March 8, 2019

DEPARTMENT OF COMMERCE
Patent and Trademark Office
[Docket No. PTO-P-2018-0053]
Response to Request for Comments on: 2019 Revised Patent Subject Matter Eligibility Guidance

Under Secretary of Commerce for Intellectual Property and
Director of the USPTO
Andrei Iancu
Announcement of Revised Guidance for Determining Subject Matter Eligibility
Via email: Eligibility2019@uspto.gov

Dear Sir:

Thank you for this opportunity:

1. to comment on all the issues addressed by 2019 Revised Patent Subject Matter Eligibility Guidance and
2. to submit suggestions for material to address in future guidance supplements.

Probably no one has described the incoherence of § 101-eligibility doctrine better than Judge Plager in *Interval Licensing LLC, v. AOL, Inc.*, 896 F.3d 1335, 1348 (Fed. Cir. 2018).[i] Because SCOTUS and the CAFC have been unable to clarify this doctrine, Epistemography LLC must commend the Director and the the Office for taking the lead in clarification.

Below are comments and suggestions.

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PS. This email is attached in a PDF file.

Introduction

The Eligibility Guidance is helpful in so far as it goes, but it does not really explain how SCOTUS broke the US patent system. Maybe Examiners have no need to understand the mistake that the USPTO is surreptitiously correcting, but if they do, they will probably perform better and higher quality examinations.

SCOTUS' use of the word *idea* in decisions since *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498 (1874) has been confusing and incoherent, but this word or the phrase *abstract idea* did not ruin the patent system. *Mayo* Collaborative Servs. *v. Prometheus* Labs., Inc., 132 S. Ct. 1289, 566 U.S. 66, 182 L. Ed. 2d 321, 2012 U.S. LEXIS 2316, 101 U.S.P.Q.2D (BNA) 1961 rendered the patent system logically inconsistent because the Prometheus Claim 1 is obviously § 101-eligible. Then SCOTUS created a test for § 101-eligibility in *Alice Corp., 134 S. Ct. at 2355, 110 USPQ2d* at 1981 (citing Mayo, 566 U.S. 66, 101 USPQ2d 1961) and taught that it finds the claims at issue in *Mayo* and *Alice* § 101-ineligible. This illogic creates a situation such that judges following guidance from SCOTUS can find an obviously § 101-eligible claim either ineligible or eligible[1] and follow SCOTUS in either finding.

This Guidance is helpful in overcoming the problem the broken § 101-eligibility doctrine has created, but there is a need for future supplemental guidance with respect to the nature of invention in the context of logic circuits. Such guidance will help examiners but may ultimately be beneficial to attorneys representing clients in post-grant review proceedings, in ITC trials, and in Article III court proceedings.

What's the Matter with *Mayo*?

Below is *Prometheus* claim 1 of US patent no. 6,355,623 (Seidman, Method of treating IBD/Crohn's disease and related conditions wherein drug metabolite levels in host blood cells determine subsequent dosage).

1 According to *Diamond v. Diehr, 450 U.S. 175 (1981)*, see below.

1. A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:

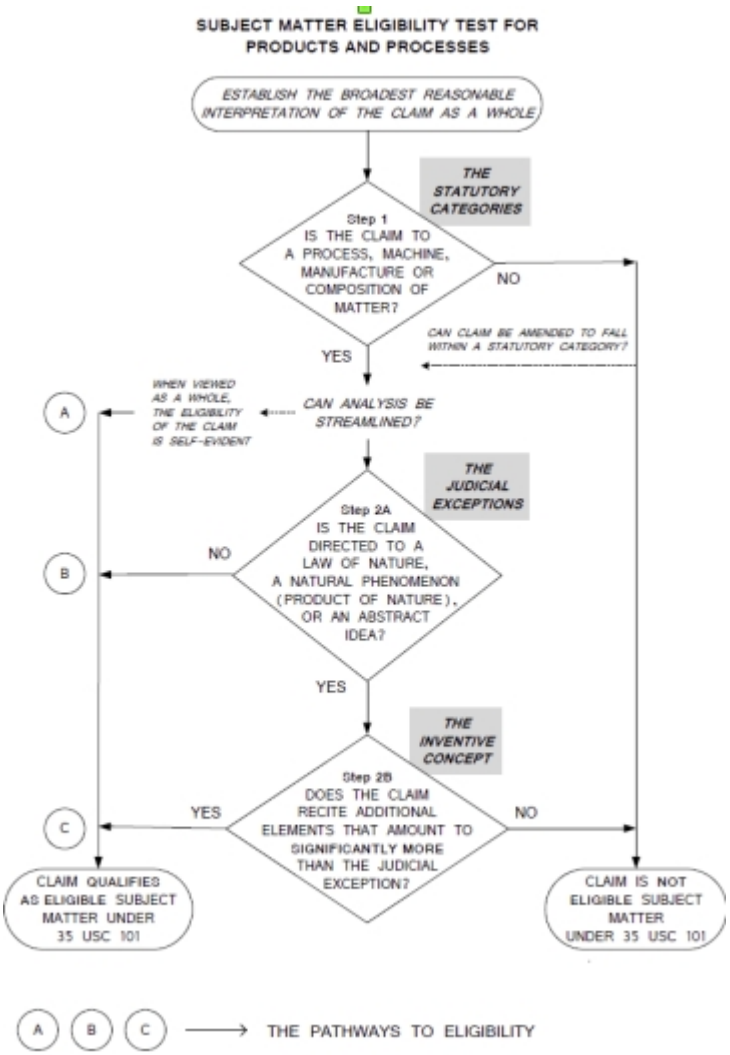
(a) administering a drug providing 6-thioguanine to a subject having said immune-mediated gastrointestinal disorder; and

(b) determining the level of 6-thioguanine in said subject having said immune-mediated gastrointestinal disorder,

wherein the level of 6-thioguanine less than about 230 pmol per 8.times.10.sup.8 red blood cells indicates a need to increase the amount of said drug subsequently administered to said subject and

wherein the level of 6-thioguanine greater than about 400 pmol per 8.times.10.sup.8 red blood cells indicates a need to decrease the amount of said drug subsequently administered to said subject.

Step (a) comes from prior art disclosure found in US patent no. 5,733,915 (Sandborn, Use of azathioprine to treat Crohn's disease). If the above Seidman '623 claim had been staked out in Sandborn '915 when the treatment was new, the claim would almost certainly have been both § 101-eligible and also patentable.



When we apply the Alice/Mayo two-part test as originally defined (see image above, *Alice Corp., 134 S. Ct. at 2355, 110 USPQ2d* at 1981 (citing Mayo, 566 U.S. 66, 101 USPQ2d 1961)), we find that the claim belongs to a statutory category, but we also find that it is directed to a natural phenomenon of the patient's level of 6-thioguanine. When we move on to step 2B we see that the claim also recites a genuine medical treatment for Crohn's disease along with the well-understood, routine, conventional activity – (medical) praxis – of adjusting treatment to patient response. Not only is there something "significantly" more in the Claim, but there is, in fact, a lot more.

Here is the key point from the syllabus of decision from *Mayo v. Prometheus*.

> *Held:* Prometheus' process is not patent eligible. Pp. 8–24.
>
> (a) Because the laws of nature recited by Prometheus' patent claims—the relationships between concentrations of certain metabolites in the blood and the likelihood that a thiopurine drug dosage will prove ineffective or cause harm—are not themselves patentable, the claimed processes are not patentable unless they have additional features that provide practical assurance that the processes are genuine applications of those laws rather than drafting efforts designed to monopolize the correlations. The three additional steps in the claimed processes here are not themselves natural laws but neither are they sufficient to transform the nature of the claims. The "administering" step simply identifies a group of people who will be interested in the correlations, namely, doctors who used thiopurine drugs to treat patients suffering from autoimmune disorders. Doctors had been using these drugs for this purpose long before these patents existed. And a "prohibition against patenting abstract ideas 'cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.'" *Bilski*, *supra*, at ___. The "wherein" clauses simply tell a doctor about the relevant natural laws, adding, at most, a suggestion that they should consider the test results when making their treatment decisions. The "determining" step tells a doctor to measure patients' metabolite levels, through whatever process the doctor wishes to use. Because methods for making such determinations were well known in the art, this step simply tells doctors to engage in well-understood, routine, conventional activity previously engaged in by scientists in the field. Such
>
> activity is normally not sufficient to transform an unpatentable law of nature into a patent-eligible application of such a law. *Parker* v. *Flook*, 437 U. S. 584, 590. Finally, considering the three steps as an ordered combination adds nothing to the laws of nature that is not already present when the steps are considered separately. Pp. 8–11.

Here is the decision.

> In consequence, we must hesitate before departing from established general legal rules lest a new protective rule that seems to suit the needs of one field produce unforeseen results in another. And we must recognize the role of Congress in crafting more finely tailored rules where necessary. Cf. 35 U. S. C. §§161–164 (special rules for plant patents). We need not determine here whether, from a policy perspective, increased protection for discoveries of diagnostic laws of nature is desirable.
>
> * * *
>
> For these reasons, we conclude that the patent claims at issue here effectively claim the underlying laws of nature themselves. The claims are consequently invalid. And the Federal Circuit's judgment is reversed.
>
> *It is so ordered.*

SCOTUS goofed. By SCOTUS' Alice/Mayo two-part test, which explicitly references this erroneous decision, the *Prometheus* claims were certainly § 101-eligible, and SCOTUS should have proceeded further to find the claims unpatentable.

Prometheus Claim 1 is directed to (recites[2])a natural phenomenon just as the Diehr claims are (do), and also *Prometheus* Claim 1 recites much more, i.e., a medical treatment (found in Alice/Mayo two-part test step 2B), than a judicial exception (found in Alice/Mayo two-part test step 2A) just as the *Diehr* Claim does.

Why did the Justices believe the *Diehr* claims § 101-eligible but the *Prometheus* claims not?

2 The new guidance metaphorically patches the hole SCOTUS punched in the roof of the patent system by covering it with a tarp that works by narrowing the meaning and usage of the phrase "directed to." The Director must receive two cheers for this legal and semantic acrobatics. Unfortunately he cannot receive the third cheer because Mayo remains a legally incorrect decision. It is just pure luck that invalidity was a correct finding for the wrong reason (§ 101-ineligibility instead of unpatentability by virtue of either obviousness or lack of novelty).

1. A method of operating a rubber-molding press for precision molded compounds with the aid of a digital computer, comprising:

providing said computer with a data base for said press including at least,

natural logarithm conversion data (1n),

the activation energy constant (C) unique to each batch of said compound being molded, and

a constant (x) dependent upon the geometry of the particular mold of the press,

initiating an interval timer in said computer upon the closure of the press for monitoring the elapsed time of said closure,

constantly determining the temperature (Z) of the mold at a location closely adjacent to the mold cavity in the press during molding,

constantly providing the computer with the temperature (Z),

repetitively performing in the computer, at frequent intervals during each cure, integrations to calculate from the series of temperature determinations the Arrhenius equation for reaction time during the cure, which is

where v is the total required cure time,

repetitively comparing in the computer at frequent intervals during the cure each said calculation of the total required cure time calculated with the Arrhenius equation and said elapsed time, and

opening the press automatically when a said comparison indicates completion of curing.

Diehr Claim 1

SCOTUS did not have the guts to say that Prometheus Claim 1 was anticipated and obvious. Or SCOTUS was unable to articulate the lack of patentability under §102 or § 103 coherently.

[It may be unfair to the Justices, but they seem to have difficulty in distinguishing between a medical procedure, which can be a claimable process, and a software procedure, which is not.]

The *Mayo v Prometheus* decision is almost formulated correctly, but SCOTUS failed to understand its own words and overread the *Rubber-Tip Eraser* decision.

When the *Mayo v Prometheus* decision points out that a medical treatment is associated with well-understood, routine, conventional activity like “modifying dosage according to patient response,” SCOTUS means but does not seem to understand that it has just identified an inherent limitation of the medical treatment (medical praxis probably associated with practically all medical treatments).

In short, adding measurement of a natural phenomenon to the prior-art disclosed medical procedure does not create a novel non-obvious patentable process.

***Prometheus* claim 1 is unpatentable. The assertion of invalidity by § 101-ineligibility is total crap.**

So how is overreading *Rubber-Tip Eraser* relevant?

1874 SCOTUS did not invalidate Blair's patent because he was claiming an abstract idea (idea of itself). SCOTUS was just saying that Blair's invention was a good idea.

1874 SCOTUS was merely pointing out that a limitation of the well-understood, routine conventional activity [praxis] of "joining by insertion" added nothing to the original device (or more correctly system), which consisted of lead-pencil *cum* India rubber.

Likewise adding the step of actually measuring the natural phenomenon of thioguanine level adds nothing to the prior disclosed method because all doctors apply the praxis of modifying treatment according to patient response.

Thus SCOTUS broke the US patent system because it resorted to § 101-eligibility instead of rationally explaining why the *Prometheus* claims were unpatentable under § 102 or § 103.

The *Rubber-Tip Eraser* Claim

SCOTUS made a major goof in *Mayo* probably because too many patent law professionals have been overreading *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498 (1874). Analyzing the *Rubber-Tip Pencil* decision can help both to explain the error of *Mayo v. Prometheus* and also to demonstrate that SCOTUS' Alice/Mayo two-part test is basically correct albeit overly complex, something which is corrected in the new guidance.

The patent of the *Rubber-Tip Pencil* decision is US patent no. 66,938 (Blair, *Rubber Head for Lead-Pencils*), which was owned Rubber-Tip Pencil Co. The single Blair '938 claim is alleged to protect aspects of an invention associated with a manufacture or device. Here is the conclusion of the decision.

> Certainly words could hardly have been chosen to indicate more clearly that a patent was not asked for the external form, and it is very evident that the essential element of the invention as understood by the patentee was the facility provided for attaching the head to the pencil. The prominent idea in the mind of the inventor clearly was the form of the attachment, not of the head. If additional proof of this is required, it may be found in the further statement in the specifications, which locates the head for use at or near the end of the pencil, and so made as to surround the part on which it is to be placed and be held thereon by the inherent elasticity of the material of which it is to be composed. If intended for use at any other place than on the end of the pencil, the projections could not be essential, as any form that would surround the part would present the requisite erasive surface.
>
> Again, the head is to have in it longitudinally, a socket to receive one end of a lead pencil or a tenon extending from it. This socket is to be cylindrical or of any other proper shape. Usually, the inventor says, he made it so as to extend part way through the head, but if desirable, it might be extended entirely through. It must be within one end, but any particular location at the end is not made essential. This clearly is no more than providing that the piece of rubber to be used must have an opening leading from one end into or through it. This opening may be of any form and of any extent longitudinally. The form, therefore, of the inside cavity is no more the subject of the patent than the external shape. Any piece of rubber with a hole in it is all that is required thus far to meet the calls of the specifications, and thus far there is nothing new, therefore, in the invention. Both the outside and inside may be made of any form which will accommodate the parties desiring the use.
>
> But the cavity must be made smaller than the pencil and so constructed as to encompass its sides and be held thereon by the inherent elasticity of the rubber. This adds nothing to the patentable character of the invention. Everybody knew when the patent was applied for that if a solid substance was inserted into a cavity in a piece of rubber smaller than itself, the rubber would cling to it. The small opening in the piece of rubber not limited in form or shape, was not patentable, neither was the elasticity of the rubber. What, therefore, is left for this patentee but the idea that if a pencil is inserted into a cavity in a piece of rubber smaller than itself the rubber will attach itself to the pencil, and when so attached become convenient for use as an eraser?
>
> An idea of itself is not patentable, but a new device by which it may be made practically useful is. The idea of this patentee was a good one, but his device to give it effect, though useful, was not new. Consequently he took nothing by his patent.

[The above passage is a sort of first attempt in SCOTUS' patent decisions at articulating a Doctrine of Aggregation.[ii]]

Unfortunately, the claim of US patent no. 66,938 is not a modern format claim.

I claim as a new article of manufacture—
An elastic erasive pencil-head, made substantially in manner as described.

J. B. BLAIR.

Witnesses:
DAN'L M. ZIMMERMAN,
B. A. LATIMER.

SCOTUS seems to be judging a claim, which in modern format might correspond to something like one of the following.

An elastic erasive pencil-head comprising:
an India rubber having:
a solid pencil-head shape into which a circular socket has been substantially drilled so that a lead-pencil can be joined to the elastic erasive pencil-head by inserting one end of the lead-pencil into the socket in an elastic interference fit.

A method for joining a lead-pencil to an elastic erasive pencil-head, the method comprising the steps of:
obtaining an India rubber;

forming the India rubber into a solid pencil-head shape;

substantially drilling a socket so that a lead-pencil can be joined to the India rubber by means of insertion into the socket in an elastic interference fit;

obtaining a lead-pencil having:
a blunt end; and

inserting the blunt end of the lead-pencil into the India rubber's socket in order to join the lead-pencil to the India rubber by means of an elastic interference fit.

An elastic erasive pencil-head for a lead-pencil having:
a straight uniform elongated convex polygon tube shape;

a first tube-terminal end; and

a second tube-terminal end, which can be sharpened to a lead-pencil point,

the elastic erasive pencil-head comprising:
an India rubber having:
a three-dimensional solid pencil-head shape into which a circular socket has beer substantially drilled so that the first-tube terminal end can be joined to the elastic erasive pencil-head by means of insertion into the circular socket in an elastic interference fit, and

a straight uniform elongated tube shape having a straight uniform elongated curved side being defined to be a limiting shape of a geometric sequence of straight uniform elongated convex polygon tube shapes, each successive sequence member of said sequence being a straight uniform elongated convex polygon tube shape having more polygon sides than an immediately preceding member.[xiii]

Possible Modern Format Claims

While the proposed modernized Blair '938 claims[iii,3] are directed to praxis (not an abstract idea) of joining by insertion,[4] they also recite a lead-pencil and an Indian rubber. While one could point out that

3 Note the endnote of the original text (xiii) is reproduced in endnote iii.
4 Praxis is a lot shorter to write than " well-understood, routine conventional activity" or element.

neither a lead-pencil nor an India rubber was novel when the Blair application was filed, novelty and non-obviousness determination is part of patentability analysis and not a part of § 101-eligibility determination.[iv] In modern terminology 1874 SCOTUS found the claim § 101-eligible but not patentable, for Blair's "device to give [his idea] effect, though useful, was not new" because he merely applied praxis to an aggregation.

If we apply the Alice/Mayo two-part test to any proposed modern-form Blair '938 claim, once again we find a claim to a statutory category, which in this case is an article of manufacture or a method. If the Alice/Mayo two-part test had existed in 1874, SCOTUS would have found at Step 2A that the claim was directed somewhat implicitly to praxis, which is "joining by insertion,[5]" while at Step 2B 1874 SCOTUS would have found the recited lead-pencil and the recited India rubber definitely to have constituted something "significantly more" that renders any of the above proposed modern-format claims to be § 101-eligible.

It should now be completely clear that 1874 SCOTUS was complaining that the idea of itself created a distraction from the utter lack of novelty in Blair's invention. 1874 SCOTUS was not asserting that a claim to an idea of itself made the invention § 101-ineligible.

In other words, a claim to a system comprising:

- a lead-pencil;
- an Indian rubber; and
- a socket in the Indian rubber

has no novelty and is totally obvious because of prior-art system comprising:

- a lead-pencil; and
- an Indian rubber.

Adding a limitation of praxis (a well-understood, routine, conventional element) that consists of a socket to enable "joining by insertion" adds nothing to the system to render it patentable. At some point in time both the lead-pencil and also the Indian rubber were patentable. The system comprising:

1. a lead-pencil; and
2. a Indian rubber

probably was never patentable because the new system result was predictable from a combination that was obvious to make.

There is absolutely no need whatsoever to address either the Prometheus or the Blair claims from the standpoint of § 101-eligibility.

5 "Joining by insertion" like "adjusting treatment to patient response" represents "well-understood, routine, conventional activity." In the case of the two device claims, "joining by insertion" is recited as a claim element that characterizes a limitation and not as an explicit limitation.

Praxis: The Fourth Judicial Exception

The first grouping in the list of Groupings of Abstract Ideas 2019 Revised Patent Subject Matter Eligibility Guidance makes sense. Mathematical ideas are obviously abstract ideas. The other two groupings:

- certain methods of organizing human activity (hedging, insurance, mitigating risk, … following rules or instruction) and
- mental processes (observation [e.g. of temperature], evaluation [e.g. of completion of vulcanization process], judgment, opinion, etc.)

might be mathematical, or for the purposes of prosecutions be considered obvious or self-evident praxis ("well-understood, routine, conventional activity" or elements).

While it is not clear that the distinction between praxis and organizational methods or mental processes is always significant, SCOTUS – in addition to breaking the patent system with *Mayo v. Prometheus* – seems – without having told anyone – to have introduced a fourth judicial exception: **a well-understood, routine, conventional activity/functionality**. SCOTUS probably did not want to scare the IP community by using the more succinct Greek term, which is praxis (πρᾶξις: conventional practical activity or functionality) and which I have been using because typing the phrase well-understood, routine, conventional activity etc. drives me insane.

Thanks to clarification and elaboration in *Berkheimer v. HP* there are now four unclaimable judicial exceptions: natural law, natural phenomena, abstract idea, and praxis. Abstract idea should really be confined to mathematics. The praxis judicial exception differs from the other three exceptions because according to *Berkheimer v. HP* praxis requires factual determination. That requirement makes sense. Something that is conventional in one art may not be conventional in another art.

For example, a non-volatile memory provides a conventional functionality (praxis) in a CRM claim. The non-volatile memory becomes unconventional after it is programmed with instructions or data.

To a EE doing research in AI, a non-volatile memory is a conventional element (praxis).

To a life scientist doing research in AI, a non-volatile solid state memory probably would not be a conventional functionality. More to the point, a biological non-volatile memory might be a bio-organic membrane-based system that provides long-term memory functionality in a bio-organic membrane-based quantum computer that uses qusyms instead of qubits. Such a biological non-volatile memory would certainly not be providing a conventional functionality today (although the situation will probably be different 100 years in the future).

Key Holding in Berkheimer

This passage from *Berkheimer* introduces the need for factual determination to determine whether a claim recites more than praxis.

> Claims 4–7, in contrast, contain limitations directed to the arguably unconventional inventive concept described in the specification. Claim 4 recites "storing a reconciled object structure in the archive without substantial redundancy." The specification states that storing object structures in the archive without substantial redundancy improves system operating efficiency and reduces storage costs. '713 patent at 16:52–58. It also states that known asset management systems did not archive documents in this manner. *Id.* at 2:22–26. Claim 5 depends on claim 4 and further recites "selectively editing an object structure, linked to other structures to thereby effect a one-to-many change in a plurality of archived items." The specification states one-to-many editing substantially reduces effort needed to update files because a single edit can update every document in the archive linked to that object structure. *Id* at 16:58–60. This one-to-many functionality is more than "editing data in a straightforward copy-and-paste fashion," as characterized by the district court. *Berkheimer*, 224 F. Supp. 3d at 645. According to the specification, conventional digital asset management systems cannot perform one-to-many editing because they store documents with numerous instances of redundant elements, rather than eliminate redundancies through the storage of linked object structures. '713 patent at 1:22–55, 4:4–9, 16:52–60.

Claims 6–7 depend from claim 5 and accordingly contain the same limitations. These claims recite a specific method of archiving that, according to the specification, provides benefits that improve computer functionality.

HP argues that redundancy and efficiency are considerations in any archival system, including paper-based systems. The district court agreed. *Berkheimer*, 224 F. Supp. 3d at 647. At this stage of the case, however, there is at least a genuine issue of material fact in light of the specification regarding whether claims 4–7 archive documents in an inventive manner that improves these aspects of the disclosed archival system. Whether claims 4–7 perform well-understood, routine, and conventional activities to a skilled artisan is a genuine issue of material fact making summary judgment inappropriate with respect to these claims.

We do not decide today that claims 4–7 are patent eligible under § 101. We only decide that on this record summary judgment was improper, given the fact questions created by the specification's disclosure.

CONCLUSION

For the foregoing reasons, we affirm the district court's decision that claims 10–19 of the '713 patent are invalid as indefinite and its grant of summary judgment that claims 1–3 and 9 of the '713 patent are ineligible under 35 U.S.C. § 101. We vacate the district court's grant of summary judgment that claims 4–7 are ineligible under § 101 and remand for further proceedings.

Here are claims 1, 4–7 from US patent no. 7,447,713 (Berkheimer, *System and method for archiving and outputting documents or graphical items*). Claims 4–7 should have been included in the text of the CAFC *Berkheimer* decision.

1. A method of archiving an item comprising in a computer processing system:

presenting the item to a parser;

parsing the item into a plurality of multi-part object structures wherein portions of the structures have searchable information tags associated therewith;

evaluating the object structures in accordance with object structures previously stored in an archive;

presenting an evaluated object structure for manual reconciliation at least where there is a predetermined variance between the object and at least one of a predetermined standard and a user defined rule.

4. The method as in claim 1 which includes storing a reconciled object structure in the archive without substantial redundancy.

5. The method as in claim 4 which includes selectively editing an object structure, linked to other structures to thereby effect a one-to-many change in a plurality of archived items.

6. The method as in clam **5** which includes compiling an item to be output from the archive, wherein at least one object-type structure of the item has been edited during the one-to-many change and wherein the compiled item includes a plurality of linked object-type structures converted into a predetermined output file formal.

7. The method as in claim 6 which includes compiling a plurality of items wherein the at least one object-type structure had been linked in the archive to members of the plurality.

A (substantially defined) data structure stored in memory (or storing a substantially defined data structure in memory) may go beyond praxis and render a claim § 101-eligible. Demonstrating § 101-eligibility of a computer program stored in memory seems much harder. This deserves elaboration and any supplemental guidance would be helpful to stakeholders.

§ 101-Eligibility and Patentability of a Data Structure Stored in Memory

Why might a memory containing a data structure be § 101-eligible and patentable? It seems to be a curious notion and may cause some of the push-back against those patents claimed to be software patents. The reasoning seems analogous to that found in MPEP 2164.01(b) How to Make the Claimed Invention [R-08.2012].

> Naturally, for unstable and transitory chemical intermediates, the "how to make" requirement does not require that the applicant teach how to make the claimed product in stable, permanent or isolatable form. *In re Breslow*, 616 F.2d 516, 521, 205 USPQ 221, 226 (CCPA 1980).

Why is *In re Breslow* relevant? When Tommy Flowers first began to build logic circuits at the beginning of the twentieth century (with tubes and not with transistors), he introduced the possibility of a new class of potentially § 101-eligible structure built from logic states of elements included in electrical circuits. These logic state structures in some sense live on top of the basic electrical or electronic circuits. The combinations of logic states have similarities to chemical compounds, and in justifying patent claims that refer to software(-like) data structures or to software(-like) routines, it may be helpful to think with reasoning analogous to that underlying claims found in chemical, biochemical, and pharmaceutical patents.

Neither the MPEP nor the courts (nor the EPO, which has an extremely broken concept of a software patent) have explained what a software patent really is or would be. While I could produce a treatise to explain invention at the gate level, I doubt anyone at the USPTO or EPO would want to read it. For those not interested in reading up on some very basic digital electronics, the following is the punchline of the treatise that I might write.

A correctly written software patent is shorthand for a tremendous amount of structure comprising states of basic digital elements called gates. Including all those digital elements and their states in attempt to provide enablement at the lowest digital circuit level would provide the exact opposite of a clear and concise specification. In addition, the definition of the metes and bounds of the invention in such a low level claim would be unclear both to the hardware engineer (probably not the PHOSITA) and also to the software engineer (probably the PHOSITA). Specification of inputs and outputs, flow diagrams, and memory structures constitute one way of reasonably specifying the metes and bounds of a claim. The memory structures of the program are roughly analogous to the transitory but well-defined chemical intermediates of MPEP 2164.01 (b).

An in-memory software data structure invention is shorthand way of describing the novel and non-obvious structure of an intermediate electronic gate array circuit state.

A computer program itself is also an in-memory software data structure as a processor executes it, but source code of a high-level program may prove to be both too specific to encompass the invention

adequately and also simultaneously so indefinite that it pertains to embodiments of the invention that the inventor does not possess. Genetic and amino acid sequences can suffer from similar problems when an inventor attempts to claim a biotech, biochemical, or pharmaceutical invention.

It is not impossible that someone will find a way to claim a computer program simply stored in memory. The family of LISP programming languages do not really distinguish between data structures and program structures. If a LISP program could be claimable as a program/data structure stored in memory, one could envision the claiming of an in-memory program written in another language if the language compiler is somehow incorporated in the claims.

The CAFC points out with *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) that a digital computer (a program-executing device) in the role of a component combined with software in the role of a component can interchange with discrete digital components. Possibly an ASIC (Application Specific Integrated Circuit) or an FPGA (Field Programmable Gate Array) into which logic has been synthesized can also substitute for a computer in the role of a component combined with software in the role of a component.

An ASIC and FPGA designer will say that he programs either an ASIC or an FPGA. Yet compiling a software program to run on a computer system and synthesizing logic into a Integrated Circuit (IC) are very different operations.

An ASIC or FPGA-based invention in most cases comprises both circuit-level structure and also logic-state level structure.

While historically a typical VHSIC (Very High Speed Integrated Circuits) has not comprised a processor core+memory, recently it has become more common to synthesize an ASIC or an FPGA with such a core that can be associated with memory. After synthesis the final programmed IC effectively includes a program-executing device. Such a program-executing device could be described to act like an active substrate comparable to the passive substrate of Printed Matter Doctrine. In claiming a programmed ASIC or FPGA, the inventor needs to supply:

- a high-level logic description, which may look like a software program;
- detailed description of IC inputs and outputs; and also
- internal structure or register descriptions.

One is unlikely to use much in the way of analog mechanical logic today, but it is worth mentioning that a non-infringing substitute for the invention described in US patent no. 4344142 A (*Direct digital control of rubber molding presses*), which is the subject of *Diamond v. Diehr*, 450 U.S. 175 (1981), could probably have been created from several materials, each of whom expanded according to different factors on heating or each of whose resistance changed by different amounts according to temperature.

(A earlier patent to such an invention exists. Gould 3,718,721 entitled *Method for controlling the state of cure of curable articles* discloses an invention comprising a method for controlling curing state.

Gould uses a combination of a digital computer with an analog computer. Before digital computers became so fast, analog computers were often employed in situations where it was needed rapidly to solve a problem or to make a determination. Thus, while Gould ‘721 seems to anticipate Diehr ‘142, it does not, because the two technologies are very different, and at the time many doubted whether digital control of the molding process could be fast enough.)

Combinations comparable to the most complex logic system synthesized into an ASIC or into a FPGA exist in pharmacology, in biotechnology, and in biochemistry. A new class of technology combines technologies of the biologic arts with technologies of the digital electronic arts.

Patent Prosecutors May Have to Be as Inventive as Inventors

The Courts tell us that a claimable software invention for a program-executing device should should provide improvement in the functioning of computing system. Claims are allowed that describe novel and non-obvious processes to refine materials. Why should a claim not be allowed that describes a novel and non-obvious process to refine and improve information?

Sir Alec Jeffreys' genetic fingerprinting method claims in US 5175082 and in US 5413908 encompass a transformation of ordinary genetic information gathered by standard detection techniques into a refined conceptual combination that has new meaning as a genetic fingerprint.

It is probably water under the bridge, but the decision in *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371 (Fed. Cir. 2015) seems wrong because the Sequenom invention produced improved or refined diagnostic information through a better noninvasive technique.

It should be possible to go beyond obvious praxis (or if one prefers certain methods of organizing activity, e.g., hedging or mitigating risk) by moving into another technological art (a hedging claim could be presented in terms of playing a game against the market) or by claiming the claimable in-memory data structure enabling risk-mitigation if said data structure has a novel non-obvious aspect of the sort that requires factual determination according to *Berkheimer* to determine whether or not it might represent praxis.

The patent prosecutor and the examiner both should keep in mind that a computer function implementing a mathematical formula is not a mathematical formula but a specification for a sequence of logic states that can produce a result.

It might be helpful if someone at the USPTO reviewed the above for correctness and decided whether supplemental guidance is worthwhile.

i Judge Plager's comments from INTERVAL LICENSING LLC v. AOL, INC. are worth reproducing.

II. Inventive Concept

Having determined the claims at issue to be directed to nothing more than 'abstract ideas,' the majority opinion, following the *Alice* analysis, segues to "*Alice* Step 2: Inventive Concept." Here the court explores whether the invention's claims, determined in Step 1 to be abstract, are not really abstract because they limit the abstractness by an 'inventive concept.' In the case before us, no such concept is seen; the trial court's determination of fatal abstraction is affirmed.

A small puzzle—if a court, after reviewing challenged claims in light of their terminology and written description, determines the claims to be 'abstract' in Step 1, how can the same court be expected to determine on a second reading that the same claims have become 'un-abstract' via Step 2? Could it be that an 'inventive concept' cannot exist until the court reads the patent at least one more time? Perhaps courts cannot be expected to read the claims carefully enough the first time?

A bigger puzzle regarding the 'inventive concept' concept: Those who are familiar with the history of the Patent Act, when in 1952 the law of patenting was given a major statutory overhaul, will be the most puzzled. Is it the case that now, some 65 years later, we really have resurrected the concept of an 'inventive concept'?[13] The late Judge Giles Rich, the grand old man of patent law, whose portrait hangs in the place of honor in the Federal

Circuit courthouse—how can he rest in peace? He was one of the acclaimed authors of the new Patent Act. At the time he, along with many others, thought that the undefinable—truly abstract—concept of 'inventive concept' had been put into the dustbin of history by the specific criteria for a valid patent in the new Patent Act, specifically § 103, non-obvious subject matter.

Judge Rich wrote extensively on the point. *See, e.g.*, Giles S. Rich, *Laying the Ghost of the "Invention" Requirement*, 1 APLA Q.J. 26 (1972); Giles S. Rich, *The Vague Concept of "Invention" as Replaced by Sec. 103 of the 1952 Patent Act*, 46 J. Pat. Off. Soc'y 855 (1964).[14] In his 1964 article, based on a speech he gave twelve years after the statutory changes were enacted, Judge Rich reviewed the long and sorry history during the 19th century of the "injection into the law of what has ever since been called the 'requirement for invention.'" 46 J. Pat. Off. Soc'y at 860. "This proliferation of views on what did and did not amount to 'invention' went on for 100 years. We were enlightened with the view that 'invention' resulted from the exercise of the 'inventive faculties' and other circular reasoning." *Id.* He attributed this development to an 1851 Supreme Court case, *Hotchkiss v. Greenwood*, 52 U.S. 248 (1851), and noted that "[a]s is usual with a 'doctrine' derived from a court opinion, the doctrine persists while the facts out of which it arose are forgotten." *Id.* at 859–60.

Judge Rich bemoaned the fact that, even after the statutory enactment of § 103 of the Patent Act, some still used the meaningless 'invention' or 'inventive requirement' phrase. He concluded his article with a series of propositions to reinforce "that when 103 has been complied with, there is no further and different requirement called 'invention'; that compliance with 103 is the policy judgment of Congress on how to bring the invention within the Constitutional purpose." *Id.* at 875.

Without referring to this history, the Supreme Court in *Alice* instructed that we ask whether there is such structure or something in the patent claim(s) that recites an 'inventive concept' "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself." *Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 73). Beyond the question of ultimate meaning of the 'inventive concept' phrase, other questions abound. When we search for this significantly more 'inventive concept,' are we limited to the limitations of a particular claim in the patent? If not limited to the limitations in the individual claim, then what? Do the written description and the scope of other claims in the patent come into play, as perhaps they did in Step 1?

And adding a little more complexity to the matter, the Supreme Court has recognized that "[a]t some level, 'all inventions . . . embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.'" *Id.* at 2354 (quoting *Mayo*, 566 U.S. at 71). With that in mind, we are left to ponder at what level of abstraction do we focus—put another way, how deep into the 'elements' do we dig when we search for that which is not 'abstract,' or for that non-abstract combination that saves an otherwise 'abstract idea' patent claim?

When the 'abstract idea' notion appeared in the law back in the 19th century, the requirement for 'invention'

in its many variants—currently 'inventive concept'—was also part of patent law. Then, as now, it seemed logical that something claiming to be an invention should have something called an 'inventive concept' at its core. And as a literary construct that is unexceptional.

As a decisional construct for validation of a property right—a patent—the idea of a necessarily underlying 'inventive concept' proved unworkable. The concept provided no discernable boundaries for decision-making in specific cases, resulting in an incoherent legal rule that led to arbitrary outcomes. Judge Rich, who devoted his life to patent law, saw this clearly, and gave the Congress a workable alternative—nonobvious subject matter—which they adopted.

The modern Supreme Court inherited this body of formulaic doctrine, and we now expect the Court to make sense of it. That they have failed is less a commentary on their efforts than on the absence of recognition of the problem on the part of the lawyers and judges who continue to treat these doctrines as if they were gospel.[15]

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[13] Some authorities attribute the resurrection of 'inventive concept' to *Mayo*, and to Justice Stevens in his earlier opinion in *Parker v. Flook*, 437 U.S. 584 (1978). For the history buffs, see Jeffrey A. Lefstin, *Inventive Application: A History*, 67 Fla. L. Rev. 565, 572–77 (2015).

[14] *See also In re Bergy*, 596 F.2d 952, 959–64 (CCPA 1979), *vacated in part sub nom. Diamond v. Chakrabarty*, 444 U.S. 1028 (1980), *and aff'd sub nom. Diamond v. Chakrabarty*, 447 U.S. 303 (1980); Giles S. Rich, *Why and How Section 103 Came to Be*, *in* Nonobviousness—The Ultimate Condition of Patentability 1:201 (John F. Witherspoon ed., 1980); Giles S. Rich, *Principles of Patentability*, 28 Geo. Wash. L. Rev. 393 (1960).

15 See Amy L. Landers, *Patentable Subject Matter as a Policy Driver*, 53 Hous. L. Rev. 505, 517–18 (2015) ("Like an ice sculpture that is shaped by the parts that have been chipped away, the legal definition of invention is shaped by its exceptions. Decisions lack clarity. Their reasoning rests heavily on a limited field of precedent that is, in turn, written in opaque terms during a different technological era." (footnote omitted)), and sources cited therein.

ii See Patent Eligibility as a Function of New Use, Aggregation, and Preemption through Application of Principle by N. Scott Pierce. Pierce discusses *Reckendorfer v. Faber*, 92 U.S. 347 (1875) in which SCOTUS seems to address the same issue that lay at the heart of *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498 (1874). By returning to essentially the same controversy, SCOTUS was able to rearticulate itself more clearly. Here is the critical passage.

> The combination, to be patentable, must produce a different force or effect or result in the combined forces or processes from that given by their separate parts. There must be a new result produced by their union; if not so, it is only an aggregation of separate elements. An instance and an illustration are found in the discovery that, by the use of sulphur mixed with india-rubber, the rubber could be vulcanized, and that without this agent the rubber could not be vulcanized. The combination of the two produced a result or an article entirely different from that before in use. Another illustration may be found in the frame in a saw mill which advances the log regularly to meet the saw, and the saw which saws the log; the two cooperate and are simultaneous in their joint action of sawing through the whole log; or in the sewing machine, where one part advances the cloth and another part forms the stitches, the action being simultaneous in carrying on a continuous sewing. A stemwinding watch key is another instance. The office of the stem is to hold the watch, or hang the chain to the watch; the office of the key is to wind it. When the stem is made the key, the joint duty of holding the chain and winding the watch is performed by the same instrument. A double effect is produced or a double duty performed by the combined result. In these and numerous like cases, the parts cooperate in producing the final effect, sometimes simultaneously, sometimes successively. The result comes from the combined effect of the several parts, not simply from the separate action of each, and is therefore patentable.
>
> In the case we are considering, the parts claimed to make a combination are distinct and disconnected. Not only is there no new result, but no joint operation. When the lead is used, it performs the same operation and in the same manner as it would do if there were no rubber at the other end of the pencil; when the rubber is used, it is in the same manner
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> and performs the same duty as if the lead were not in the same pencil. A pencil is laid down and a rubber is taken up, the one to write, the other to erase; a pencil is turned over to erase with, or an eraser is turned over to write with. The principle is the same in both instances. It may be more convenient to have the two instruments on one rod than on two. There may be a security against the absence of the tools of an artist or mechanic from the fact that the greater the number, the greater the danger of loss. It may be more convenient to turn over the different ends of the same stick than to lay down one stick and take up another. This, however, is not invention within the patent law, as the authorities cited fully show. There is no relation between the instruments in the performance of their several functions, and no reciprocal action, no parts used in common.

iii According to Wikipedia "[an] interference fit, also known as a press fit or friction fit is a fastening between two parts which is achieved by friction after the parts are pushed together, rather than by any other means of fastening." The interference fit is standardized as an engineering fit by ANSI and ISO.

The phrase “a straight uniform elongated tube shape having a straight uniform elongated curved side being defined to be a limiting shape of a geometric sequence of straight uniform elongated convex polygon tube shapes, each successive sequence member of said sequence being a straight uniform elongated convex polygon tube shape having more polygon sides than an immediately preceding member” is a compound nominative absolute phrase and is meant to forestall need to apply the Doctrine of Equivalents in an infringement proceeding. The judge-made law Doctrine of Equivalents was first enunciated in *Winans v. Denmead*, 56 U.S. 330 (1853) and was applied to a limit of a sequence of frustum shapes. This local definition via nominative absolute phrase may not successfully obviate need for Doctrine of Equivalents.

With a reasonable explanation, an examiner probably would not reject this sort of embedded definition according to MPEP 2173.05(m) Prolix [R-08.2012].

iv The method of using rubber to erase a pencil mark was first identified in 1770 almost 100 years before the Blair application. The vulcanization process for rubber that made an India rubber possible was not invented until 1839. Thus the vulcanized India rubber was already almost 30 years old at the time of the Blair application. The modern lead-pencil is a French invention developed in focused military research during the Napoleonic Wars when Britain ceased to sell pencils to France. Thus the modern lead-pencil was almost 50 years old when Blair applied for his patent. See *The Pencil: A History of Design and Circumstance* by Henry Petroski.