The Mind as Computer Metaphor:
Gottschalk v Benson and the Mistaken Application of Mental Steps to Software Inventions

Robert R. Sachs[1,2]

Of the three recognized judicial exceptions to Section 101—laws of nature, natural phenomena, and abstract ideas—none has proved more resistant to reasoned judicial analysis than the last. From its inception in *Gottschalk v. Benson*[1] to the Supreme Court's explicit refusal to define the term in *Alice Corporation v. CLS Bank International*,[2] the boundaries of this exception have remained elusive. Rather than principled analysis drawn on well-developed theories in philosophy of language, linguistics, cognitive psychology and other disciplines, the courts have gone "hunting for abstractions"[3] to slowly but steadily sweep a variety of different and unrelated constructs into this "murky morass."[4] Thus, abstract ideas are said to encompass fundamental economic practices, methods of organizing human activities, mathematical algorithms, ideas themselves, and finally mental steps.

Courts now routinely invoke this last subcategory to invalidate claims for software inventions that "*can be* performed in the human mind, or by a human using a pen and paper." *CyberSource Corp. v. Retail Decisions, Inc.*[5] The emphasis on *can be* is intentional and important: it reflects the fundamental shift in the patent eligibility jurisprudence from considering whether the claimed invention was intended *in fact* to performed mentally (the "factual form" of mental steps) to a hypothetical embodiment of whether it *could be* (the "fictional form" of mental steps).

It is this shift in framing that has led to the vigorous use of the mental steps doctrine in the field of software patents. Between the June 2014 *Alice* decision and March 29, 2016, there have been 175 federal court decisions invalidating patents under Section 101, and 24% of those decisions relied upon the "mental steps" doctrine. The eighty-two patents thus invalidated were not limited to suspect categories such as "business methods," but included electronic design automation,[6] computer and database security,[7] information retrieval,[8] microbiology,[9] user interfaces for interactive television,[10] telecommunications,[11] and digital image management.[12]

How did the mental steps doctrine come to have such sweeping breadth? The answer lies at the intersection of the popularity of the "mind as computer" metaphor and aggressive advocacy. This paper will examine the development of the mental steps doctrine, focusing in particular on its transformation in *Benson* from the relatively narrow factual form of the doctrine to an unbounded fictional form of the doctrine.

---

[1] The views expressed herein should not be attributed to Fenwick & West LLP, or any clients thereof, or other organization with which I'm affiliated.
[2] My thanks to Adam Lewin for his significant contributions and suggestions to this article.

I. THE ORIGINAL DOCTRINE: INVENTIONS REQUIRING MENTAL STEPS IN FACT

Historically, the "mental steps" doctrine was used only in very narrow circumstances, where an invention as conceived by the inventor and as claimed *necessarily required* steps performed in the human mind. This "factual form" of the mental steps doctrine arose in cases involving inventions that occurred before the use of computers in business and industrial applications. The patent disclosures thus described the invention in terms of mathematical or other procedures that could only be performed mentally by "head and hand," or human judgments, at best guided by mathematical or other considerations. That is, there was no disclosure of any way to perform the mathematical operations *except* by mental operations, at best assisted using existing mechanical devices, such as adding machines.

The earliest Court of Customs and Patent Appeals case that expressly applied the mental steps doctrine to method claims is *In re Heritage* (1945).[13] The claims were directed to a method of "producing a porous coated fiber board" including coating samples with varying amounts of material, testing them for sound reduction coefficient, selecting a specimen within the range of coefficients, and using the amount of material applied to the selected specimen as the criterion for further coatings.[14] There was no disclosure of any apparatus or machine used to make the selection. Rather, all of these steps had to be carried out by the artisan using his own judgment. The court held that "owing to the fact that claims 1 and 2 are essentially directed to a purely mental process of making a selection of the amount of coating material to be used in coating a porous fiber board in accordance with a predetermined system they do not define patentable subject matter."[15]

The C.C.P.A. applied *In re Heritage* in a line of cases considering mental steps before the advent of claims for computer implemented inventions.[16] By the time of *In re Prater* (1951),[17] programmed digital computers were in common use in commercial and scientific settings. The claims before the court included a method of performing spectral analysis on gas mixtures to identify an unknown component with minimum error. Claim 9 recited:

> In mass spectrographic analysis where, from a given sample of material there is generated a spectrum function having peaks therein spaced along a mass scale with respect to which the relationship between concentration, contribution factor of each of the *m* constituents of the mixture and the magnitude of each of the n peaks in said spectrum is represented by a set of m linear algebraic equations and where n is an integer greater than m, the method of selecting for analysis a set of *m* peaks least susceptible to error in concentration determination which comprises
>
> > dividing each said contributing factor for each peak by a normalizing function,
> >
> > successively generating a determinant function for each said set of peaks,
> >
> > successively generating output indications of the magnitudes of said determinant functions, and

> selecting therefrom the determinant function of greatest magnitude for identification of said peaks least susceptible to error.[18]

The court distinguished its prior decisions of *In re Abrams* and *In re Yuan*, in which there was no physical apparatus to perform the claimed processes.[19] That is, the court viewed the mental steps embodiment as a necessary one that required human performance and judgment. The *Prater* court stated that “Although in view of our decision here we find it unnecessary to analyze and/or review in depth the so-called "mental steps" doctrine, it would appear that the disclosure of apparatus for performing the process wholly without human intervention merely shows that the disclosed process does not fall within the so-called "mental steps" exclusion.”[20] In support of this narrow interpretation of the mental steps doctrine, the court cited an early treatise on the patent eligibility of software, “Disclosure of apparatus for performing the process without human intervention may make out a prima facie case that the disclosed process is not mental and is, therefore, statutory.”[21] Ultimately, the court did invalidate the method claim, but under Section 112, not Section 101, because claim did read on “a mental process augmented by pencil and paper markings,” and “thus interpreted, reads on subject matter for which appellants do not seek coverage, and therefore tacitly admit to be beyond that which "applicant regards as his invention.”[22] As to the apparatus claims, the court held that “We do not perceive of any "mental steps" issue in regard to apparatus claim 10. It is quite clear that claim 10, in typical means-plus-function language as expressly permitted by the third paragraph of 35 USC 112, does not encompass the human being as the "means" or any part thereof.”

The question of whether a method claim that recited computer elements was statutory was intentionally left open in *Prater*. The Court of Customs and Patent Appeals addressed that specific question a few months later *In re Bernhart* (1951).[23] The claims included method and apparatus claims for automatically making a two-dimensional portrayal of a three-dimensional object from any desired angle and distance and on any desired plane of projection. The patent disclosed the use of a general purpose computer and the specific equations used to generate the projections. The method claim recited steps of programming the computer to perform equations and generate the plots.[24] The apparatus claims were set forth in means-for form, including “electronic digital computer means programmed” to compute a set of signals values based on a specified equation.

Affirming the eligibility of the apparatus claims first, the court stated broadly:

> Moreover, all machines function according to laws of physics which can be mathematically set forth if known. We cannot deny patents on machines merely because their novelty may be explained in terms of such laws if we are to obey the mandate of Congress that a machine is subject matter for a patent. We should not penalize the inventor who makes his invention by discovering new and unobvious mathematical relationships which he then utilizes in a machine, as against the inventor who makes the same machine by trial and error and does not disclose the laws by which it operates.[25]

This is a profound insight into not just the legal jurisprudence of patent eligibility, but into the nature of the creativity and innovation. The inventor who discovers and discloses the law governing the operation of a machine for new purposes makes a greater contribution to the store of human knowledge than one who merely discovers the machine by trial and error. The former teaches principles that can be further developed upon and extended, often to new and unanticipated domains; the latter merely contrives a new artifact, leaving it to others to determine—or perhaps not—the governing relationships. The latter is at best a highly skilled craftsman; the former is a true engineer.[26]

The court also upheld the method claims:

> In the case now before us, the disclosure shows only machinery for carrying out the portrayal process. In fact it is the chief object of the invention to eliminate the drudgery involved in a draftsman's making the desired portrayals. Accordingly, a statutory process is here disclosed. Looking then to method claim 13, we find that it in no way covers any mental steps but requires both a "digital computer" and a "planar plotting apparatus" to carry it out. *To find that the claimed process could be done mentally would require us to hold that a human mind is a digital computer or its equivalent*, and that a draftsman is a planar plotting apparatus or its equivalent. *On the facts of this case* we are unwilling so to hold. We conclude that the method defined by claim 13 is statutory, and its patentability must be judged in light of the prior art.[27]

Here the court expressly denounces the fictional approach to mental steps, since that would require holding that the human mind was the equivalent of a digital computer, and there were no facts in the record (nor could there have been) in support of such a finding. The court affirmed this approach a year later in *In re Mahoney* (1952), where it upheld method claims for synchronizing a receiver with an incoming bitstream based on comparisons of bit values.[28] The court held that the words "bit" and "bit stream," as used in the claims and understood in the art, make "mental performance of the claimed process impossible."[29] The court emphasized "it would be absurd to say that the claims reasonably read on a mentally implemented process. We are aware of no way in which the human mind can operate on such signals."[30]

This line of reasoning was further extended by the court in *In re Musgrave*, in an opinion by Judge Rich.[31] The claims there dealt with methods of correcting seismographic signals for timing errors caused by variations in the soil that the signals pass through before being detected at a seismograph.[32] The court again rejected the fictional form of the mental steps argument that the claims were ineligible "merely because some or all the steps therein can also be carried out in or with the aid of the human mind or because it may be necessary for one performing the processes to think."[33] Instead of asking whether mental steps were involved, the court proposed the technological arts test.[34] . Judge Baldwin, the author of *Prater*, concurred in the result, but expressed grave concern that the latter was an unnecessary change in the law that had "foreseeable problems" in "interpreting the meaning of "technological arts.""[35] Nonetheless, Judge Baldwin agreed that "cases before this court have made it clear that there is now only a very narrow scope to this "fearful" mental steps doctrine," noting that "in reality very little remains of the "mental steps" doctrine."[36]

The Court of Customs and Patent Appeals maintained this view of mental steps in *In re Foster*,[37] *In re McIlroy*,[38] and most significantly, in its decision in *In re Benson*.[39] In *In re Benson,* the USPTO rejected the claims as being directed to mental steps. The court disagreed, and upheld the claims as statutory.[40] The court was nonplussed by the argument that a human could perform the claim "manually although in actual practice it seems improbable anyone would ever do that," because of "speed measured in milli- or even micro-seconds being essential in the practical utilization of such a process."[41] The court's acknowledgement of the importance of speed of operation in practical embodiments is another example of how the Rich court was sensitive to the realities of actual technology practice—in contrast with the present view of the Federal Circuit that speed of computation is irrelevant.[42] The court went so far as to state that even mental performance was irrelevant, because such mental steps were "only to the extent necessary to assure that [the operator] is doing what the claim tells him to do. *In no case is the exercise of judgment required or even the making of a decision as between alternatives*."[43]

Thus, until the Supreme Court's decision *Benson*, no court had invalidated claims computer-implemented inventions using the fictional form of the mental steps doctrine, that the claims "could be" performed by a human. Indeed, this approach had been repeatedly rejected by Judge Rich and others on the Court of Customs and Patent Appeals. Instead, the court applied the factual form of the doctrine: claims to a computer-implemented invention were ineligible only if mental implementation was necessary. A disclosure of a programmed computer was sufficient structure to demonstrate the mental implementation was not necessary.

To extend the mental steps doctrine into the fictional form, the Court in *Benson* needed support for the assumption that the operations of a computer are "the same procedures which a human being would perform" by "head and hand." As will be shown next, this view was set forth by the Solicitor General in its brief to the Court.

II. *BENSON* AND SHIFT TO FICTIONAL MENTAL STEPS

The fictional form of the mental steps doctrine arose in *Benson*, where the Court stated:

> A digital computer, as distinguished from an analog computer, is that which operates on data expressed in digits, solving a problem by doing arithmetic as a person would do it by head and hand.[44]

and

> the conversion of BCD numerals to pure binary numerals can be done mentally… can also be performed without a computer.[45]

Where did the Supreme Court come up with this principle that a digital computer solves problems the same way a person does? The Court cited Ronald Benrey, *Understanding Digital Computers* (1964) as support. First, it seems odd that a book titled *Understanding Digital Computers* ("UDC"), which would likely be directed to a technical discussion of the operation of digital computers, would make such an authoritative-sounding statement at a time when science had little real insight into how the human brain actually performs calculations. Second, the citation to UDC is illuminating but not sufficient, since clearly the Supreme Court did not do its own research to source this statement.

The explanation for the latter problem is that this principle was argued by the Solicitor General, based on a partial quotation from UDC:

> A digital computer solves a problem by actually doing arithmetic in much the same way a person would by hand.[46]

The Solicitor General went on to argue that a computer performs essentially mental steps when performing calculations because "the conversion of BCD numerals to pure binary numerals can be accomplished by a conventional series of mental steps."[47] While the Solicitor General's brief acknowledged that "the computer operates by physical equivalents of logical functions," the Solicitor General nonetheless maintained that "the functions themselves are the same procedures which a human being would perform in working the same computation, but reduced to the physical characteristics of the device."[48] These two statements of procedural equivalence became the basis on which the Supreme Court transformed the mental steps doctrine from the factual form to its fictional one and applied it to computer-implemented inventions.

But that leaves the question of whether UDC actually made this rather bold assertion about the procedural equivalence of brains and computers. It turns out that it did not.

III. *UNDERSTANDING DIGITAL COMPUTERS* AND THE USE OF THE MIND-COMUTER METHOR

A careful reading of UDC shows that to support its argument that computers use the same procedures as humans, the Solicitor General took the various statements out of context.[49]

As author Ronald Benrey explains in his introduction to UDC, in 1964 "advances in electronic digital computer technology [had] made possible many spectacular scientific achievements that would have seemed like 'science fiction' three or four decades ago," and computers were "generally pictured as incredibly complex electronic machines, aglow with flashing lights."[50] Benrey's goal as a writer was to demystify computers and clearly explain that they "owe many of their capabilities to their inherent simplicity."[51] His book was not intended for scholars, but "for the person who wants more than a "cocktail party conversation" familiarity with digital computers, but who does not have the background or desire to delve into a rigorous consideration of electronic digital computer design techniques."[52]

In the early 1960s, many hobbyists were familiar with analog computers, which had been in use for many years. Thus, before delving into the details of the structure of digital computers, UDC included a short section labeled *What does "digital" mean?* to distinguish between analog and digital computers. This is the section which the Solicitor General selectively quoted, and thus it is reproduced here in its entirety. The portion quoted by the Solicitor General is shown in italics:

> The "digital" in digital computer tells us a lot about how these devices calculate. As we have said, input numbers are fed into a digital computer and output numbers are taken out. But what happens inside?
>
> "Digital" describes any calculating mechanism that represents quantity with integers as it calculates. Another way of saying the same thing is that *a digital computer solves a problem by actually doing arithmetic, in much the same way a person would "by hand."*

> If you were to look inside a digital computer as it is performing a calculation (we will in later chapters) you would see different numbers represented by the mechanism at various times: At the start of the problem, the input numbers would be "visible." Then, as the calculation goes on, "intermediate" results would appear. Finally, the answer would pop into view, just before it is sent out through the output. In effect, the computer is "writing the numbers down" as it does the arithmetic.
>
> Notice that "digital" can be used to describe any calculating device that represents quantity in this fashion. Desk calculators, cash registers, abacuses and most mechanical counters, such as odometers, meet this requirement. These devices are actually mechanical digital computers. The abacus represents numbers with wooden beads, the others use gears or notched wheels.[53]

As is clear from the entire context of this section, UDC here explained that *digital* computers operate on *digits*—representations of discrete numbers. UDC provided additional examples to illustrate the concept, noting that many types of calculating devices familiar to 1960s readers can be considered digital: desk calculators, cash registers, abacuses, and even odometers in automobiles. Later on, Benrey returned to the idea that devices that manipulate numbers can be considered digital, writing, "We learned in Chapter 1 that digital mechanisms actually represent within themselves, the numbers being manipulated. Pascal's adding machine, for example, represented the numbers with notched wheels. Each wheel had ten notches—one notch for each decimal digit."[54] Thus, it is clear from context that Benrey's statement was as part of a larger discussion that related the meaning of digital—contrasted with analog—computation to something Benrey's reader were familiar with—doing arithmetic. It was not intended as a statement of scientific fact that computers operate like human brains.

Moreover, as a full reading of the third paragraph makes clear, Benrey used a simple analogy—arithmetic done with pencil and paper—to help lay readers understand this foundational concept. Obviously one cannot "look inside" a computer to "see" actual numbers "pop into view"—this is simply a useful metaphor—nor does the computer "write down" anything on paper. When UDC was published in 1964, most people performed simple arithmetic using pencil and paper, and so Benrey used the pencil-and-paper analogy since it would have been instantly understood by every reader. That made it an effective and obvious figure of speech to help readers grasp an essential difference between analog and digital computers—but it was never intended as a scientific statement.

Most importantly, Benrey indeed took pains to point out that computers operated differently from human minds. In other portions not cited by the Solicitor General, Benrey expressly distinguished computers from human minds. In his introduction, Benrey lamented that "newspapers are forever reporting the latest feat performed by an electronic brain. As a result amazing intellectual powers and super-human thinking abilities have been attributed to digital computers."[55] Benrey then stated that "digital computers cannot 'think,' and as we shall see, they are not as complicated as most people believe. In fact, computers owe many of their capabilities to their inherent simplicity."[56] Benrey went on to explain that "No computer 'thinks for itself'; it only operates at high speed according to the instructions it has received."[57]

In summary then, UDC provided no support—indeed precisely contradicted—the proposition for which the Solicitor General cited it, and upon which the Supreme Court relied when it applied the mental steps doctrine to Benson's claims.

IV. FUNCTIONALISM: A PHILOSOPHICAL ARGUMENT IN SUPPORT OF THE FUNCTIONAL EQUIVALENCE OF MENTAL STEPS AND COMPUTER

Even if UDC did not support the Solicitor General's argument that "the functions themselves are the *same procedures* which a human being would perform in working the same computation," there remains whether this theory nonetheless holds merit on its own. This is an important question because this argument underlies the "pencil and paper" test of patent eligibility that is frequently invoked by the courts.

The functional equivalence argument—that the mind/brain operates in a similar way as a digital computer—is now a familiar part of the "mind as computer" metaphor. The "mind as computer" metaphor is presently formalized as the computational theory of mind or *computationalism*,[58] the view "that intelligent behavior is causally explained by computations performed by the agent's cognitive system (or brain)."[59] Simply stated, as applied to humans, it holds that cognition in the brain is provided by computation. This view is now the dominant view in cognitive science and related fields.

The Solicitor General's argument is more specific than that. It argues that computers actually perform the *same functional procedures* as the mind/brain itself. This stronger claim falls within a specific version of computationalism known as "machine functionalism" formalized by Hilary Putnam:

> According to this model, psychological states ("believing that *p*," "desiring that *p*," "consider whether *p*," etc.) are simply "computational states" of the brain. The proper way to think of the brain is a digital computer. Our psychology is to be described as the software of this computer—its "functional organization."[60]

Simplified, functionalism is the view that mental states are identified by what *functions* they perform, rather than by the underlying *structure* of the brain that generates them. This thesis was inspired by numerous developments in computer science and in the field of artificial intelligence, which sought to construct machines that could think. Early successes in the field, such as the computer program Logic Theorist (1956), which successfully proved numerous mathematical theorems by a deductive process, suggested that this goal was achievable.[61] In the 1930s Alan Turing proposed the model of an abstract machine (the Turing Machine) that could be programmed to compute any computable sequence.[62] In the 1940's McCollough and Pitts modeled the operation of neurons in the brain using Boolean logic, the same logic used in computer programming.[63] John von Neumann, regarded with Turing as one of the architects of the modern computer,[64] took these works further and proposed a general theory of automata in which both living organisms and machines could be described using the same principles, including those of the sort described by McCollough and Pitts. To von Neumann, biological entities, including the human brain, could be modeled and replicated, in digital mechanisms, at least under certain circumstances.[65] However, functionalism, as proposed by Putnam, and as implicitly present in the mental steps doctrine, is not without its problems. Putnam himself described his own functionalism doctrine: “*Functionalism, construed as the thesis that propositional attitudes are just computational states of the brain, cannot be correct*.” [66]

But even machine functionalism does not make the same philosophical and factual commitments set forth by the Solicitor General’s procedural equivalence argument. Machine functionalism describes the operations of the mind/brain architecturally. It makes no argument or assumption about how *specific types* of computations would be made by the brain, nor does it imply that a digital computer, even accounting for the differences in its “physical characteristics,” performs the same procedures as a human brain would for a given function. While there are still strong arguments for more sophisticated versions of functionalism, the Solicitor General’s procedural equivalence argument is very likely wrong, particularly when applied to mathematical operations.

Over the past two decades, significant work in neurophysiology has begun to discretely identify the specific structures in the brain that are involved in mathematical operations and how those operations are performed.[67] The brain does not simply add, subtract, multiply and divide numbers in a single region, but instead uses between ten and twenty different regions performing different tasks.[68] In particular, multiplication first involves conversion of the numbers into a linguistic or verbal (word) format to access a verbal (not numerical) memory of multiplication tables; in contrast, number comparisons (e.g., “is 3 > 7?” or deciding between images which has more “dots”) are entirely non-linguistic.[69] As Dehaene notes, “The diversity of cerebral areas involved in multiplication and comparison underline once more that arithmetic is not a holistic phrenological “faculty” associated with a single calculation center. Each operation recruits an extended cerebral network. Unlike a computer, a brain does not have a specialized arithmetic processor.”[70] Not only are many mathematical operations linguistically driven, they are use the same brain circuits used for the perception of time, space, and even hand and eye movement.[71] Tests showed that during addition, subjects’ eyes moved to the right (increasing along an internal number line, and during subtraction, their eyes moved to the right (decreasing along the number line).[72] Dehaene observes: “When we think about numbers, or do arithmetic, we do not solely rely on a purified, ethereal, abstract concept of number. Our brain immediately links the abstract number to concrete notions of size, location and time. We do not do arithmetic “in the abstract.””[73] The brain does not merely compute numbers: it uses multiple and diverse operations involving linguistic, spatial, visual, and temporal components.

Thus, the arguments and assumptions that underlie *Benson*’s procedural equivalence of computers and brains are false. Computers do not convert digital bits for “1” and “0” into the words “one” and “zero” or activate a digital camera (the “eyes”) to determine results. The actual computational procedures performed by a computer are entirely different both in form and process from what a human does, even if both would ultimately achieve the same results. For example, when a computer multiplies two numbers, the underlying procedures are entirely different from what a human would do. What a human does in a few operations to multiply two digits, say “9 x 8,” requires dozens of operations at the level of individual logic gates (complexes of transistors). Even if a person were to perform the calculation in binary, the sequence of operations used would be quite different.

Another problem with this procedural equivalence argument is that it turns the inventor’s disclosure of the invention as required by Section 112 against the invention’s eligibility under

Section 101. To satisfy Section 112, the disclosure must allow one of skill in the art to practice the invention. To an engineer this is often an explanation of the operative principles of the invention, often in terms of engineering equations or other computational representations. Once thus described, a court can readily conclude that a human can perform the equations with "pencil-and-paper"—a trivial conclusion at best.

One rebuttal to this line of analysis is that of course computers do not do exactly what human brains do, because they have digital circuits, not neurons. What matters, this line of reasoning goes, is that operations are *functionally* equivalent, not physically or procedurally the same. But this argument begs the question since there does not appear to be *any level* of functional organization at which the actual *native* operations of the brain use the "same procedures" as, or are functionally equivalent to, the computer. The argument assumes that relevant procedures are the entirely *artificial* ones created by humans to define the mathematical operations of interest. But that ignores the fact that these operations are implemented on a machine that was designed in the first place in accordance with mathematical principles precisely for the purpose of implementing such procedures. The power of computers comes not from their ability to perform monolithically complex equations *per se*, but rather from a design that relies on the ability of the hardware to perform a limited number of very simple, repetitive operations at high speed. This hardware model was adopted because mathematical problem solving involves breaking complex operations down into a large (often extremely large) number of simpler operations. After all, humans invented the formal symbolism of arithmetic, and likewise invented computers, as well as other machines, to perform these functions. Put another way, generally speaking, there is no algorithm that is executed by a computer that was not first thought of by a human computer programmer. It should be no surprise then, let alone considered an insightful analysis, that a person *can* perform the operations described for a computer.

Further, the articulation of the Step 1 of the *Alice* test, to identify whether the claim is "directed to" an abstract idea only serves to make matters worse, not better.[74] The courts use this step as a "quick look" for the "gist" of the claim.[75] This merely allows the courts to create a high level description of the purpose of the invention, which in the software domain is frequently to solve a functional problem--the very reason humans create artifacts in the first place.[76] At that point it becomes trivially easy to argue that a human *could* perform the function. For example, in *Comcast IP Holdings I, LLC v. Sprint Commc'ns Co. L.P.*, the claim was directed to a method of optimizing a telephone network, and included a step of "determining whether a telephony parameter associated with the request requires acceptance of a user prompt to provide to the application access to the telephony network, [77] The court boiled this down to simply "the abstract idea at the heart of the claim is the very concept of a decision," which immediately led to the conclusion that "A decision is a basic mental process upon which everyone relies. A decision may be performed, and generally is performed, entirely in the human mind."[78] In short, Step 1 of the *Alice* test enables the question-begging of the fictional form of the mental step doctrine to begin right off the bat.

Another key difference between how computers perform their operations and how humans do is that humans, but not computers, understand what they are doing, and the meaning of their operations. A human undertaking the task of sorting book on a shelf alphabetically by title knows that she is dealing with books, that the sequence of words on the binding are titles, and that words are composed of letters, and so forth. She performs these operations directly on the words. This knowledge of the domain impacts how the operations themselves are performed. A computer can sort the same titles, but only once each title is represented as a string of numbers—the computer does not "know" that the numbers represent a book title any more than the human's finger "knows" she is moving a book, and cannot use this knowledge to change the manner of sorting.

Thus, whether taken as a specific or general statement, the arguments made by the Solicitor General and adopted by the Supreme Court, do not support the functional equivalence of the operations of digital computers in relationship to human minds.

V. THE CONTINUED APPLICATION OF MENTAL STEPS TO SOFTWARE INVENTIONS

Unfortunately, the Supreme Court's misstatement of the relationship between computers and minds continues to this day to be cited as authority and a statement of fact about how computers operate. The Court's conversion of the mental steps doctrine from its factual form to its fictional form in essence turned the performance of mental steps from being a *necessary* condition for ineligibility to a *sufficient* condition. And since the *Alice* decision refused to offer a definition or even a methodology for identifying abstract ideas, the fictional form of mental steps has been taken up as a model tool. As a result, it has substantively impacted both the case law and the outcome of many patent cases.

Though the Federal Circuit decided dozens eligibility cases after *Benson*, it was not until some forty years later that Federal Circuit adopted the fictional form of mental steps. First, in *Cybersource*, that court stated that "in finding that the process in Benson was not patent-eligible, the Supreme Court appeared to endorse the view that methods which can be performed mentally, or which are the equivalent of human mental work, are unpatentable abstract ideas--the "basic tools of scientific and technological work" that are open to all."[79] Then in *Bancorp*, the court stated

> As the Supreme Court has explained, "[a] digital computer . . . operates on data expressed in digits, solving a problem by doing arithmetic as a person would do it by head and hand." *Benson*, 409 U.S. at 65. Indeed, prior to the information age, a "computer" was not a machine at all; rather, it was a job title: "a person employed to make calculations." Oxford English Dictionary, *supra*. Those meanings conveniently illustrate the interchangeability of certain mental processes and basic digital computation, and help explain why the use of a computer in an otherwise patent-ineligible process for no more than its most basic function—making calculations or computations—fails to circumvent the prohibition against patenting abstract ideas and mental processes.[80]

Here too, the statements from UDC have been taken out of context and used in a manner at odds with their intended purpose and meaning. However, as should be clear, the digital operations of a computer are not "interchangeable" with the mental processes of a human. As demonstrated above, that both can be *described* in a common way does not make them the same in fact. If the programmed operations of a computer are interchangeable with the mental processes of a human, then so too are the mechanical operations of an adding machine, since these operations can likewise be described as the “same procedures” performed by a human. Clearly, this result would not be correct, and thus it implies that the “interchangeability” premise is false.

After *Alice*, reliance on *Benson*’s “mental steps” and the pencil-and-paper test increased significantly, even where the claims were directed to processes that were disclosed as fully performed by a computer. These types of claims that would have been eligible under the pre-*Benson* factual mental steps approach of Judge Rich and the Court of Customs and Patent Appeals. What follows is a short survey of several exemplary cases:

In *Planet Bingo, LLC v. VKGS LLC*, the Federal Circuit stated that “The district court correctly concluded that managing the game of bingo “consists solely of mental steps which can be carried out by a human using pen and paper,” and expressly relied on *Benson*: “Like the claims at issue in *Benson*, not only can these steps be “carried out in existing computers long in use,” but they also can be “done mentally.””[81]

In *Broadband iTV, Inc. v. Oceanic Time Warner Cable, LLC*, the claims included steps of “enabling the online uploading of videos” and “converting the uploaded videos standard TV digital format.” [82] The court nonetheless held “Even though the ‘336 Patent anticipates that its steps will be performed through computer operation, it describes a process that a person could perform “[u]sing a pen, paper, and her own brain.”[83] The court did not explain how a human with pencil and paper could themselves enable uploading of videos or convert the videos into a specific digital format.

In *Concaten, Inc. v. Ameritrak Fleet Solutions, LLC*, one of the claims dealt with generating maps of the locations of snow plows, and presenting graphical users interfaces based on such maps, along with automated instructions to the snow plow operator. The claim included steps of “processing, by the server, the received collected information to (i) provide a map associated with a physical location of a selected snow maintenance vehicle” and providing, over the wireless cellular network, the map and an operator instruction to the selected snow maintenance vehicle of the plurality of snow maintenance vehicles, wherein the map is visually displayed, by a touch screen monitor”.[84] The court held that these steps were “nothing more than taking steps routinely performed by humans.”[85]

In *Evolutionary Intelligence, LLC v. Sprint Nextel Corp.*, the claims were directed computer search methods using a data structure described as a “container” formed of “registers” with specific types of relationships ("the container registers having defined therein data comprising historical data associated with interactions of the identified containers with other containers from the plurality of containers, wherein searching the first container registers comprises searching the historical data;” etc.). [86] The court held that the claims cover “no more than a computer automation of what “can be performed in the human mind, or by a human using a pen and paper.””[87]

In *Kinglite Holdings Inc. v. Micro-Star Int'l Co. Ltd.*, the claims were directed to encrypting the BIOS of a computer:[88] “A method to securely invoke Basic Input and Output System (BIOS) services, comprising: creating a service request to invoke BIOS services; signing the service request with a service request signature generated using a private key in a cryptographic key pair; and verifying the service request signature using a public key in the cryptographic key pair to ensure the integrity of the service request.”[89] The court held that the steps of “generating a signature using a "private key" and verifying that signature with a "public key" can be performed by a human who is capable of reading such keys."[90] The court did not explain exactly how a human would *mentally* create a service request for a BIOS service, since such an operation takes within the operating system, not at any user-accessible level of the computer.

Finally, perhaps the strangest application of the mental steps doctrine is *Stanacard v. Rubard, LLC*.[91] The invention involved combining caller ID and call forwarding to route and connect a call to a unique recipient. The customer of a telephone service has their own phone number, as is normal. The telephone service also provides a local ten-digit telephone number that the customer can assign to a second phone number (including long distance international numbers) of another person. When the customer, calling from their own phone, calls the local number, the telephone service determines the caller's number using caller ID, and then looks up the second number that the caller assigned to the local number. The service then connects the caller to that second number.[92] Claim 1 recited:

> 1. A method comprising
>
> detecting an identity of a caller;
>
> receiving an assigned incoming telephone number;
>
> identifying a recipient associated with the assigned incoming telephone number and the identity;
>
> connecting the caller and the recipient;
>
> wherein said caller has a plurality of assigned incoming telephone numbers to choose from, at least one of said plurality of assigned incoming telephone numbers being associated with said recipient,
>
> wherein each assigned incoming telephone number is associated with multiple recipient telephone numbers, a particular telephone number of a recipient being determined solely by a particular assigned incoming telephone number used by a particular identified caller and without input of further data by said caller, whereby said caller is not required to be within a particular network for making calls.

The court went so far as to refer to the "genius of the '156 patent (and it is indeed clever and creative),"[93] as an "elegant solution to the problem of the calling card PIN was apparently overlooked by a lot of smart people for a very long time."[94] Nonetheless, the court found the claims directed to a mental process, relying on *Cybersource* and the pencil-and-paper analysis. The court's implementation of the pencil-and-paper test, however, borders on the bizarre:

> When I was a child I watched *Lassie* on television. Whenever June Lockhart, playing Ruth Martin, wanted to reach someone by telephone, she rang Jenny at Central and got herself connected to whomever she wished just by saying "Can you get the doctor?" or "I need to speak to Timmy's teacher, Miss Jones." Ruth didn't have to dial any numbers at all. Jenny, the intermediary, recognized Ruth as the caller from the line that rang at Central, and she knew which receptacle to

> plug Ruth's line into so that Ruth's call to Central would be forwarded to its intended recipient. Nothing different happens here, except that switching machinery and computers (none of which is claimed) recognize who the incoming caller is and to whom she wishes her call forwarded. As defendant points out, a room full of telephone operators with sheets of paper containing the look-up tables could accomplish the same result- expensively, true, but the same result, using the same process.[95]

It's a fair bet that in the history of patent litigation no court has invalidated a patent based on its childhood memories of television shows.

These cases illustrate the types of patents that have been invalidated under the fictional form of the mental steps doctrine and pencil-and-paper test. Not all courts presented claims for software inventions adopt the mental steps approach. The most cogent judicial critique of the mental steps test is by Judge Pfaelzer in *California Inst. of Tech. v. Hughes Commc'ns Inc*.[96] The claim before the court dealt with the generation of parity bits for communication packets, "Claim 1 of the '032 patent recites generating a parity bit by accumulating two values: (i) the value of the previous parity bit and (ii) the sum of a number of randomly chosen irregular repeats of message bits." Even accepting this simplification of the claim, the court rejected Hughes's argument that the steps could be performed mentally:

> One of Hughes' arguments deserves special attention. Hughes argues that calculating parity bit values involve "mental steps [that] can be performed by a person with pencil and paper." Therefore, Hughes, argues the claim is not patentable. Defs.' Mem. in Supp. of Invalidity at 14, Dkt. No. 126. The Court finds this mode of analysis unhelpful for computer inventions. Many inventions could be theorized with pencil and paper, but pencil and paper can rarely produce the actual effect of the invention. Likewise, with regard to software, a human could spend months or years writing on paper the 1s and 0s comprising a computer program and applying the same algorithms as the program. At the end of the effort, he would be left with a lot of paper that obviously would not produce the same result as the software.[97]

The court offers two further insightful observations. First, "Pencil-and-paper analysis can mislead courts into ignoring a key fact: although a computer performs the same math as a human, a human cannot always achieve the same results as a computer."[98] This is an important point, one regularly overlooked by the courts, as the examples in *Kinglite* and *Broadband iTV* above show: while a human may be able to calculate manually a cryptographic key (*Kinglite*) or perhaps even manually encode a video (*Broadband iTV*) that would not achieve the same results as claimed. This is consistent with Judge Rich's observation in *In re Benson* that speed of computation is "essential in the *practical* utilization" of the process.[99] Today, the courts have distanced themselves entirely from appreciating the significance of practical considerations—patent eligibility is performed in an intellectual vacuum.

The court's second observation was that "it is clear that Caltech's error correction codes were not conventional activity that humans engaged in before computers, and the codes do not become conventional simply because humans can do math."[100] This point is likewise routinely ignored:

once a court decides a human can perform the claimed steps, it typically reduces the subsequent analysis of whether there is an inventive step to these simplistic terms. This is how the *Stanacard* undertook the inventive step analysis: "The claimed invention is literally no more sophisticated than what Jenny the Operator did on Lassie, those many years ago; as defendant argues, any telephone operator given a copy of the lookup table (which is not part of the claimed invention) can route and connect the call."[101]

VI. THE FICTIONAL MENTAL STEPS DOCTRINE DOES NOT APPLY TO PROGRAMMED GENERAL PURPOSE COMPUTERS

The fictional form of the mental steps doctrine is inapplicable to digital computers and computer-implemented inventions for several reasons.

First, prior to the widespread usage of the general purpose computer, many inventions were created, and many patents granted, for mechanical and electrical machines that performed mathematical calculations. For example, between 1900 and 1960, there were over 2,300 patents issued that related to mechanical computing devices. That such devices were patent-eligible subject matter seemed beyond dispute, and there are no federal cases in which claims to such devices or their methods of operation were held to be unpatentable subject matter. Calculating machines also perform simple arithmetic that a human could easily do by "head and hand", but that does not disqualify them as patentable subject matter. This is because the mathematical operations had been mechanized into physical elements: the "locus of the operation" was in the mechanical or electrical elements of the machine.

Most calculating machines typically could only perform individual mathematical operations such as addition, subtraction, multiplication, division, logarithm, and so forth. Performing a complex series of mathematical calculations, therefore, required the human operator to control the sequence and execution of a series of calculations, as well as in many cases to store, typically on a notepad, intermediate results for later entry into the machine. In short, even though the locus of the operation was in the machine, the locus of control in those devices was always in the mind of the human operator, whether he was using a desk calculator, a slide rule, or an abacus. Accordingly, in patent cases decided prior to the widespread application of computers, the courts were correct to hold that a claim to mathematical procedures or use of formula was essentially one for mental steps, because there was then no known way to have a machine perform the entire mathematical process automatically.

However, von Neumann's architecture of the stored program computer represented a fundamental change in where control of the operations is held. Prior to the von Neumann architecture, a human had to enter a program one step at a time into the computer's memory—this was essentially the same as the human controlling the adding machine by pressing keys and pulling handles. In the stored program computer, the locus of control resides in the machine itself: the computer program controls the operation of the computer by sequentially changing the signals stored and manipulated by the computer, without any human intervention other than high level inputs. These low level signals are not representative of the mental states of the human but rather are signals that electronically represent the machine language "instructions" that the computer can execute. At a minimum, just as the mechanical or electrical implementation of calculating machines would not be ignored in deciding patent eligibility, the implementation of a digital computer should not be ignored either.

The only reason to ignore the presence of digital computer elements, such as the shift register in *Benson*, or even a general-purpose computer itself, is if one assumes that computers perform mental steps in the same way that a human does. Once this assumption is removed, there is no principled reason to distinguish between the mechanical nature of a calculating machine and the computer technology in digital computers. Both likewise contribute to patent eligibility. And as shown above, the assumptions of functional and procedural equivalence was without support in *Benson* in 1972 and remains even less likely today.

The fictional form of the mental steps doctrine represents a significant and unwise departure from the factual form. The fictional form is untethered from the conceptual and technological attributes of computer design, the nature of human cognition, and the practical reality and value in computer-implemented inventions. The courts should return to the doctrine's factual form, and avoid a further descent into the fact-free analysis that now characterizes patent eligibility.

***

End Notes

[1] 409 U.S. 63 (1972).
[2] 573 U.S. ___ , 134 S.Ct. 2347 (2014).
[3] *CLS Bank Int'l v. Alice Corp. Pty, Ltd.*, 717 F.3d 1269, 1298 (Rader, J., dissent) ("A court cannot go hunting for abstractions by ignoring the concrete, palpable, tangible limitations of the invention the patentee actually claims.").
[4] *MySpace, Inc. v. GraphOn Corp.*, 672 F.3d 1250, 1259 (Fed. Cir. 2012). Apparently, not much has changed in *forty-two* years; see *In re Musgrave*, 431 F.2d 882, 890 (C.C.P.A. 1970) ("whatever law there may be on the subject [of "mental steps"] cannot be attributed to Congress. It is purely a question of case law.That law we, like others, have found to be something of a morass.").
[5] 654 F.3d 1366, 1373 (Fed. Cir. 2011) (emphasis added).
[6] *Synopsys Inc. v. Mentor Graphics Corp*., 78 F. Supp. 3d 958 (N.D. Cal., 2015).
[7] *Kinglite Holdings Inc. v. Micro-Star Int'l Co. Ltd*. Case No. CV-14-03009 JVS (PJWx), 2015 U.S. Dist. LEXIS 145121 (C.D. Cal. Oct. 16, 2015); *Protegrity USA, Inc. v. Netskope, Inc.*, Case No. 15-cv-02515-YGR 2015, U.S. Dist. LEXIS 142633 (N.D. Cal., Oct. 19, 2015); *FairWarning IP, LLC v. Iatric Sys., Inc*. Case,8:14-cv-2685-T-23MAP, 2015 U.S. Dist. LEXIS 81999 (M.D. Fla. June 24, 2015)
[8] *Collarity, Inc. v. Google Inc.*, C.A. No. 11-1103-MPT, 2015 U.S. Dist. LEXIS 159031 (D.Del., Nov. 25, 2015).
[9] Univ. of Utah Res. Foundation v. Ambry Genetics Corp., 774 F.3d 755 (CAFC Dec. 17, 2014).
[10] *Netflix, Inc. v. Rovi Corp.*, No. 11-cv-6591 PJH, 2015 U.S. Dist. LEXIS 92766 (N.D. Cal., July 15, 2015).
[11] *Stanacard v. Rubard, LLC*, 12 Civ. 5176 (CM (MHD), 2015 U.S. Dist. LEXIS 157345 (S.D.N.Y. , Nov. 18, 2015); *Comcast IP Holdings I, LLC v. Sprint Commc'ns Co. L.P.*, No. CV 12-205-RGA, 2014 WL 3542055 (D. Del. July 16, 2014); *Telenit Techs., LLC v. Alteva, Inc.*, Civ. No. 2:14-CV-369 2015, U.S. Dist. LEXIS 125991 (E.D. Tex. Sept. 21, 2015).
[12] *Wolf v. Capstone Photography*, 2-13-cv-09573, 2014 U.S. Dist. LEXIS 156527 (C.D. Cal., Oct. 28, 2014); *In re: TLI Comm'ns LLC Patent Litig.*, 87 F. Supp. 3d 773 (E.D. Va. 2015).
[13] 150 F.2d 554 (C.C.P.A. 1945).
[14] Id. at 1172.
[15] Id. at 1174.

[16] *In re Abrams*, 188 F.2d 165 (C.C.P.A 1951) (claims ineligible as mental steps where no No specific apparatus or machine was disclosed for performing the steps, thus requiring human performance); *In re Yuan*, 188 F.2d 377 (C.C.P.A 1951) (relying on Abrams, claims ineligible as mental steps where no specific structure disclosed).
[17] 415 F.2d 1393 (C.C.A.P. 1969).
[18] Id. at 1407.
[19] Id. at 1402, 1407
[20] Id.
[21] Id., citing Kayton, *Patent Protectability of Software: Background and Current Law*, in The Law of Software 1968 Proceedings B-25 (1968).
[22] Id.
[23] 417 F.2d 1395 (C.C.P.A. 1969).
[24] 13. A plotting method comprising: (a) a first step of programming the computer to compute the position of planar Cartesian coordinate axes in the given plane relative to the given set of object points, (b) a second step of programming the computer to compute and produce an output defining in sequence the coordinates of the projection of each given point on the plane with reference to the Cartesian coordinate axes, and (c) the step of applying the computer output to the input of a planar plotting apparatus adapted to provide on a plane a succession of straight-line segments that connect between sequential points having positions corresponding to the coordinates computed by the second step.
[25] Id. at 1399 (emphasis added).
[26] See Dasgupta, *Technology and Creativity* 12-14 (1996).
[27] 417 F.2d at 1400 (emphasis added).
[28] 421 F.2d 742 (C.C.P.A. 1970).
[29] Id. at 745.
[30] Id.
[31] 431 F.2d 882 (C.C.P.A. 1970).
[32] Id. at 884.
[33] Id. at 892.
[34] Id.
[35] Id. at 895 (Baldwin, J., concurring).
[36] Id. 894 (Baldwin, J. concurring; "this court should concern itself only with realities and let the law professors worry about academic problems.").
[37] 438 F.2d 1011 (C.C.P.A. 1971).
[38] 442 F.2d 1397 (C.C.P.A. 1971).
[39] 441 F.2d 682 (C.C.P.A. 1971).
[40] Id. at 688.
[41] Id.
[42] See *Bancorp Servs., LLC v. Sun Life Assurance Co. of Can*., 687 F.3d 1266, 1278 (Fed. Cir. 2012) ("[T]he fact that the required calculations could be performed more efficiently via a computer does not materially alter the patent eligibility of the claimed subject matter."); *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363 (Fed. Cir. 2015) ("relying on a computer to perform routine tasks more quickly or more accurately isinsufficient to render a claim patent eligible.").
[43] Id. (emphasis added). The acknowledgement that claims would still be eligible even if mental steps were required, so long as the person simply performed the claimed steps without the exercise of judgment provides a basis for the patent eligibility of games (e.g., card games, board games) using standard components (e.g., playing cards, balls, etc.), as well as some business methods.
[44] 409 U.S. at 65 n.3, citing Benrey, Understanding Digital Computers, New York, John Rider Pub. Inc. (1964) p. 4.
[45] Id. at 67.
[46] Brief of Solicitor General, *Gottschalk v. Benson*, 1972 WL 137527 *4 (U.S.) (hereinafter "Solicitor General Brief"), citing UDC, at 4.
[47] Id. at *12.
[48] Id. *7 (emphasis added).

[49] Significant portions of this section are based upon the Brief of Ronald Benrey as Amicus Curiae, *Alice Corp. v. CLS International*, 573 U.S. ___ (2014) No. 13-298, which I co-authored, and personal communications with Mr. Benrey.
[50] UDC at 2.
[51] Id. at 3
[52] Id.
[53] Id., at 4-5. (emphasis added).
[54] Id. at 28.
[55] Id at 2. Given the availability of academic textbooks on digital computers available in 1972, it's unclear why the Solicitor General relied upon a hobbyist book from 1964 to support its argument.
[56] Id. at 3.
[57] Id.
[58] See *The Computational Theory of Mind*, Stanford Encyclopedia of Philosophy (Oct. 16, 2015), http://plato.stanford.edu/entries/computational-mind/.
[59] Piccinini, *Computationalism in Philosophy of Mind*, Philosophy Compass, v4 515-532 (2009), DOI: 10.1111/j.1747-9991.2009.00215.x.
[60] Putnam, *Representation and Reality* 73 (1988).
[61] See Dasgupta, *It Began with Babbage-The Genesis of Computer Science* 236 (2014). Dasgupta's book provides an exceptional review and analysis of the history of computer science.
[62] Turing, *On Computable Numbers, with an Application to the Entscheidungs problem*, Proceedings of the London Mathematical Society 2 (1937).
[63] McColluch, Pitts, *A Logical Calculus of the Ideas Immanent in Nervous Activity*, Bulletin of Mathematical Biophysics 5:115–133 (1943).
[64] von Neumann authored the seminal report on the EDVAC computer in 1945, in which he described architecture of the stored program computer. See Dasgupta, fn. 61, p. 108-112.
[65] von Neumann, *The General and Logical Theory of Automata* (1951).
[66] Putnam, fn. 60, p. 73 (emphasis in original).
[67] See generally Dehaene, *The Number Sense—How the Mind Creates Mathematics* (Revised and Updated Ed.) (2011). See also Dehaene, Molko, Cohen, and Wilson, *Arithmetic and the brain*, Current Opinion in Neurobiology 14:218-224 (2004), and references cited therein (summarizing several decades of research into how the brain performs mathematical and related operations).
[68] Dehaene, p. 200.
[69] Id. at 180, 202, 242,
[70] Id. at 204.
[71] Id. at 244-245.
[72] Id. 246.
[73] Id. See also Lakoff, Johnson, *Philosophy in the Flesh-The Embodied Mind and Its Challenge to Western Thought*, 4 (1990) ("Reason is not disembodied, as the tradition has largely held, but arises from the nature of our brains, bodies, and bodily experience…The same neural and cognitive mechanisms that allow us to perceive and move around also create our conceptual systems and modes of reason. Thus, to understand reason we must understand the details of our visual system, our motor system, and the general mechanisms of neural binding.")
[74] *Alice*, 134 S. Ct. at 2355.
[75] *Enfish, LLC v. Microsoft Corp.*, 56 F. Supp. 3d 1167, 1173 (C.D. Cal. 2014) ("Step one is a ... 'quick look' test, the purpose of which is to identify a risk of preemption and ineligibility. If a claim's purpose is abstract, the court looks with more care at specific claim elements at step two."); *Open Text S.A. v. Box, Inc.*, 78 F. Supp. 3d 1043, 1046 (N.D. Cal. 2015) (citing *Bilski v. Kappos*, 561 U.S. 593, 611-12 (2010)). ("In evaluating the first prong of the Mayo/Alice test, which looks to see if the claim in question is directed at an abstract idea, the Court distills the gist of the claim."
[76] See, Simon, *Sciences of the Artificial* 4-5 (1996) ("The engineer, and more generally the designer, is concerned with how things ought to be how they *ought* to be in order to *attain goals*, and to *function*.")(emphasis in original).
[77] Civ. No. CV 12-205-RGA, 2014 WL 3542055, at *4 (D. Del. July 16, 2014).

[78] Id. at 6.
[79] *Cybersource*, 654 F.3d at 1371.
[80] *Bancorp Servs., L.L.C. v. Sun Life Assur. Co. of Canada*, 687 F.3d 1266, 1277 (Fed. Cir. 2012) (holding patent claims to a computer-implemented system non-statutory as mental steps).
[81] 576 F. App'x 1005, 1008 (Fed. Cir. 2014), quoting *Benson*, 409 U.S. at 67.
[82] Civ. No. 15-00131-ACK-RLP, 2015 U.S. Dist. LEXIS 131726, at *16 (D. Haw. Sep. 29, 2015).
[83] Id. at *23.
[84] Civ. No. 14-cv-00790-PAB-NYW, 2015 U.S. Dist. LEXIS 127679, at *2 (D.Colo. Sep. 23, 2015).
[85] Id. at *12.
[86] Civ. No. 13-04513, 2015 U.S. Dist. LEXIS 136458, at *6 (N.D. Cal. Oct. 6, 2015).
[87] Id. at *15, quoting *Cybersource*, 654 F.3d at 1372.
[88] Civ. No. CV-14-03009 JVS (PJWx), 2015 U.S. Dist. LEXIS 145121 (C.D. Cal. Oct. 16,2015).
[89] Id. at *12
[90] Id. at 14.
[91] 12 Civ. 5176 (CM (MHD), 2015 U.S. Dist. LEXIS 157345 (S.D.N.Y. Nov. 18, 2015).
[92] Id. at *2.
[93] Id. at *10.
[94] Id. 11.
[95] Id. at 9
[96] 59 F. Supp. 3d 974 (C.D. Cal. 2014).
[97] Id. at 982.
[98] Id.
[99] *In re Benson*, 441 F.2d. at 688 (emphasis added).
[100] Id.
[101] *Stanacard*, 2015 U.S. Dist. LEXIS 157345, at *10.