdings[168]	N	N	N	N	N
Fed. Home Loan Mortg. Corp. v. Graff/Ross Holdings, LLP[169]	N	N		N	N
Fed. Home Loan Mortg. Corp. v. Graff/Ross Holdings, LLP[170]	N	Y	N		
Fed. Home Loan Mortg. Corp. v. Graff/Ross Holdings, LLP[171]	N	Y	N		
Fed. Home Loan Mortg. Corp. v. Graff/Ross Holdings, LLP[172]	N	Y	N		
France Telecom S.A. v. Marvell Semiconductor, Inc.[173]	Y	Y	Y	N	Y
Fuzzysharp Tech. Inc. v. Intel Corp.[174]	N	N	N	N	
Intellectual Ventures I LLC v. Capital One Fin. Corp.[175]	N	N	N	N	N

[161] Codepro Innovations, LLC v. Blockbuster Inc., No. 3:2011-cv-01171 (N.D. Tex. June 2, 2011).

[162] CyberFone Sys. LLC v. Charter Commc'n Holding Co., No. 1:11-cv-00828 (D. Del. Aug. 15, 2012).

[163] CyberFone Sys. LLC v. CNN Interactive Grp. Inc., 558 Fed. Appx. 988 (Fed. Cir. 2014).

[164] DietGoal Innovations LLC v. Bravo Media LLC, No. 13 Civ. 8391, 2014 U.S. Dist. LEXIS 92484 (S.D.N.Y. 2014).

[165] Digitech Image Tech. LLC v. Electronics For Imaging Inc., No. 8:12-cv-1324-ODW, 2013 U.S. Dist. LEXIS 108008 (C.D. Cal. July 31, 2013) *aff'd*, 758 F.3d 1344 (Fed. Cir. 2014).

[166] Every Penny Counts, Inc. v. Wells Fargo Bank, N.A., No. 8:11-cv-2826-T-23TBM, 2014 U.S. Dist. LEXIS 127369 (M.D. Fla. Sep. 11, 2014).

[167] Exergen Corp. v. Brooklands Inc., No. 12-12243-DPW, 2014 U.S. Dist. LEXIS 113736 (D. Mass. Aug. 15, 2014).

[168] Fed. Home Loan Mortg. v. Graff/Ross Holdings, 893 F. Supp. 2d 28 (D.D.C. 2012).

[169] *Id.*

[170] *Id.*

[171] *Id.*

[172] *Id.*

[173] France Telecom S.A. v. Marvell Semiconductor, Inc., No. 12-cv-04967-WHO, 2014 U.S. Dist. LEXIS 52564 (N.D. Cal. Apr. 14, 2014).

[174] Fuzzysharp Tech. Inc. v. Intel Corp., No. 12-CV-04413, 2013 U.S. Dist. LEXIS 160897 (N.D. Cal. Nov. 6, 2013) *amended by* 2013 U.S. Dist. LEXIS 160689 (N.D. Cal. Nov. 7, 2013).

[175] Intellectual Ventures I LLC v. Capital One Fin. Corp., No. 1:13-cv-00740, 2014 U.S. Dist. LEXIS 53001 (E.D. Va. Apr. 16, 2014).

Case Name	E	F	A	M	T
Island Intellectual Prop., LLC v. Promontory Interfinancial[176]	Y	Y	Y		
Kingsdown, Inc. v. King Koil Licensing Company, Inc.[177]		X	X	X	X
Leveraged Innovations, LLC v. NASDAQ[178]		X	X	X	X
Lincoln Nat'l Life Ins. Co. v. Transamerica Fin. Life Ins. Co.[179]		X		X	X
Lincoln Nat'l Life Ins. Co. v. Transamerica Fin. Life Ins. Co.[180]		X		X	X
LML Patent Corp. v. JP Morgan[181]	Y	Y	Y	Y	Y
CyberFone Sys. LLC v. ZTE (USA) Inc.[182]	N	N		N	N
CyberFone Sys. LLC v. American Airlines Inc.[183]	N	N		N	N
CyberFone Sys. LLC v. Knology Inc.[184]		X	X	X	X
Nazomi Commc'n Inc. v. Samsung Telecomm.[185]	Y	Y	Y		
Netview Tech., Inc. v. Microsoft Corp.[186]		X	X	X	X
Oleksy v. General Electric Co.[187]	Y	Y	Y		
Oplus Tech., Ltd. v. Sears Holdings Corp.[188]	Y	Y	Y	N	N
PerkinElmer, Inc. v. Intema Ltd.[189]	Y	Y	Y		Y

[176] Island Intellectual Prop., LLC v. Promontory Interfinancial, 658 F. Supp. 2d 615 (S.D.N.Y. 2009).

[177] Kingsdown, Inc. v. King Koil Licensing Company, Inc., No. 1:2011-cv-00220 (M.D.N.C. Mar. 17, 2011).

[178] Leveraged Innovations, LLC v. NASDAQ, No. 11 Civ. 3203, 2013 U.S. Dist. LEXIS 12613 (S.D.N.Y. Jan. 28, 2013).

[179] Lincoln Nat'l Life Ins. Co. v. Transamerica Fin. Life Ins. Co., No. 1:04-CV-396, 2010 U.S. Dist. LEXIS 103744 (N.D. Ind. Sep. 30, 2010).

[180] *Id.*

[181] LML Patent Corp. v. JP Morgan, No. 2:08-CV-448, 2010 U.S. Dist. LEXIS 144649 (E.D. Tex. Sep. 20, 2010).

[182] CyberFone Sys. LLC v. ZTE (USA) Inc., No. 11-827-SLR, 2014 U.S. Dist. LEXIS 13478 (D. Del. Feb. 4, 2014).

[183] CyberFone Sys. LLC v. Cellco P'ship, No. 11-cv-00831, 2012 U.S. Dist. LEXIS 60045 (D. Del. Apr. 30, 2012) (including American Airlines as a co-defendant).

[184] CyberFone Sys. LLC v. Knology Inc., No. 12-cv-00116 (D. Del. Aug. 13, 2012).

[185] Nazomi Commc'n Inc. v. Samsung Telecomm., No. C-10-05545, 2013 U.S. Dist. LEXIS 122869 (N.D. Cal. Aug. 28, 2013) *aff'd*, 739 F.3d 1339 (Fed. Cir. 2014).

[186] Netview Tech., Inc. v. Microsoft Corp., No. 1:09-cv-12072 (D. Mass. Sep. 10, 2012).

[187] Oleksy v. General Electric Co., No. 6-C-1245, 2014 U.S. Dist. LEXIS 119342 (N.D. Ill. Aug. 27, 2014).

[188] Oplus Tech., Ltd. v. Sears Holdings Corp., No. 2:12-cv-05707-MRP-Ex, 2013 U.S. Dist. LEXIS 145917 (C.D. Cal. Oct. 2, 2013) *appeal dismissed* 560 Fed. Appx. 977 (Fed. Cir. 2014).

[189] PerkinElmer, Inc. v. Intema Ltd., 496 Fed. Appx. 65 (Fed. Cir. 2012) *cert. denied* 134 S. Ct. 102 (2013).

Case Name	E	F	A	M	T
Planet Bingo, LLC v. VKGS, LLC[190]	N	N	N		
Planet Bingo, LLC v. VKGS, LLC[191]	N	N	N		
Prompt Med. Sys., LP v. AllscriptsMysis Healthcare Solutions, Inc.[192]	Y	Y	Y	N	N
Shire LLC v. Amneal Pharm., LLC[193]					
Smartgene, Inc. v. Advanced Bio. Labs., SA[194]	N	N		N	N
Software Tree, LLC v. Red Hat, Inc.[195]		X	X	X	X
Tessenderlo Kerley, Inc. v. Or-Cal, Inc.[196]		X			
Touchscreen Gestures, LLC v. HTC Corp.[197]		X	X		
TQP Dev., LLC v. Intuit Inc.[198]	Y	Y	Y		Y

Table 7: Litigation Analysis, Legend

Legend	
E	Patent-Eligible under 35 USC 101? (Y/N/X)
F	Eligible under Pre-Empting the Formula? (Y/N/X)
A	Eligible under Insignificant Extra-solution Activity? (Y/N/X)
M	Eligible under Particular Machine? (Y/N/X)
T	Eligible under Transforming an Article? (Y/N/X)

[190] Planet Bingo, LLC v. VKGS, LLC, 961 F. Supp. 2d 840 (W.D. Mich. 2013) *aff'd*, No. 2013-1663, 2014 U.S. App. LEXIS 16412 (1st Cir. Aug. 26, 2014).

[191] *Id.*

[192] Prompt Med. Sys., LP v. AllscriptsMysis Healthcare Solutions, Inc., No. 6:10-CV-71, 2012 U.S. Dist. LEXIS 30694 (E.D. Tex. Feb. 13, 2012).

[193] Shire, LLC v. Amneal Pharm., LLC, No. 11-3781, 2014 U.S. Dist. LEXIS 85369 (D.N.J. June 23, 2014) *aff'd*, 2014 U.S. Dist. LEXIS 64760 (D.N.J. May 12, 2014).

[194] Smartgene, Inc. v. Advanced Bio. Labs., SA, 555 Fed. Appx. 950 (D.C. Cir.) *cert. denied* No. 13-1299, 2014 U.S. LEXIS 5865 (U.S. Oct. 6, 2014).

[195] Software Tree, LLC v. Red Hat, Inc., No. 6:09-CV-097, 2010 U.S. Dist. LEXIS 70542 (E.D. Tex. June 24, 2010).

[196] Tessenderlo Kerley, Inc. v. Or-Cal, Inc., No. C 11-04100, 2012 U.S. Dist. LEXIS 78044 (N.D. Cal. June 5, 2012) *patent interpreted by* 2012 U.S. Dist. LEXIS 112310 (N.D. Cal. Aug. 9, 2012).

[197] Touchscreen Gestures, LLC v. HTC Corp., No. 3:2013-cv-01772 (N.D. Cal. Apr. 19, 2013).

[198] TQP Dev., LLC v. Intuit Inc., No. 2:12-CV-180-WCB, 2014 U.S. Dist. LEXIS 84054 (E.D. Tex. June 20, 2014).