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AVOIDING THE RABBIT HOLE: AN ONTOLOGICAL MODEL FOR DETERMINING SECTION 101 PATENT-ELIGIBILITY UNDER *ALICE*

ALAN J. GOCHA

ABSTRACT

In *Alice Corp. Pty. v. CLS Bank International*, 134 S. Ct. 2347 (2014), the Supreme Court established a two-part test for determining whether a patent claim is directed at the patent-ineligible category of abstract ideas. Unfortunately, however, the Supreme Court in *Alice* offered little clarification as to what constitutes an abstract idea—leaving innovators and competitors uncertain as to their legal rights. Likewise, instead of creating a definitive test, the Federal Circuit has proceeded by engaging in self-referential argument by analogy. This article, *Avoiding the Rabbit Hole: An Ontological Model for Determining Section 101 Patent-Eligibility under Alice*, argues that the Supreme Court and Federal Circuit case law can be synthesized to provide a comprehensive set of rules to help guide the *Alice* analysis.

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AVOIDING THE RABBIT HOLE: AN ONTOLOGICAL MODEL FOR
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ALAN J. GOCHA*

I. INTRODUCTION

The declared purpose of patent law is to promote the progress of the useful arts by granting inventors exclusive rights for a limited time, which enables them to secure the financial rewards for their inventions.¹

Section 101 of the Patent Act defines the subject matter eligible for patent protection.²

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.³

The Supreme Court has long held that section 101 contains three implicit exceptions: laws of nature, natural phenomena, and abstract ideas.⁴ “The concepts covered by these exceptions are part of the storehouse of knowledge of all men, free to all men and reserved exclusively to none.”⁵ Accordingly, granting monopolization over these tools would impede innovation more than it would tend to promote it.⁶ The Court has noted, however, that at some level “all inventions embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.”⁷

In *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, the Court established a two-step framework for distinguishing patents which are directed at “patent-ineligible laws of nature. . . —[and] add too little to such underlying ineligible subject matter—from those that claim patent-eligible applications of those concepts.”⁸ The first step of *Mayo* test requires courts to determine whether the claims set forth are directed at a law of nature.⁹ And if so, the second step asks whether “the claims do significantly more than simply describe these natural relations.”¹⁰

* © Alan J. Gocha 2017. J.D., Georgetown University Law Center (2016); B.A., University of Michigan (2013).

¹ See *U.S. v. Univis Lens Co.*, 62 S. Ct. 1088, 1093 (1942); see also U.S. CONST., art. I, § 8, cl. 8.

² See 35 U.S.C. § 101.

³ *Id.*

⁴ *Alice Corp. Pty. v. CLS Bank International*, 134 S. Ct. 2347, 2354 (2014). “While these exceptions are not required by the statutory text, they are consistent with the notion that a patentable process must be “new and useful.” *Bilski v. Kapos*, 130 S. Ct. 3218, 3225 (2010).

⁵ *Bilski*, 130 S. Ct. at 3225 (internal quotation omitted).

⁶ *Alice*, 134 S. Ct. at 2354.

⁷ *Id.* (internal quotation omitted).

⁸ *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1254 (Fed. Cir. 2014).

⁹ 132 S. Ct. 1289, 1296-97 (2012).

¹⁰ *Id.* at 1297.

In *Alice Corp. Pty. v. CLS Bank International*, the Supreme Court extended *Mayo*'s two-step analysis to all section 101 eligibility questions.¹¹ Accordingly, when determining whether a patent is directed at the patent-ineligible category of abstract ideas, courts must: first, determine whether the patent at issue is directed to an abstract idea (“abstract idea” prong); and if so, then, second, determine whether the elements of each claim sufficiently transform the nature of the claim such that it amounts to significantly more than a patent on an ineligible concept (“inventive concept” prong).¹² Although seemingly straight forward, the application of *Alice* has proven to be exceedingly difficult. This struggle, at least in part, stems from the Court’s decision “not [to] labor to delimit the precise contours of the ‘abstract ideas’ category”¹³ Instead, the Court deemed it adequate to utilize argument by analogy.¹⁴ Similarly, the Federal Circuit indicated that it “found it sufficient to compare claims at issue to [] claims already found to be directed to an abstract idea in previous cases.”¹⁵ This lack of clarifying instruction has not been without consequence. Subject-matter eligibility determinations under *Alice* have seen seemingly unpredictable and inconsistent results— “leaving innovators and competitors uncertain as to their legal rights.”¹⁶

¹¹ See *Alice*, 134 S. Ct. at 2354.

¹² *Id.* at 2355. Note, this test is applied regardless of claim type—e.g. method or system. *Id.* at 2359-60.

¹³ *Id.* at 2357.

¹⁴ *Id.* (Finding it “enough to recognize that there is no meaningful distinction between the concept of risk hedging in *Bilski* and the concept of intermediated settlement at issue”); see *California Institute of Technology v. Hughes Communications v. Hughes Communications Inc.*, 59 F. Supp. 3d 974, 984 (C.D. Cal. 2014).

¹⁵ *Enfish, LLC v. Microsoft Corp.*, 2016 WL 2756255, at *4 (Fed. Cir. 2016); *AMDOCS (Israel) Ltd. v. Openet Telecom, Inc.*, 2016 WL 6440387, at *4 (Fed. Cir. Nov. 1, 2016) (“[A] search for a single test or definition in the decided cases concerning § 101 from this court, and indeed from the Supreme Court, reveals that at present there is no such single, succinct, usable definition or test.”); *But see Versata Development Group, Inc. v. Sap America, Inc.*, 793 F.3d 1306, 1331 (Fed. Cir. 2015) (suggesting that defining abstract may be “inherent in the search for a definition of an ‘abstract idea’ that is not itself abstract.”).

¹⁶ See *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1345 (Fed. Cir. 2015); *Affinity Labs of Texas, LLC v. DIRECTV, LLC*, 2016 WL 5335501 (Fed. Cir. Sept. 23, 2016) (“We have acknowledged that precision has been elusive in defining an all-purpose boundary between the abstract and the concrete.” (internal quotation marks omitted)); (Julia Powles, *Alice v. CLS Bank: United States Supreme Court Establishes General Patentability Test*, WORLD INTELLECTUAL PROPERTY ORG. (Aug. 2014), http://www.wipo.int/wipo_magazine/en/2014/04/article_0004.html (“Instead, subject-matter is an impressionistic, somewhat unpredictable assessment, and overlaps dangerously with novelty and inventive step. This is seen in the *Alice* case itself, where the Court was clearly influenced by the fact that intermediated settlement was a long-occurring practice.”).

[A] review of the cases that cite *Alice* shows that courts do attempt to fit their facts to the *Alice* and *Bilski* criteria. But what remains often appears to be less analysis and more hindsight-laden, conclusory, gut reaction to the subject matter at issue. Therefore, it can be difficult to know with certainty when patent subject matter is directed to an abstract idea, especially in scenarios where neither the Federal Circuit or the Supreme Court has not already determined similar subject matter to be unpatentable.

Jason M. Schwent, *Patent Landscape Post-Alice: Not Much Clearer, But Trends Worth Noting*, BLOOMBERG BNA (Dec. 4, 2014), <http://www.bna.com/patent-landscape-postalice-n17179917982/#!>

The Federal Circuit has noted that “a search for a single test or definition in the decided cases concerning § 101 . . . reveals that at present there is no such single, succinct, usable definition or test.”¹⁷ This article suggests that, upon thorough review of the Supreme Court and Federal Circuit case law [collectively hereinafter “*Alice* Cases”],¹⁸ a set of comprehensive rules can indeed be synthesized to guide the *Alice* analysis. For the sake of simplicity, this article refers to these proposed tests collectively as the OSA (“Ontological System of Abstraction”) model.¹⁹ In creating this model, the author sought to achieve three primary goals: (1) fully incorporate the theoretical justifications cited in *Alice* Cases (“totalizing”); (2) principally demonstrate explanatory capacity—i.e. to generate the same results as the *Alice* Cases (“faithful”); and (3) provide a consistent, yet non-arbitrary, method for making subject-matter eligibility determinations (“consistent”).²⁰

II. OSA METHODOLOGY

The Supreme Court and Federal Circuit, while cautiously refraining from providing bright-line rules, have established a number of non-mutually exclusive categories²¹—or genotypes²²—of abstract ideas, including: (a) fundamental economic and conventional business practices;²³ (b) methods of organizing human activity;²⁴ (c)

¹⁷ *Amdocs (Israel), Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1294 (Fed. Cir. 2016).

¹⁸ Thus, in this article, “*Alice* Cases” will be used to refer to decisions only by the Supreme Court and Federal Circuit. Using District Court cases is problematic, because the validity of the decision has not been confirmed. Although, arguably, this can also be said to be true for the Federal Circuit holdings, the lack of Supreme Court guidance on the issue (a) suggests the Federal Circuit will do much of the heavy lifting and (b) means there is no meaningful alternative. So, for the sake of discussion, it is assumed that the Federal Circuit cases have been decided correctly.

¹⁹ “Ontological System on Abstraction.”

²⁰ An additional goal could be to maintain a cognizable division between step 1 and step 2 of the *Alice* test (“delineated”). However, the OSA model arguably eliminates the need for the second-step of the *Alice* analysis, and the Federal Circuit has begun to recognize that the distinction is increasingly hard to maintain. *Cf. Amdocs*, 841 F.3d at 1294 (“Recent cases, however, suggest that there is considerable overlap between step one and step two, and in some situations this analysis could be accomplished without going beyond step one.”).

²¹ *See, e.g. TDE Petroleum Data Solutions, Inc. v. AKM Enterprise, Inc.*, 2016 WL 4271975 (Fed. Cir. Aug. 15, 2016) (claim was directed at a purely mental process as well as a mathematical algorithm).

²² Note, “genotype” is not a term employed by the courts. Moreover, in the field of biology, genotype refers to a singular organism rather than a class of organisms, or in this case, things. I use the term genotype, rather than a more apt description, such as class, to describe a group of things for the purposes of distinguishing between court analysis and language used to describe my proposed system (as will be clearer later in the section).

²³ *See Enfish*, 2016 WL 2756255, at *4.

²⁴ *See In re TLI Communications LLC Patent Litigation*, 2016 WL 2865693, at *5 (Fed. Cir. 2016) (classifying and storing digital images in an organized manner.); *Intellectual Ventures; Content Extraction* at 1355; *see Parker v. Flook*, 437 U.S. 584, 586 (1978) (noting that, while the invalid claim’s calculations are “primarily useful for computerized [applications],” they could still “be made [using a] pencil and paper”); *see also In re Bilski*, 545 F.3d 943, 972 (Fed. Cir. 2008) (Dyk, J., concurring) (“There is no suggestion in any of th[e] early [English] consideration of process patents that processes for organizing human activity were or ever had been patentable”) (cited in *Alice*, 134 S. Ct. at 2360 (Sotomayor, J., concurring)); *cf. Bilski*, 561 U.S. at 603 (“Concerns about attempts to call any form of

purely mental processes;²⁵ (d) claims directed at the idea itself²⁶; (e) mathematical algorithms²⁷; and (f) fundamental relationships.²⁸ Likewise, the Court and Federal Circuit have identified a set of common elements that will not, by themselves, save a claim from subject-matter ineligibility—i.e. (1) the mere recitation of (a) concrete or tangible components,²⁹ (b) performance of generic computer functions,³⁰ or (c) well-understood, routine conventional activities,³¹ and (2) the limiting of an abstract idea to a particular domain or environment [collectively “Non-Essential Characteristics or Activities”].³² Notably, these Non-Essential Characteristics or Activities will not save a claim at either step 1 or step 2 of the *Alice* test.³³

I suggest that this alphabet soup of concepts can be succinctly separated into two broad categories.³⁴ More specifically, “abstract ideas” can veraciously be divided into

human activity a “process” can be met by making sure the claim meets the requirements of § 101”). *But see* Robert R. Sachs, Comments on USPTO’s Interim Patent Eligibility Guidance, 20 N.O. 3 Cyberspace Law 6 (2015) (“Several commentators made the . . . argument [] that the Alice Court did not say that all methods of organizing human activities were abstract ideas.”).

²⁵ *See Bilski*, 545 F.3d at 965 (“[M]ental processes are not patent-eligible subject matter because the ‘application of only human intelligence to the solution of practical problems is no more than a claim to a fundamental principle.’”); *Gottschalk v. Benson*, 409 U.S. 63, 65 (1972); *In re Chomiskey*, 554 F.3d 967, 980 (Fed. Cir. 2009) (“[I]t is established that the application of human intelligence to the solution of practical problems is not in and of itself patentable.”); *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 809 F.3d 1282, 1285 (Fed. Cir. 2015).

Methods which can be performed entirely in the human mind are unpatentable not because there is anything wrong with claiming mental method steps as part of a process containing non-mental steps, but rather because computational methods which can be performed entirely in the human mind are the types of methods that embody the “basic tools of scientific and technological work that are free to all men and reserved exclusively to none.” *CyberSource; Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011).

²⁶ *See Internet Patents*, 790 F.3d at 1348.

²⁷ *See Benson*, 409 U.S. at 65.

²⁸ Compare with Examples: Abstract Ideas, U.S. Patent and Trademark Office 3 (last visited June 12, 2016) (noting fundamental economic practice, a method of organizing human activity, an idea itself, and mathematical relationship); Stephen T. Schreiner and Brendan McCommas, *The Patentability of Financial Processes After the Supreme Court’s Alice Decision*, 131 BANKING L.J. 777, 784 (2014) (“Examiners are then given examples of abstract ideas mentioned in Alice, such as ‘fundamental economic practices,’ ‘certain methods of organizing human activities,’ an ‘idea of itself,’ and ‘mathematical relationships or formulas.’”).

²⁹ *TLI Communications*, 2016 WL 2865693, at *5 (“It is well-settled that mere recitation of concrete, tangible components is insufficient to confer patent eligibility to an otherwise abstract idea. Rather, the components must involve more than performance of ‘well-understood, routine, conventional activities previously known to the industry.’” (citing *Alice*, 134 S. Ct. at 2359)).

³⁰ *Id.*; *Mortgage Grader, Inc. v. First Choice Loan Services, Inc.*, 811 F.3d 1314, 1324 (Fed. Cir. 2016).

³¹ *Alice*, 134 S. Ct. at 2359; *see, e.g., In re Smith*, 815 F.3d 816, 818 (Fed. Cir. 2016) (“shuffling and dealing cards”); *TLI Communications*, 2016 WL 2865693, at *4 (classifying and storing digital images in an organized manner); *Content Extraction and Transmission, LLC v. Wells Fargo Bank*, 776 F.3d 1343, 1347 (Fed. Cir. 2014) (“collecting data,” “recognizing certain data within the collected data set,” and “storing the recognized data in memory”).

³² *Bilski*, 561 U.S. at 612 (“[L]imiting an abstract idea to one field of use . . . [does] not make the concept patentable.”); *see TLI Communications*, 2016 WL 2865693 at *6.

³³ Confusingly, these “non-essential” characteristics have been discussed as abstract genotypes in it of themselves.

³⁴ That is, these genotypes are in reality sub-genotypes.

two representative sub-sets: inherently abstract ideas³⁵ (*a priori*) and temporally abstract ideas³⁶ (*a posteriori*). This distinction is not ungrounded in the case law.³⁷ The Supreme Court has noted that some ideas are abstract because they are “preexisting, fundamental truth[s]” while others are abstract because they are “longstanding [] practice[s].”³⁸ The Federal Circuit has similarly observed that, while in some cases the court need only refer to the four-corners of a patent, review prior case law, then utilize deductive reasoning, in other cases the court must engage in fact finding.³⁹

Inherently abstract ideas, as used here, merely recite ontological categories.⁴⁰ Accordingly, they can be deemed abstract without reference to empirical evidence—i.e.

³⁵ *Cf.* *Genetic Technologies Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1375 (Fed. Cir. 2016) (“Linkage disequilibrium is indisputably a universal, inherent feature of human DNA, and the ‘179 patent itself notes that the claims are based on this fact.”); *Enfish*, 2016 WL 2756255, at *4 (Fed. Cir. 2016) (“We do not read *Alice* to broadly hold that all improvements in computer-related technology are inherently abstract and, therefore, must be considered at step two.” (note that the court, here, is using “abstract” to refer to concepts that fail both steps of the *Alice* test)).

³⁶ Temporally abstract ideas as a distinct kind of abstract idea can be seen in the case law. For example, in *DDR Holdings*, the majority reasoned that the cited cases could be distinguished because the claims at issue “stand apart because they do not merely recite the performance of some business practice known from the pre-Internet world along with the requirement to perform it on the Internet.” 773 F.3d at 1257 (emphasis added).

The dissent suggests that the “store within a store” concept, such as a warehouse store that contains a kiosk for selling a third-party partner’s cruise vacation packages, is the pre-Internet analog of the ‘399 patent’s asserted claims. Dissenting Op. 1264. While that concept may have been well-known by *the relevant timeframe*, that practice did not have to account for the ephemeral nature of an Internet “location” or the near-instantaneous transport between these locations made possible by standard Internet communication protocols, which introduces a problem that does not arise in the “brick and mortar” context. In particular, once a customer enters a physical warehouse store, that customer may encounter a kiosk selling third-party cruise vacation packages. There is, however, no possibility that by walking up to this kiosk, the customer will be suddenly and completely transported outside the warehouse store and relocated to a separate physical venue associated with the third-party—the analog of what ordinarily occurs in “cyberspace” after the simple click of a hyperlink—where that customer could purchase a cruise package without any indication that they were previously browsing the aisles of the warehouse store, and without any need to “return” to the aisles of the store after completing the purchase. It is this challenge of retaining control over the attention of the customer in the context of the Internet that the ‘399 patent’s claims address.

Id. at 1258 (emphasis added).

³⁷ See *infra* note 38–39

³⁸ 123 S.C.t. at 2356.

³⁹ See, e.g., *Merial*, 818 F.3d at 1374 (“In many cases . . . evaluation of a patent claim’s subject matter eligibility under § 101 can proceed even before a formal claim construction. ‘Claim construction is not an inviolable prerequisite to a validity determination under § 101.’”); *TLI Comm.*, 2016 WL 2865693 at *5 (Dismissing proposition that court needs to do fact finding to hold a claim invalid, stating that reviewing the specification can be sufficient); *Mortgage Grader*, 811 F.3d at 1325 (recognizing that sometimes fact issues are relevant to § 101 invalidity determinations while other times it is not).

⁴⁰ See generally Jan Westerhoff, *Ontological Categories: Their Nature and Significance* (2005). Importantly, there are varying systems of ontology for categorizing things and ideas. I use ontological category in context of the system I have developed using the Supreme Court’s reasoning in *Alice* and its predecessors’ cases, as well as post-*Alice* Fed Circuit cases.

their abstract nature is determinable *a priori*. Inherently abstract ideas can further be sub-divided into two non-mutually exclusive groups: tautologies and purely cognitive⁴¹ processes. Tautologies can roughly be defined as claims directed at truisms, while purely cognitive processes refer to claims directed to non-tangible ideas. Conversely, temporally abstract ideas require empirical inquiries (*a posteriori*), but similarly, can be separated into two non-mutually exclusive groups: (1) fundamental and conventional economic practices; and (2) methods of organizing human activity.⁴² Fundamental and conventional economic practices are exactly as the name connotes—economic practices that are either fundamental or conventional. What constitutes methods of organizing human activity is, however, far from self-explanatory. It can loosely be said to encapsulate activities that individuals (or group of individuals) can complete by hand.⁴³

The OSA model can be understood as a system of taxonomy (a chart of the following taxonomic structure is attached as Appendix A). For clarity purposes, I borrow terminology from the field of biology, including the appropriation of its classification ranks.⁴⁴ Inherently abstract ideas and temporally abstract ideas are

⁴¹ I use the terminology of “purely cognitive processes” to distinguish my use to describe a “family,” discussed later in the section, from the court delineated category of “purely mental processes.” Additionally, I believe cognitive better acknowledges the broad scope of its reach because it more easily includes computer conducted activity. *Cf. CyberSource*, 654 F.3d at 1372-78 (discussing why mental processes are abstract and therefore subject-matter ineligible for patentability) (explaining why mental processes do not become non-abstract when simply performed on a computer); *SmartGene, Inc. v. Advanced Biological Labs, SA*, 555 Fed. Appx. 950, 954 (Fed. Cir. 2014) (citing *Benson*, 409 U.S. at 67-68 and *Flook*, 437 U.S. at 589).

⁴² *Cf. Alice*, 123 S. Ct. at 2356.

⁴³ *Cf. McRo, Inc. v. Bandai Namco Games America, Inc.*, 2016 WL 4896481, at *8 (Fed. Cir. Sept. 12, 2016) (“The computer here is employed to perform a distinct process to automate a task previously performed by humans.”). Notably, it is neither the case that courts *must* engage in fact finding to determine whether a claim is directed at a temporally abstract idea nor is it the case that fact finding is *never* necessary to identify inherently abstract claims. For the former, it is possible that the particular *a posteriori* knowledge required to make a determination is well-established and/or non-controversial. As for the latter, it may be the case that a claim is essentially directed to an inherently abstract idea, yet to identify such character requires an inquiry into specific facts surrounding the patent. While these distinctions may seem overly semantical, I believe they have significant implications that may help alleviate confusion arising out of the *Alice* cases.

⁴⁴ A.J. Cain, Taxonomy, *ENCYCLOPEDIA BRITANNICA* (last visited Oct. 25, 2016), <https://www.britannica.com/science/taxonomy>. The following taxonomic ranks are in order from the most inclusive to the least inclusive. Note, while each lower rank is necessarily included within its higher ranks, these are non-mutually exclusive classifications—thus, an individual claim may be included on more than one taxonomic branch. At the top of the hierarchy are claims that are ineligible for patentability—*Ineligible Claims*. The corresponding rank in the field of biology is “Life.” Just as non-life is excluded, by definition, from the taxonomic hierarchy, in this model, so too are claims that are not ineligible for patentability. At the top of the hierarchy are claims that are ineligible for patentability—*Ineligible Claims*. The corresponding rank in the field of biology is “Life.” Just as non-life is excluded, by definition, from the taxonomic hierarchy, in this model, so too are claims that are not ineligible⁴⁴ for patentability.⁴⁴ Ineligible Claims can be divided into *Domains* based on category of ineligibility. The relevant Domain here encompasses claims that fail to satisfy section 101’s subject-matter eligibility requirement (“101 ineligible claims”). Within this Domain are two *Kingdoms*: (1) claims that violate 101’s explicit mandates, and (2) claims that fail both steps of the *Alice* test—i.e. ones that are directed at an implicit exception and do not contain an inventive concept sufficient to transform the claim into patent eligible subject matter. Within the latter Kingdom, there are three

both *Classes*. Within each Class are *Families*. For example, the Families of inherently abstract ideas are “tautologies” and “purely cognitive processes,” while the Families for temporally abstract ideas are “fundamental and conventional economic practices” and “methods of organizing human activity.” The next rank, *Genus*, is an expansive rank with a number of groups. These will be discussed along with their relevant Families below, but for illustration, the Genera within tautologies are “fundamental relationships,” “ideas themselves,” and “algorithms.” The final rank, other than individual claims, is *Species*.⁴⁵ Species are groups of Genera that can be categorized by a particular commonality. For the purposes of this discussion, it is sufficient to recognize that Species are a sub-set of a Genus. Thus, a claim that is directed at subject-matter existing within a Genus, but for which does not encapsulate the entire Genus, is a Species.

Each Family has its own test for determining whether claims are abstract, and in fact, the same justifications for their delineation inform their design. Below, I offer the basic outline of the model—offering potential language for the tests contained therein. Additionally, I explain how each rule is justified by the *Alice* decisions.

A. *Inherently Abstract Ideas, Tautologies (“INAIT”) Test*

1. *INAIT Test Wording*

A claim is directed at an inherently abstract idea when the intended purpose or function of the claimed invention is the same as the essence of the invention itself.

2. *Summary*

The INAIT test stands for the proposition that a claim is abstract if it merely claims its intended result.⁴⁶ Accordingly, a claim should not pass the INAIT test if a

Phyla: laws of nature, natural phenomena, and abstract ideas. The abstract ideas Phylum consists of two *Classes*, inherently abstract and temporally abstract ideas. Note, I excluded the rank of “order” (a) because there are more ranks in biology than needed for this purpose, (b) the term “order” could be confusing as it has a particularized meaning in patent law—i.e. the order of steps in a process. A “species,” the subsequent rank to “genus,” could be used if courts become more specific in distinguishing abstract genotypes.

⁴⁵ (s. Species).

⁴⁶ See, e.g., *Vehicle Intelligence and Safety LLC v. Mercedes-Benz USA, LLC*, 635 Fed. Appx. 914, 927 (Fed. Cir. 2015)

Vehicle Intelligence argues that there are at least four inventive concepts in the claims at issue: 1) screening by one or more expert systems; 2) selectively testing; 3) a time-sharing allocation of at least one processor; and 4) a screening module that includes one or more expert systems that use at least a portion of one or more equipment modules. But the claims do not specify what screening should be done or how the expert system would perform such screening. They do not explain how to select the tests to run or even what tests to select from. They do not explain how the “time-sharing allocation” on a processor should be done. And they do not explain

finding of infringement is *necessarily* dependent upon the effectiveness of the claimed invention (or alleged infringing device/conduct’s effectiveness at solving the problem for which the claimed invention addresses). This formulation is consistent with the cases in which the Federal Circuit has invalidated a claim under section 101 for being described in “purely functional terms”⁴⁷ as well as the Court’s (perhaps ironically) tautological statement that “[t]he ‘abstract ideas’ category embodies ‘the longstanding rule’ that ‘an idea of itself is not patentable.’”⁴⁸ As stated in *RecogniCorp, LLC v. Nintendo Co., Ltd.*, “[t]he inquiry often is whether the claims are directed to ‘a specific means or method’ for improving technology or whether they are simply directed to an abstract end-result.”⁴⁹ Such tautological claims are definitionally abstract.⁵⁰ This notion can be seen in cases involving three Genera of abstract ideas: ideas themselves, mathematical algorithms, and fundamental relationships.

a. Idea Itself

The phrasing “idea itself” is often used broadly as a general principle.⁵¹ However, its recitation as a category of abstract ideas became explicitly recognized in *Internet*

how the expert system works to screen for impairments or how such systems can be portioned out over one or more equipment modules. The claims merely state the abstract idea of testing an equipment operator for impairments using an unspecified “expert system” running on equipment that already exists in various vehicles. This is not sufficient to pass *Mayo/Alice* Step two.

Id.

⁴⁷ See, e.g., *TLI Communications*, 2016 WL 2865693 at *4 (“The specification does not describe a new telephone, a new server, or a new physical combination of the two. The specification fails to provide any technical details for the tangible components, but instead predominately describes the system and methods in purely functional terms.”); *Merial*, 818 F.3d at 1375 ; see also (“Claim 1 broadly covers essentially all applications, via standard experimental techniques, of the law of linkage disequilibrium to the problem of detecting coding sequences of DNA.”); *Carilogic, Inc. v. FormFree Holdings Corp.*, 2017 WL 992528, at *2 (Fed. Cir. Mar. 15, 2017) (“We look to whether the claims in the patent focus on a specific means or method, or are instead directed to a result or effect that itself is the abstract idea and merely invokes generic processes and machinery.”); *Apple, Inc. v. Amermath, Inc.*, 842 F.3d 1229, 1241 (Fed. Cir. 2016) (“The patents claim systems including menus with particular features. They do not claim a particular way of programming or designing the software to create menus that have these features, but instead merely claim the resulting systems.”); *Intellectual Ventures I LLC v. Symantec Corp.*, 2016 WL 5539870, at *5 (Fed. Cir. Sept. 30, 2016) (“[W]hen a claim directed to an abstract idea ‘contains no restriction on how the result is accomplished and the mechanism is not described, although this is stated to be the essential innovation,’ then the claim is not patent-eligible.” (internal citation omitted) (quoting *Internet Patents Corp.*, 790 F.3d at 1347)).

⁴⁸ *Alice*, 134 S. Ct. at 2354 (quoting *Benson*, 409 U.S. at 67).

⁴⁹ 855 F.3d 1322, 1326 (Fed. Cir. 2017).

⁵⁰ See, e.g., *TLI Communications*, 2016 WL 2865693 at *4 (“The specification does not describe a new telephone, a new server, or a new physical combination of the two. The specification fails to provide any technical details for the tangible components, but instead predominately describes the system and methods in purely functional terms.”); *Genetic Technologies Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1375 (Fed. Cir. 2016). (“Claim 1 broadly covers essentially all applications, via standard experimental techniques, of the law of linkage disequilibrium to the problem of detecting coding sequences of DNA.”).

⁵¹ See, e.g., *Alice* 134 S. Ct. at 2355 (“The ‘abstract ideas’ category embodies ‘the longstanding rule that ‘[a]n idea of itself is not patentable.’”) (alterations in original) (quoting *Benson*, 409 U.S. at 67);

*Patents Corp. v. Active Network, Inc.*⁵² Moreover, the U.S. Patent and Trademark Office considers it to be a category of abstract ideas.⁵³ The Federal Circuit in *Internet Patents* invalidated a patent which claimed “the use of conventional web browser Back and Forward navigational functionalities without data loss in an online application consisting of dynamically generated web pages.”⁵⁴ The court concluded that, when looking at the patent as a whole, the end result of “maintaining the state” is the most important aspect of the patent and is described as the innovation over the prior art.⁵⁵ The district court found, and the Federal Circuit agreed, that the patent was directed at the abstract ideas of “retaining information in the navigation of online forms” and “avoiding data loss.”⁵⁶ In other words, the claimed invention is materially the same as the desired result.

b. Mathematical Algorithms

The Supreme Court in *Gottschalk v. Benson* defined an algorithm as a “procedure for solving a given type of mathematical problem.”⁵⁷ The Court found the claims at issue to be abstract because the “procedures set forth . . . [were a] generalized formulation for programs to solve mathematical problems by converting one form of numerical representation to another.”⁵⁸ Relying on the nineteenth century case *Le Roy v. Tatham*, it explained that “[a] principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of

CLS Bank Intern v. Alice Corp. Pty. Ltd., 717 F.3d 1269, 1282 (Fed. Cir. 2013) (“With the pertinent abstract idea identified, the balance of the claim can be evaluated to determine whether it contains additional substantive limitations that narrow, confine, or otherwise tie down the claim so that, in practical terms, it does not cover the full abstract *idea itself*.”) (emphasis added); Kaavo Inc. v. Cognizant Technology Solutions Corporation, 2016 WL 476730, at *8 (D. Del. 2016) (“Given the ubiquity of computers,’ it said, ‘wholly generic computer implementation is not generally the sort of ‘additional featur[e]’ that provides any ‘practical assurance that the process is more than a drafting effort designed to monopolize the [abstract *idea*] *itself*.’”) (alterations in original) (emphasis added) (quoting *Mayo*, 132 S. Ct. at 1297).

⁵² *Internet Patents*, 790 F.3d at 1348 (“The mechanism for maintaining the state is not described, although this is stated to be the essential innovation. The court concluded that the claim is directed to the *idea itself*—the abstract idea of avoiding loss of data.”) (emphasis added).

⁵³ See, e.g., U.S. PATENT AND TRADEMARK OFFICE, EXAMPLES: ABSTRACT IDEA 3 (last visited June 15, 2016), http://www.uspto.gov/patents/law/exam/abstract_idea_examples.pdf; U.S. PATENT AND TRADEMARK OFFICE, APPLYING ABSTRACT IDEA UNDER § 101 AT PTO (last visited June 15, 2016), <http://www.uspto.gov/sites/default/files/patents/law/comments/al-f-raczkowski20140805.pdf>; MEMORANDUM: U.S. PATENT AND TRADEMARK OFFICE, PRELIMINARY EXAMINATION INSTRUCTIONS IN VIEW OF THE SUPREME COURT DECISION IN *ALICE CORPORATION PLY. LTD. V. CLS BANK INTERNATIONAL, ET AL.* 2-3 (Andrew H. Hirshfeld, Deputy Commissioner for Patent Examination Policy), http://www.uspto.gov/sites/default/files/patents/announce/alice_pec_25jun2014.pdf.

⁵⁴ 790 F.3d at 1344.

⁵⁵ *Id.* at 1348.

⁵⁶ *Id.* Notably, the Federal Circuit also held that the patent did not have a sufficiently inventive concept, because it merely recited generic computer parts, data collection steps, situated the concept in a particular technological environment. *Id.* at 1349.

⁵⁷ 409 U.S. 63, 65 (1972).

⁵⁸ *Id.*

them an exclusive right.”⁵⁹ Although the broader notion is that such claims are unacceptably preemptive, the Court offers important insight into how to determine if this principle is violated.⁶⁰ The claim is violative if it is “so abstract and sweeping as to cover both known and unknown uses.”⁶¹ And indeed, if a patent claim’s means and ends are equivalent, then any future invention—no matter how unanticipated by the inventor at the time of filing—would necessarily be covered by the claim.

c. Fundamental Relationships

Fundamental relationships can be broadly defined as correlation and causation.⁶² This typically arises in cases involving claims laws of nature.⁶³ A good example can be found in *In re BRCA1- and BRCA2-Based Hereditary Cancer Test Patent Litigation*.⁶⁴ In *BRCA1*, the Federal Circuit determined that the claimed methods—“directed to identification of alterations of the gene”—“require[d] merely comparing the patient's gene with the wild-type and identifying any differences that arise.”⁶⁵ And accordingly, the court held that the claims were “directed to the patent-ineligible abstract idea of comparing BRCA sequences and determining the existence of alterations.”⁶⁶ Similarly, in *Cleveland Clinic Foundation v. True Health Diagnostics, LLC*, the Federal Circuit held claims “directed to multistep methods for observing the law of nature that MPO correlates to cardiovascular disease” were abstract.⁶⁷ Implied within the reasoning of these cases is the broader notion that processes that merely utilize correlations through the comparison of data are abstract.⁶⁸ Indeed, the court’s cited concern

⁵⁹ *Id.* (quoting *le Roy v. Tatham*, 55 U.S. 156, 175 (1852)).

⁶⁰ *Id.*

⁶¹ *Id.* (“The end use may (1) vary from the operation of a train to verification of drivers' licenses to researching the law books for precedents and (2) be performed through any existing machinery or future-devised machinery or without any apparatus.”).

⁶² *Cf. Merial*, 818 F.3d at 1375-76.

⁶³ *See, e.g., In re BRCA1- and BRCA2-Based Hereditary Cancer Test Patent Litigation*, 774 F.3d 755 (Fed. Cir. 2014) [hereinafter “*BRCA*”].

⁶⁴ *Id.*

⁶⁵ *Id.* at 763.

⁶⁶ *Id.*

⁶⁷ 2017 WL 2603137, at *6 (Fed. Cir. June 16, 2017); *see also Coffelt v. NVIDIA Corp.*, 2017 WL 999217, at *1 (Fed. Cir. Mar. 15, 2017) (finding that the “claims at issue [were] directed to the abstract idea of calculating and comparing regions in space”).

⁶⁸ *In re BRCA1- and BRCA2-Based Hereditary Cancer Test Patent Litigation*, 774 F.3d at 763-64.; *see also Merial*, at 1375-76. In *Merial*, the Federal Circuit described the claims at issue, generally, as “methods of detecting a coding region allele by amplifying an analyzing any linked non-coding region, which could be found within the same gene as the coding region, within a different gene, or within an intergenic region.” 818 F.3d at 1375-76. Under a *Mayo* analysis, the court determined that the claims were directed at the patent ineligible subject-matter (law of nature) of a correlation between variations in the non-coding regions and allele presence in coding regions. *Id.* at 1375. *But see Rapid Litigation Mgmt. Ltd. v. CellzDirect, Inc.*, 827 F.3d 1042, (Fed. Cir. July 5, 2016) (“The same is not true here. The end result of the ’929 patent claims is not simply an observation or detection of the ability of hepatocytes to survive multiple freeze-thaw cycles. Rather, the claims are directed to a new and useful method of preserving hepatocyte cells.”).

surrounded that of preemption.⁶⁹ Nevertheless, the court employed similar reasoning as in the mathematical algorithms cases, noting that the claims covered “yet-undiscovered alterations, as well as comparisons for purposes other than detection of cancer.”⁷⁰ Thus, the INAIT test encapsulates fundamental relationships for the same reason as it does algorithms—to claim a fundamental relationship is to claim an “invention” that is materially the same as the desired result (the relationship itself).

3. “Essence”

The term “essence”⁷¹ serves the purpose of preventing subversion of the rule through the incorporation of Non-Essential Characters or Activities: concrete or tangible components, performance of generic computer functions, or well-understood, routine conventional activities.⁷² Such inquiry is justified by the Federal Circuit’s instruction that a proper analysis requires courts to determine if a claim’s “character as a whole” is directed to excluded subject matter.⁷³

⁶⁹ See *BRCA*, 774 F.3d at 764. (“Similar concerns to the ones the Supreme Court expressed in *Myriad* with respect to isolated DNA exist here: allowing a patent on the comparison step could impede a great swath of research relating to the BRCA genes, and it is antithetical to the patent laws to allow these basic building blocks of scientific research to be monopolized.”) (citing *Association for Molecular Pathology v. Myriad*, 133 S. Ct. 2107, 2116 (2013)).

⁷⁰ *Id.*

⁷¹ Cf. *Rapid Litigation Mgmt.*, 827 F.3d at 1048 (“Although the claims in each of these cases employed method steps, the end result of the process, the *essence* of the whole, was a patent-ineligible concept.”) (emphasis added).

⁷² Cf. *Enfish*, 2016 WL 2756255 at *4-5; *Alice*, 143 S. Ct. at 2360 (claims that recite general-purpose computer components); see, e.g., *Content Extraction*, 776 F.3d at 1347 (claims recite “scanner”); *Mortg. Grader*, 811 F.3d at 1324–25 (claims reciting an “interface,” “network,” and a “database”); *Intellectual Ventures I LLC v. Symantec Corp.*, 2016 WL 5539870, at *6 (Fed. Cir. Sept. 30, 2016); *Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1346 (Fed. Cir. 2013) (database components). On a more fundamental level, it is not inconsistent with the Court’s jurisprudence to look for the heart of the invention (at least in the *Alice* context). See, e.g., *Versata*, 793 F.3d at 13 (“In *Gottschalk v. Benson*, 409 U.S. 63, 93 S. Ct. 253 (1971), the Court held that claims involving an algorithm for converting binary-coded decimal numerals into pure binary form were unpatentable since the patent was, in practical effect, a patent on the algorithm itself.”) (emphasis added).

⁷³ See *Intellectual Ventures I LLC v. Erie Indemnity Co.*, 850 F.3d 1315, 1325 (Fed. Cir. 2017); *Affinity Labs of Tex., LLC v. DIRECTTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016); see also *Internet Patents*, 790 F.3d at 1344 (identifying the “most important aspect” of the patent when invalidating the claims).

B. Inherently Abstract Ideas, Cognitive (“INAIC Test”)

1. Test Wording

A claim is directed at an abstract idea if a theoretical being that has errorless and unlimited computative capacity could essentially duplicate the claimed invention in its mind.

2. Summary

The INAIC test is intended to capture claims that are directed to non-tangible ideas for which can be entirely performed in the mind—i.e. purely cognitive processes (which includes purely mental processes and algorithms).⁷⁴

a. Purely Mental Processes

As stated in *CyberSource Corp. v. Retail Decisions, Inc.*,

Methods which can be performed entirely in the human mind are unpatentable not because there is anything wrong with claiming mental method steps as part of a process containing non-mental steps, but because computational methods which can be performed entirely in the human mind are the types of methods that embody the ‘basic tools of scientific and technological work’ that are free to all men and reserved exclusively to none.”⁷⁵

The INAIC test faithfully encapsulates this proposition by: (1) excluding processes for which only some of the essential elements can be duplicated in the mind, and (2)

⁷⁴ *Cf. Coffelt v. NVIDIA Corp.*, Case No. 2017-1119, 2017 WL 999217, at *1 (Fed. Cir. Mar. 15, 2017) (“We have held that ‘analyzing information by steps people can go through their minds, or by mathematical algorithms, without more are mental processes within the abstract-idea category.’”); *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1349 (Fed. Cir. 2014) (The asserted claims are not directed to any tangible embodiment of this information (*i.e.*, in physical memory or other medium) or claim any tangible part of the digital processing system. The claims are instead directed to information in its non-tangible form.”). Note, I use the term “purely cognitive processes” instead of the term “purely mental processes” to distinguish the Family from the Genus.

⁷⁵ *CyberSource*, 654 F.3d at 1373 (citing *Benson*, 409 U.S. at 67). *But see* *Trading Technologies Int’l, Inc. v. GQG, Inc.*, 2017 WL 192716, at *3 (Fed. Cir. Jan. 18, 2017) (agreeing with the district court that “the challenged patent claims do not simply claim displaying information on a graphical user interface. The claims require a specific, structured graphical user interface paired with a specific, structured graphical user interface paired with a prescribed functionality directly related to the graphical user interface’s structure that addressed to and resolves a specifically identified problem in the prior state of the art.”).

including claims that are merely computerized versions of a mental process (hence the use of “theoretical being” rather than “person”).⁷⁶

b. Mathematical Algorithms

The INAIC test uses the language “theoretical being that has errorless and unlimited computative capacity” in place of “person” to ensure that it covers claims directed at computerized versions of cognitive activities.⁷⁷ For example, while many algorithms may not be practically implementable in the mind of an ordinary person, this would not be the case for a being having errorless and unlimited computative capacity. This formulation appears sound given an absence of reason to believe that courts would find an algorithm to be non-abstract merely because of its level of complexity.⁷⁸ Indeed, the simplicity or complexity of an invention has never been dispositive of patentability.⁷⁹ Moreover, the Federal Circuit has invalidated claims

⁷⁶ *Cf.* *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1346–47 (Fed. Cir. Mar. 8, 2017) (“We have held claims ineligible as directed to an abstract idea when they . . . embody mental processes that could be performed by humans.”); *Synopsys, Inc. v. Mentor Graphics Corporation*, 2016 WL 6068920 (Fed. Cir. Oct. 17, 2016) (merely aiding mental translation through implementation of a computer is an abstract idea); *Symantec*, 2016 WL 5539870, at *7 (claim abstract because each step can be performed in the human mind); *TDE Petroleum Data Solutions*, 2016 WL 4271975 (data gathering and processing can be done in the mind); *Electric Power Group, LLC v. Alstrom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016) (“Information as such is an intangible.”).

⁷⁷ *Cf. Alice*, 134 S. Ct. at 2358 (indicating that “*Flook* stands for the proposition the prohibition against patenting abstract ideas cannot be circumvented by attempting to limit the use of [the idea] to a particular technological environment.”) (alteration in original) (quoting *Bilski*, 561 U.S. at 610-611) (citing *Flook*, 437 U.S. at 585-86, & 593-94); *Electric Power*, 830 F.3d at 1354 (“[T]he focus of the claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools.”). The Court similarly noted that “implementing a mathematical principle on a physical machine, namely a computer, [i]s not a patentable application of that principle.” *Id.* (quoting *Mayo*, 132 S. Ct., at 1301).

⁷⁸ *Cf. Synopsys*, 2016 WL 6068920, at *1 (“Synopsys argues that . . . the Gregory Patents are not directed to ineligible subject matter because they relate to complex algorithms used in computer-based synthesis of logic circuits. We disagree.”).

⁷⁹ *See Goodyear Tire & Rubber Co. v. Ray-O-Vac Co.*, 321 U.S. 275, 279 (1944) (stating that the simplicity of an invention does not negate invention); *see also Metal Co. v. Bradford*, 214 U.S. 366, 381 (1909) (“The fact that the invention seems simple after it is made does not determine the question; if this were the rule, many of the most beneficial patents would be stricken down.”); *Para-Ordnance Mfg., Inc. v. SGS Importers Intern., Inc.*, 73 F.3d 1085, 1092 (Fed. Cir. 1995) (“A simple invention may be patentable, even if the invention comprises the combination of features known in the art, provided the combination itself is not obvious.”); *Magic Ruffle Co. v. Douglas*, 16 F. Cas. 394, (S.D.N.Y. 1863) (“A subject-matter to be patentable must require invention, but is not necessarily the result of long and painful study, or embodied alone in complex mechanism. A single flash of thought may reveal to the mind of the inventor the new idea, and a frail and simple contrivance may embody it.”).

An invention does not cease to be meritorious because it is simple. Many of the greatest inventions are most simple. The test should not be whether the mechanism is simple or complex, but whether the patentee has given the world something new; whether the public is richer for his contribution to the art, whether he has produced novel and beneficial results.

Gould Coupler Co. v. Pratt, 70 F. 622, 624 (N.D.N.Y. 1895); *see also Manhurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1578 (Fed. Cir. 1996) (“In fact, some inventions are so simple and their purpose and efficacy so obvious that their complete construction is sufficient to demonstrate workability.”).

under *Alice* that, at least arguably, were directed at functions incapable of being accomplished in the human mind.⁸⁰

3. “Essentially”

The term “essentially”⁸¹ is necessary to distinguish between inventions that improve computers as tools—which may or may not perform functions capable of being performed by the human mind—and ones that merely employ computers to perform functions that are *theoretically* organic tasks. In other words, “essentially”, as used here, is both enlarging and limiting. Similarly to “essence” in the INAIC test, the term “essentially” broadens the INAIC test to cover claims that are otherwise directed at abstract ideas and merely recite non-abstract Non-Essential Characteristics and Activities. Alternatively, “essentially” narrows the scope of the INAIC test by excluding domain specific solutions to domain specific problems—i.e. under the INAIC test, an invention is not abstract where its *essential* function cannot be preserved through replication in the mind.⁸² Thus, in deciding whether a theoretical being could *essentially* duplicate the invention its mind, one must ask whether the invention maintains its value or purpose when applied to the purely cogitative realm. For example, under the INAIC test, a claim generically directed at an advantageous method of organizing information would be abstract (whether or not limited to a computerized environment), while a claim directed at a method of organizing information in a computer environment that reduces a computer’s vulnerability to cyber-attacks may not be abstract.⁸³ This distinction has been recognized by the

⁸⁰ See, e.g. *Electric Power*, 830 F.3d at 1354 (“[T]he focus of the claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools.”)

⁸¹ Cf. *Symantec*, 2016 WL 5539870, at *5 (“[W]hen a claim directed to an abstract idea contains no restriction on how the result is accomplished and the mechanism is not described, although this is stated to be the *essential* innovation, then the claim is not patent-eligible.” (emphasis added) (internal citation and quotation marks omitted)).

⁸² Cf. *Trading Technologies Int’l, Inc. v. CQG, Inc.*, 675 Fed. Appx. 1001, 1004 (Fed. Cir. 2017) (“Precedent has recognized that specific technologic modifications to solve a problem or improve the functioning of a known system generally produce patent-eligible subject matter.”); *Enfish*, 822 F.3d at 1338–39 (stating that claims are not abstract where they are “directed to a specific implementation of a solution to a problem in the software arts”); *TLI Communications*, 2016 WL 2865693 at *5 (If “the plain focus of the claims is on an improvement to computer functionality itself, not on economic or other tasks for which a computer is used in its ordinary capacity then the claim is not abstract.”); *Thales Visionix, Inc. v. United States*, 850 F.3d 1343, 1348 (Fed. Cir. 2017) (“While the claims utilize mathematical equations to determine the orientation of the object relative to the moving reference frame, the equations—dictated by the placement of the inertial sensors and application of laws of physics—serve only to tabulate the position and orientation information in this configuration.”).

⁸³ This formulation is consistent with the Federal Circuit’s decision in *Enfish*, which held that claims directed at a *self-referential* table for a computer database. 822 F.3d at 1337. This self-referential model improved upon conventional database structures by no longer requiring a programmer to preconfigure a structure to which a user must adapt data entry. *Id.* Moreover, the model increased flexibility, faster search times, and memory requirements. *Id.* Indeed, the invention provided a computer specific solution—“[c]reate, in a computer memory, a logical table that . . .”—that addressed a computer specific problem—the inflexibility, slowness, and large memory requirements of the prior model. See *id.* at 1336–37. One additional caveat that needs to be addressed is “post-

Federal Circuit on a number of occasions.⁸⁴ For example, in *Thales Visionix Inc. v. United States*, the Federal Circuit held that claims related to “an inertial tracking system for tracking the motion of an object relative to a moving reference frame” were not abstract.⁸⁵ The court reasoned that the “claims provide a method that eliminates many ‘complications’ inherent in previous solutions for determining position and orientation of an object on a moving platform,” including that the “resulting system . . . is simpler to install than conventional systems” and “is [] beneficially self-contained [as it] requires no external information about the orientation or position of the platform.”⁸⁶ Note, the inventions’ advantage of being simpler to “install” would not be maintained in the mind of a theoretical being because such entity does not require installation. Likewise, the fact that the system is self-contained, requiring no external information, is not analogously useful in the mind of a theoretical being as *errors caused by* “relative position and orientation of a moving object on a moving reference frame” do not occur in the mind.⁸⁷

C. Temporally Abstract Ideas, Economic Practices (“TAIEP”) Test

1. Test Wording

A claim is directed at an abstract idea if a theoretical being possessing errorless and unlimited computational capacity could essentially duplicate the claimed invention in its mind—*assuming*, as given, that all current or previous economic practices are mental processes.

2. Summary

The TAIEP test differs from the INAIC test in that it assumes (for the purposes of the test) that all current or previous economic⁸⁸ practices are mental processes. Thus, as compared to the INAIC test, the TAIEP test creates a lower threshold for

solution activity.” As the Federal Circuit explained in *In re Brown*, if “the central purpose” of the claimed method is entirely a mental process, a claim cannot be saved by simply tacking on insignificant or well-known/routine activity to the end of the process. 2016 WL 1612776, at *2 (Fed. Cir. 2016) (“[T]he central purpose of the claimed method is the process before cutting, and that the hair-cutting step constitutes ‘insignificant post-solution activity.’”). Thus, to remain faithful to the case law, “essentially” must also be read to exclude post-solution activity.

⁸⁴ See, e.g., *Enfish*, 822 F.3d at 1337; *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1348 (Fed. Cir. 2017); *Trading Technologies Int’l, Inc. v. CQG, Inc.*, 675 Fed. Appx. 1001, 1004 (Fed. Cir. 2017).

⁸⁵ *Thales Visionix*, 850 F.3d at 1344–48.

⁸⁶ *Id.* at 1348.

⁸⁷ *Cf. id.* at 1349; *cf. Tranxition, Inc. v. Lenovo (United States), Inc.*, 2016 WL 6775967, at *3 (Fed. Cir. Nov. 16, 2016) (finding that claims were not abstract because they were directed to solving problems *arising out of* migration).

⁸⁸ When determining what constitutes an “economic” practice, one should review and apply the case law.

finding claims directed at economic practices to be abstract because the theoretical being in question is given a larger toolbox to draw from when attempting to duplicate the invention in its mind—i.e. the addition of current or previous economic practices not capable of being performed in the mind.

There are two primary justifications for such disparate treatment. First, the quest to determine what constitutes a “fundamental” and “conventional” economic practice, by its very nature, requires an inquiry into current and prior activities. And indeed, the Federal Circuit’s has often pointed to such activities to invalidate claims as fundamental and conventional economic practices.⁸⁹ Second, such disparate treatment is supported by the case law. More specifically, courts have (a) invalidated claims for being directed at fundamental and conventional economic practices at a comparatively high rate,⁹⁰ and (b) been liberal in identifying Species of abstract economics-based practices⁹¹—e.g. intermediate settlement,⁹² offer-based price optimization,⁹³ risk hedging,⁹⁴ using advertising as an exchange for currency,⁹⁵ data collection,⁹⁶ generating tasks in an insurance organization,⁹⁷ shopping for loans,⁹⁸ collecting cases,⁹⁹ and method of determining pricing.¹⁰⁰ For example, in *In re Smith*, the Federal Circuit held that claims “directed to rules for conducting a wagering game” were effectively directed to the fundamental business practice of “exchanging and resolving financial obligations based on probabilities created during the distribution of

⁸⁹ See also *Smith*, 815 F.3d at 819 (“We could envisage, for example, claims directed to conducting a game using a new or original deck of cards potentially surviving step two of *Alice*.”). But see *Ultramercial*, 772 F.3d at 716 (“That some of the eleven steps were not previously employed in the art is not enough—standing alone—to confer patent eligibility upon the claims at issue.”). Note, if the only non-prior art steps can be completed in the mind of a theoretical being, like in *Ultramercial*, the claims would similarly be deemed abstract under the TAIEP test.

⁹⁰ See *Enfish*, 822 F.3d at 1334 (“[F]undamental economic and conventional business practices are often found to be abstract ideas, even if performed on a computer.”); see, e.g., *infra* notes 92–100.

⁹¹ I suggest this can be explained by my theoretical distinction between inherently abstract ideas and temporally abstract ideas. Temporally abstract ideas, requiring use of concepts derived from empirical knowledge, involve an additional step in the reasoning process. Analysis regarding fundamental and conventional business practices must operate, at least partially, through induction. That is, a court must compare a claim to the empirical universe and then, from that position, to precedent. The effect, which necessarily follows, is that the court must reference a specific economic concept. Alternatively, inherently abstract claims rely upon self-referential systems—thus, an invalidity determination is more easily made deductively using derived assumptions from precedential theories. This distinction may help explain why courts feel more comfortable using demarcating language in some cases but not others. Put differently, for temporally abstract ideas, courts cannot simply deduce their abstract nature because said identity is dependent on prior practice.

⁹² *Alice*, 134 S. Ct. at 2358-59; see, e.g., *In re Chorna*, 2016 WL 4205969, at *4 (Fed. Cir. Aug. 10, 2016).

⁹³ *OIP Techs.*, 788 F.3d at 1362-63.

⁹⁴ *Biliski*, 561 U.S. at 611.

⁹⁵ *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014).

⁹⁶ *Content Extraction*, 776 F.3d at 1348; see also *Affinity Labs of Texas, LLC v. Amazon.com, Inc.*, 2016 WL 5335502, at *4 (Fed. Cir. Sept. 23, 2016).

⁹⁷ *Accenture Global Servs.*, 728 F.3d at 1346.

⁹⁸ *Mortg. Grader*, 811 F.3d 1314, 1324–25 (Fed. Cir. 2016); see also *LendingTree, LLC v. Zillow, Inc.*, 2016 WL 3974203 (Fed. Cir. July 25, 2016).

⁹⁹ See *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1355 (Fed. Cir. 2014).

¹⁰⁰ *Versata Development Group*, 793 F.3d at 1327.

the cards.”¹⁰¹ Although the wagering game arguably falls comfortably under other identified genotypes, the court based its decision largely on the economic nature of the claims at issue.¹⁰² The Federal Circuit has not provided a rationale for its relatively harsh treatment of claims directed at economic processes, but one may speculate that the court sees unique risk in granting monopolies over the basic building blocks of the modern economy.¹⁰³ Indeed, such monopolization could have remarkably deleterious effects, including: (1) undermining patent law’s very purpose—to promote the useful arts, (2) impeding commercial free speech and the free flow of ideas; and (3) harming American competitiveness in the global market.¹⁰⁴

3. Clarification

Notably, the Family and Genus for fundamental and conventional economic practices are identical in scope (and in name). This is similarly true for the Family and Genus for methods of organizing human activity. This is to be expected in the context of temporally abstract ideas because their confines are not inherent, rather they relate to evolving events and occurrences in the world. Thus, both the Family and Genus of fundamental and conventional economic practices have non-fixed boundaries which expand as time goes on. Distinguishing between the Family and the Genus, however, is still necessary because courts might eventually cause these ranks to become distinct by expanding the Family definition of fundamental and conventional economic practices to include certain kinds of non-economic activity. In such a case, the wording of the TAIEP test should be modified accordingly.

D. Temporally Abstract Ideas, Organizing Human Activities (“TAIO”) Test

1. Test Wording

A claim is directed at an abstract idea if a theoretical being, or group of theoretical beings, with unlimited strength and speed could essentially duplicate the claimed invention by hand utilizing the prior art as tools.

¹⁰¹ *Smith*, 815 F.3d at 818-19.

¹⁰² *See id.*

¹⁰³ *Cf. In re Bilski*, 545 F.3d at 1005 (J. Mayer, dissenting) (“There are a host of difficulties associated with allowing patents to issue on methods of conducting business. Not only do such patents tend to impede rather than promote innovation, they are frequently of poor quality. Most fundamentally, they raise significant First Amendment concerns by imposing broad restrictions on speech and the free flow of ideas”); *see also Alice*, 134 S. Ct. at 2356.

¹⁰⁴ *Cf. In re Bilski*, 545 F.3d at 1001–1007 (J. Mayer, dissenting).

2. Summary

There are a number of Federal Circuit cases which refer to methods of organizing human activity.¹⁰⁵ Unfortunately, however, none of them provide an explicit definition. Thus, a definition must be derived through a review of the applicable Federal Circuit cases. In *In re Salwan*, the Federal Circuit held that claims directed to the “idea of billing insurance companies and organizing patient health information” were abstract as they “describe[d] little more than the automation of a ‘method of organizing human activity’ with respect to medical information.”¹⁰⁶ In *Intellectual Ventures I LLC v. Sysmantech Corp.*, the Federal Circuit found that a claim directed at the process of filtering e-mails was abstract because the process is the electronic equivalent of separating letters in a corporate mailroom.¹⁰⁷ In *TLI Communications*, the Federal Circuit invalidated claims related to “classifying and storing digital images in an organized manner”, finding that classification and storage, by themselves, are abstract methods of organizing human activity.¹⁰⁸ In *Capital One Bank*, the court found that claims related to a method of utilizing user-selected pre-set limits on spending to notify users of over spending were directed to the abstract categories of organizing human activity and fundamental and conventional business practices.¹⁰⁹ And in *Planet Bingo*, the court determined that “the claims recit[ing] storing a player’s preferred sets of bingo numbers; retrieving one such set upon demand, and playing that set; while simultaneously tracking the player’s sets, tracking player payments, and verifying winning numbers” were a method of organizing human activity—irrespective of the fact that it would be practically “impossible” to do this by hand.¹¹⁰

Implicitly, it appears that the Federal Circuit considers methods of organizing human activity to cover tasks previously performed or capable of being performed by humans prior to technological advancement.¹¹¹ The TAIIO test synthesizes this understanding by rendering claims abstract that either have been done, or can be done, by individuals through purely physical and non-technological means. The TAIIO test uses the language “a theoretical being or group of theoretical beings with unlimited

¹⁰⁵ See, e.g. *In re Salwan*, 2017 WL 957239, at *3 (Fed. Cir. Mar. 13, 2017); *Sysmantech*, 2016 WL 5539870 (Fed. Cir. Sept. 30, 2016); *TLI Communications*, 2016 WL 2865693 (Fed. Cir. 2016); *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363 (Fed. Cir. 2015); *Planet Bingo, LLC v. VKGS LLC*, 576 Fed. Appx. 1005 (Fed. Cir. 2014); see also *RecogniCorp*, 855 F.3d at 1326 (finding the claim to be “directed to the abstract idea of encoding and decoding image data”); *Prism Tech., LLC v. T-Mobile USA, Inc.*, 2017 WL 2705338, at *2 (Fed. Cir. June 23, 2017) (finding that the “patents-in-suit [were] directed to the abstract idea of ‘providing restricted access to resources.’”); *EasyWeb Innovations, LLC v. Twitter, Inc.*, 2017 WL 1969492, at *2 (Fed. Cir. May 12, 2017) (holding the claim to be “directed to the abstract idea of receiving, authenticating, and publishing data.”).

¹⁰⁶ 2017 WL 957239, at *3.

¹⁰⁷ 2016 WL 5539870, at *7 (stating “[s]uch mailrooms receive correspondence, keep business rules defining actions to be taken regarding correspondence based on attributes of the correspondence, apply those business rules to correspondence, and take certain actions based on the application of business rules”).

¹⁰⁸ 2016 WL 2865693, at *5.

¹⁰⁹ See 792 F.3d at 1367.

¹¹⁰ 576 Fed. Appx. at 1006–1008.

¹¹¹ See *Erie Indemnity*, 850 F.3d at 1327 (“This type of activity, i.e. organizing and accessing records through the creation of an index-searchable database, includes longstanding conduct that existed will before the advent of computers and the Internet.”)

strength and speed” to faithfully respect the Federal Circuit’s determination that a method of organizing human activity is still abstract regardless of whether it *practically* can be replicated by hand alone.

The inclusion of “utilizing the prior art as tools” expands the scope of the rule to cover claims that are computerized/virtual versions of methods of organizing human activity, such as claims that merely automate human activity.¹¹² An important caveat, however, is that “prior art” in this context must be read as exclusive of new and useful improvements thereto in order to remain faithful to the case law and to avoid eroding the fundamental purpose of patent law—i.e. promoting the progress of the useful arts through incentivizing innovation and disclosure of new ideas.¹¹³

3. “Essentially”

The validity of this test cannot be reasonably maintained without inclusion of the word “essentially.” Just as for the TAIEP and the INAIC tests, an invention cannot be “essentially” duplicated where such duplication does not maintain the same character (purpose and benefit). Further support for this formulation is given in *Enfish, LLC v. Microsoft Corp.*. The patents at issue in *Enfish* were “directed to an innovative [self-referential] model for computer databases. . . . Contrary to conventional logical models, the patented logical model[] include[d] all data entities in a single table, with column definitions provided by rows in the same table.”¹¹⁴ The court distinguished this claim from other similar methods of organizing human activities by noting that it allows for: (1) “faster searching of data than would be possible with the [traditional] relational model”; (2) “more effective storage of data other than structured text, such as images and unstructured text”; and (3) “more flexibility in configuring the database.”¹¹⁵ Importantly, the model’s primary advantages are entirely domain specific in that they alleviate computer related challenges.¹¹⁶ Comparably, the Federal Circuit in *Electric*

¹¹² Cf. *Erie Indemnity*, 850 F.3d at 1327; *Salwan*, 2017 WL 957239, at *3; *Planet Bingo*, 576 Fed. Appx. at 1006–1008 (“The computer here is employed to perform a distinct process to automate a task previously performed by humans.”); *Chrona*, 2016 WL 4205969, at *3.

¹¹³ See 35 U.S.C. § 101 (“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” (emphasis added); see, e.g., *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1764 (2013) (holding that patentee could enforce patent covering genetic modification that enables soybean plants to survive exposure to glyphosate); see also *Roanwell Corp. v. Plantronics, Inc.*, 429 U.S. 1004, 1006 (1976) (“Thus, to be patentable, a combination of elements must produce something more than the sum of the pre-existing elements; there must be a synergistic result that is itself nonobvious.”); *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948) (holding that a composition of several types of naturally occurring bacteria was not patent eligible where the bacteria were not altered in any way); *Cleveland Clinic Foundation*, 2017 WL 2603137, at *6 (“The claims of the testing patents are directed to multistep methods for observing the law of nature that MPO correlates to cardiovascular disease. Moreover, the testing patents’ specifications similarly instruct that the inventions are ‘based on the discovery that patients with cardiovascular disease have significantly greater levels of leukocyte and MPO, and they do not purport to alter MPO levels in any way.’ (internal citations omitted)).

¹¹⁴ 2016 WL 2756255 at *1.

¹¹⁵ *Id.* at *2.

¹¹⁶ See *id.* at *2-*4.

Power found claims to be directed at an abstract idea because “the focus of the claims [were] not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools.”¹¹⁷

Similar to the findings of the Federal Circuit, the TAIIO test renders the claims in *Salwan*, *Sysmantec*, *TLI Communications*, *Capital One Bank*, and *Planet Bingo* abstract because a theoretical being, or group of beings, with unlimited strength and speed could theoretically replicate the inventions by hand utilizing the prior art as tools. In *Salwan*, for example, such a being could both bill insurance companies by hand—utilizing the telephone, email, and/or U.S. mail—and organize patient health information by hand—through an old-fashioned paper-based filing system. And, the purpose of the claimed invention, “billing” and “organizing,” would in no way be altered by the change in medium. Alternatively, for example, the TAIIO test would not render claims at issue in *Enfish* abstract, as the purpose and benefits of the claimed inventions could not “essentially” be replicated as they are domain specific, and thus would not be maintained in an analogous hand-made non-computerized system.”¹¹⁸

III. CONCLUSION

This article suggests that a set of comprehensive rules and tests can be synthesized to guide the *Alice* analysis. Utilizing the principles and reasoning deployed in the Federal Circuit *Alice* decisions, this article offers a potential model for providing a stable and succinct framework for determining § 101 eligibility. The OSA model contains four distinct tests, each attempting to encapsulate and embody different *Alice* rationales. These tests, collectively, incorporate the theoretical justifications cited in *Alice* Cases, demonstrate explanatory capacity, and provide consistent and non-arbitrary results. Hopefully, this article can help foster movement towards, and the development of, concrete and workable *Alice* rules.

¹¹⁷ 830 F.3d at 1354.

¹¹⁸ *Enfish, LLC v. Microsoft Corp.*, 2016 WL 2756255, at *4.

APPENDIX A

| RANK | Class | Family | Genus |
|-----------------|---------------------------|---|---|
| CATEGORY | Inherently Abstract Ideas | Tautologies | Idea Itself |
| | | | Mathematical Algorithms |
| | | | Fundamental Relationships |
| | | Purely Cognitive Processes | Mathematical Algorithms |
| | Purely Mental Processes | | |
| | Temporally Abstract Ideas | Fundamental and Conventional Economic Practices | Fundamental and Conventional Economic Practices |
| | | Methods of Organizing Human Activity | Methods of Organizing Human Activity |