Legal Analysis to Support Proposed Examination

Guidelines for Computer-Implemented Inventions

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**Legal Analysis to Support Proposed Examination Guidelines
for Computer-Implemented Inventions**

I.   Introduction [Guidelines § I.A.]

The Office has developed *Proposed Examination Guidelines for Computer-Implemented Inventions*[1] and this legal analysis (collectively, the "guidelines") to assist Office personnel in the examination of applications drawn to computer-implemented inventions. The guidelines are based on the Office's current understanding of the law, and represent the official policy of the Patent and Trademark Office. Office personnel are to rely on these guidelines in the event of any inconsistent treatment of issues between these guidelines and any earlier provided guidance from the Office.

The guidelines alter the procedures Office personnel shall employ to examine applications drawn to computer-implemented inventions. The guidelines also clarify the Office's position on certain patentability standards related to this field of technology. The positions set forth in these guidelines are believed to be fully consistent with the binding precedent of the Supreme Court, and the Federal Circuit and its predecessor courts.

The Freeman-Walter-Abele[2] test, while of limited value, may still be relied upon in analyzing claims directed solely to a process for solving a mathematical algorithm. "Business methods" are to be analyzed the same way as any other process.

The appendix includes the proposed guidelines and a graphic overview of how Office personnel will conduct an examination to determine statutory subject matter.

II.   Determine What Applicant Has Invented and Is Seeking to Patent [Guidelines § I.B.1.]

It is essential that patent applicants obtain a prompt yet complete examination of their applications. Thus, Office personnel must raise any issue that may affect patentability in the initial action on the merits. Under the principles of compact prosecution, each claim should be reviewed for compliance with every statutory requirement of patentability in the initial review of the application, even if one or more claims is found to be deficient with respect to one statutory requirement. Deficiencies should be explained clearly, particularly when they serve as a basis for a rejection. Where possible, Office personnel should indicate how rejections may be overcome and problems resolved. A failure to follow this approach can lead to unnecessary delays in the prosecution of the application.

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Prior to focusing on any specific statutory requirements, Office personnel must begin examination by determining what, precisely, the applicant has invented and is seeking to patent,[3] and how the claims relate to and define that invention. Consequently, Office personnel will no longer begin examination by determining if a claim recites a "mathematical algorithm." Rather, they will review the complete specification, including the detailed description of the invention, any specific embodiments that have been disclosed, the claims and the specific utility that has been asserted for the invention.

A. Identify and Understand the Practical Utility Asserted for the Invention [Guidelines § I.B.1.(a)]

The subject matter sought to be patented must be a "useful" process, machine, manufacture or composition of matter. Accordingly, a complete disclosure should contain some indication of why the applicant believes the claimed invention is "useful." This "usefulness" of the invention is called the "specific" or "practical" utility of the invention. Specific or practical utility is simply a shorthand way of attributing "real world" value to the claimed subject matter, i.e., assuring there is some benefit to the public.[4] An invention that has some practical application satisfies the utility requirement.[5]

The applicant is in the best position to explain why an invention is believed useful. Office personnel should therefore focus their efforts on identifying statements made in the specification that identify a practical application for the invention. Office personnel should rely on such statements throughout the examination when assessing the invention for compliance with all statutory criteria. Deficiencies under the utility requirement will be rare, however. Further guidance in evaluating an asserted specific utility for compliance with § 101 is provided below and in the Utility Examination Guidelines.[6]If the applicant asserts a practical utility for the invention, Office personnel should review the entire disclosure to determine the features necessary to accomplish the asserted practical utility.

B. Review the Detailed Disclosure and Specific Embodiments of the Invention to Determine What the Applicant Has Invented [Guidelines § I.B.1(a)]

The written description will provide the clearest explanation of the applicant's invention, by exemplifying the invention, explaining how it relates to the prior art and by explaining the relative significance of various features of the invention. Accordingly, Office personnel should begin their evaluation of a computer-implemented invention as follows:

-   determine what the programmed computer does when it performs the processes dictated by the software (i.e., the *functionality* of the programmed computer);[7]

-   determine how the computer is to be configured to provide that functionality (i.e., what elements constitute the programmed computer and how are those elements to be configured to provide the specified functionality); and

-   if applicable, determine the *relationship* of the programmed computer to other subject matter that constitutes the invention (e.g., machines, devices, materials, or process steps other than those that are part of or performed by the programmed computer).[8]

Patent applicants can assist the Office by preparing applications that clearly set forth these aspects of a computer-implemented invention.

C.   Analyze the Claims [Guidelines § I.B.1.(b)]

The claims define the property rights provided by a patent, and thus require careful scrutiny. The goal of claim analysis is to identify the boundaries of the protection sought by the applicant and to understand how the claims relate to and define what the applicant has indicated is the invention. Office personnel must analyze the language of a claim *before* determining if the claim complies with each statutory requirement for patentability.

Office personnel should begin claim analysis by identifying and evaluating each claim element. For processes, the claim elements will define steps or acts to be performed. For products, i.e., machines and articles of manufacture, the claim elements will define discrete physical structures. The discrete physical structures may be comprised of hardware or a combination of hardware and software.

As provided in the guidelines, Office personnel are to correlate each claim element to that portion of the disclosure that describes the claim element. This is to be done in all cases, i.e., whether or not the claimed invention is defined using means or step plus function language. The correlation step will ensure that Office personnel clearly understand the meaning and scope of each claim limitation.

The subject matter of a properly construed claim is defined by the terms that limit its scope, and it is this subject matter that must be examined. As a general matter, the grammar and intended meaning of terms used in a claim will dictate whether the language limits the claim scope. Language that *suggests or makes*

optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim element.

Office personnel must rely on the applicant's disclosure to properly determine the meaning of terms used in the claims.[9] An applicant is entitled to be his or her own lexicographer, and in many instances will provide an explicit definition for certain terms used in the claims. Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim. Office personnel should determine if the original disclosure provides a definition consistent with the applicant's assertions.[10] If the applicant asserts that a term has a meaning that conflicts with the term's art-accepted meaning, Office personnel should encourage the applicant to amend the claim to better reflect what applicant intends to claim as the invention.

Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure.[11] With the exception of claim elements defined in means or step plus function terminology, positive limitations on the scope of a claim cannot be read into the claims based on comments or explanations provided in the disclosure.[12] While it is appropriate to use the specification to determine what applicant intended a term to mean, a positive limitation from the specification cannot be read into a claim that does not impose that limitation. A broad interpretation of the claims by the Office will reduce the possibility that the claim, when issued, will be interpreted more broadly than is justified or intended. An applicant always has the opportunity to amend the claims during prosecution to better reflect the intended scope of the claim.

Finally, when evaluating the scope of a claim, *every* limitation in the claim must be considered.[13] Office personnel may not dissect a claimed invention into discrete elements and then evaluate the elements *in isolation*. Instead, each claimed element of the invention must be considered in the context of the claim as a whole.

III. Assess Claimed Invention for Compliance with 35 U.S.C. § 101 [Guidelines § I.B.1.(c)]

As the Supreme Court has held, Congress chose the expansive language of § 101 so as to include "anything under the sun that is made by man."[14] Accordingly, § 101 of title 35, United States Code, provides:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new

and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.[15]

As cast, § 101 defines four categories of inventions that Congress deemed to be the appropriate subject matter of a patent; namely, processes, machines, manufactures or compositions of matter. The latter three categories define "things" while the process category defines inventions that consist of "actions" (i.e., a series of steps or acts to be performed).[16]

Federal courts have held that § 101 does have certain limits. First, the phrase "anything under the sun that is made by man" is limited by the text of § 101, meaning that one may only patent something that is a machine, manufacture, composition of matter or a process.[17] Second, § 101 requires that the subject matter sought to be patented be a "useful" invention. Accordingly, a complete definition of the scope of § 101, reflecting Congressional intent, is that any new and useful process, machine, manufacture or composition of matter under the sun that is made by man is the proper subject matter of a patent. Subject matter *not* within one of the four statutory invention categories or which is not "useful" in a patent sense, accordingly, is not eligible to and cannot be patented.

The subject matter courts have found to be outside the four statutory categories of invention is limited to abstract ideas, laws of nature and natural phenomena. While this is easily stated, determining whether an applicant is seeking to patent an abstract idea, a law of nature or a natural phenomenon has proven to be challenging. These three exclusions recognize that subject matter that is not a *practical application or use* of an idea, a law of nature or a natural phenomenon is not patentable.[18]

Courts have expressed a concern over "preemption" of ideas, law of natures or natural phenomena.[19] The concern over preemption serves to bolster and justify the prohibition against the patenting of such subject matter. Such concerns are only relevant to claiming a scientific truth or principle. Thus, a claim to an "abstract" idea is non-statutory because it does not represent a practical application of the idea, not because it would preempt the idea.

A. Determine Whether The Invention is "Useful"

To be patentable, an invention must be "useful" (i.e., it must have a practical application). The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research.[20] The utility of an invention must be within the "technological" arts.[21] This

requirement can be discerned from the variously phrased prohibitions against the patenting of abstract ideas, laws of nature or natural phenomenon. Courts have indicated that any technological or utilitarian purpose may serve as an appropriate utility.[22]

Office personnel should confirm that the utility asserted for an invention is a practical application of the invention. If the utility of an "invention" is only as an object of philosophical inquiry or to be appreciated in terms of its literary or artistic value, the claimed invention should be rejected under § 101.

Additionally, Office personnel have struggled with claims directed to methods of doing business. A method of doing business is to be treated like any other process.

B.   Classify the Invention as to Its Proper Statutory Category

To properly assess compliance with the statutory invention requirements of § 101, Office personnel should classify each specifically claimed invention into *one* statutory or non-statutory category. If the subject matter falls into a non-statutory category, that should not preclude complete examination of the application for all other conditions of patentability. This classification is *only an initial finding* at this point in the examination process that will be again assessed after the examination for compliance with §§ 112, 102 and 103 and before issuance of any Office action.

1.   Non-Statutory Subject Matter [Guidelines § I.B.1.(c)(i) & (ii)]

Claims that are clearly non-statutory are those that define:

--   a "data structure" per se or computer program per se, i.e., information rather than a computer-implemented process or specific machine or computer readable memory manufacture;

--   a compilation or arrangement of non-functional information or a known machine-readable storage medium that is encoded with such information;

--   natural phenomena such as electricity and magnetism.

Claims in this form are indistinguishable from abstract ideas, laws of nature and natural phenomena and may not be patented. Claims to processes that do nothing more than solve mathematical problems or manipulate abstract ideas or concepts are more complex to analyze and are addressed below. See section 3.

(a) "Data Structures" Per Se or Computer Programs Per Se

Computers manage data by arranging the data in a particular order or sequence. The relationship that exists among the ordered data elements (i.e., the individual facts or data) is called a "data structure." Data structures in this sense are not statutory products because they are not physical "things" nor are they statutory processes, as they are not "acts" being performed.[23] In other words, when defined without any physical structure, a "data structure" is nothing more than *information* that explains a relationship that exists among ordered data, and therefore is non-statutory. In contrast, a memory circuit whose structure represents a *practical application or* use of a data structure is a statutory manufacture. Accordingly, it is important to distinguish claims that define information *per se* from claims that define statutory inventions that are based on or use non-statutory information.

Similarly, computer programs per se are not physical "things," nor are they statutory processes, as they are not "acts" being performed. In contrast, a computer process that is implemented using a computer program, a specific computer reconfigured by a computer program, or a memory circuit whose structure is defined by a computer program are statutory.

If a computer program is recited in a claim, Office personnel should determine if the computer program is being used to *describe* the physical structure of a manufacture or machine, or steps to be performed by a computer, or is intended to be the object of the patent, *per se.*

If it is clear that the claim uses the computer program elements to define actions to be performed by a computer, Office personnel should treat the claim as a process claim. If the computer program elements are recited in conjunction with a physical structure, such as a computer memory, the claim should be treated as a product claim. If the claimed subject matter cannot be treated as a process and does not have any *physical* structure, then it is non-statutory "information."

If an applicant challenges the Office's classification of a claim containing computer program elements without any physical structure as a process rather than a product, the claim should be rejected under § 101. Office personnel should also object to the specification under 37 CFR 1.71(b) if such an assertion is made, as the complete invention contemplated by the applicant has not been cast precisely as being an invention within one of the statutory categories.

(b) Non-Functional Information

The term "information" is the "communication of data." It is also used to mean signals representing data. It is the latter definition that is used in these guidelines.

Certain information, such as music, literature, art, and photographs, as well as mere facts or data,[24] cannot impart functionality to a computer. Such "information" is not a process, machine, manufacture or composition of matter.

The policy that precludes the patenting of non-functional data would be easily frustrated if the same data could be patented as an article of manufacture. For example, music is commonly sold to consumers in the format of a compact disc. In such cases, the known compact disc acts as nothing more than a carrier for non-functional data.

The non-functional content (e.g., words, images, or other information) cannot provide the practical utility for the manufacture. Function-imparting information is necessary to create a functional and useful physical manufacture (e.g., a computer memory encoded with data that causes a computer to function in a particular manner). If the utility for the encoded medium is dependent upon a human appreciating the artistic or other value of the information content, the claimed invention should be rejected under § 101.

(c) Natural Phenomena Such as Electricity and Magnetism

Claims that recite nothing but the physical characteristics of a form of energy, such as a specific radio frequency, voltage, or the strength of a magnetic field, define energy or magnetism, *per se*, and as such are non-statutory. A claim directed to a natural phenomenon such as energy or magnetism, which does not recite the practical application of that phenomenon in a process or a product, is to be rejected under § 101.

2. Statutory Subject Matter

(a) Statutory Products

If a claim defines a useful machine or manufacture by identifying the physical structure of the machine or manufacture in terms of its hardware or hardware and software combination, it defines a statutory product.[25]

(i) Product Claims--Claims Directed to Machines and Manufactures

Claims that define a computer-implemented invention as a specific machine or article of manufacture must define the

physical structure of the machine or manufacture in terms of its hardware and associated functional software. The applicant may define the physical structure of a programmed computer or its hardware or software components in any manner that can be clearly understood by a person skilled in the relevant art. Generally a claim drawn to a particular programmed computer should identify the elements of the computer and indicate how those elements are configured in either hardware or a combination of hardware and software.

A computer-related "manufacture" will typically be a component of a specific computer, such as a logic circuit or a computer memory. A manufactured computer memory containing a physical structure representing encoded computer-readable instructions, such as a computer program, is a statutory article of manufacture because the encoded computer-readable instructions give the manufactured memory a new form or structure, and new qualities or properties (e.g., the ability to cause a computer to function in a particular, predefined manner).

To adequately define a computer memory with a particular functionality, the claim must identify the physical characteristics of the memory (e.g., a logic circuit or a storage medium), and the functionality of the memory. A computer memory may be defined in a claim as:

- a logic circuit that results when a programmed computer performs a series of steps dictated by a computer program;[26]

- a memory defined by its functional and/or structural characteristics;[27] or

- a memory whose physical structure is defined by the act of storing computer-executable program code on the memory.

(ii) Claims that Encompass Any Machine or Manufacture Embodiment of a Process

A claim cast in product claim format that, when read in light of the specification, encompasses *any* computer implementation of a process should be examined on the basis of the underlying process. Such a claim can be recognized as it will:

- define the physical characteristics of a computer or computer component exclusively as functions or steps to be performed on or by a computer, and

- encompass *any* product in the stated class (e.g., computer, computer-readable memory) *configured in any manner* to perform that process.

The following hypotheticals illustrate this distinction.

Assume two applicants present a claim to the following process:

A process for determining and displaying the structure of a chemical compound comprising:

(a) solving the wavefunction parameters for the compound to determine the structure of a compound;

(b) displaying the structure of the compound determined in step (a).

In addition, each applicant claims an apparatus, and provides the noted disclosure to support the claims.

	Applicant A	Applicant B
Apparatus Claim	A computer system for determining the three dimensional structure of a chemical compound comprising: (a) means for determining the three dimensional structure of a compound; (b) means for creating and displaying an image representing a three-dimensional perspective of the compound.	A computer system for determining the three dimensional structure of a chemical compound comprising: (a) means for determining the three dimensional structure of a compound; (b) means for displaying the structure of the compound determined in step (a).

Disclosure	The disclosure describes computer program code segments that are to be employed in configuring a general purpose microprocessor to create specific logic circuits. These circuits are indicated to be the "means" corresponding to the claimed means elements.	This disclosure states that it would be a matter of routine skill to select an appropriate computer system and implement the claimed process on that computer system. No specific disclosure is made regarding the two "means" elements recited in the claim (i.e., no computer program or logic circuit is described that can perform the indicated functions). The disclosure does provide an explanation of how to solve the wavefunction equations of a chemical compound, and indicates that the solutions of those wavefunction equations can be employed to determine the physical structure of the corresponding compound.
Result	Claim defines specific computer, patentability stands independently from process claim.	Claim encompasses any computer embodiment of process claim; patentability stands or falls with process claim.
Explanation	Disclosure identifies the specific machine capable of performing the indicated functions.	In this scenario, the applicant has not provided any information that can serve to distinguish the "implementation" of the process on a computer from the factors that will govern the patentability determination of the process per se. As such, the patentability of this apparatus claim will stand or fall with that of the process claim.

Office personnel are reminded that finding a product claim to encompass any product embodiment a "process" invention simply means that the Office will *presume* that the product claim encompasses any product in the stated class that performs the specified set of functions. Because this is *interpretive* and *nothing more*, it does not provide any information as to the *patentability* of the applicant's underlying invention or the product claim.

If a claim is found to encompass any product embodiment of the underlying process, and if the underlying process is statutory, the product claim should be classified as a statutory product. By the same token, if the underlying process invention is found to be non-statutory, Office personnel should classify the "product" claim as a "non-statutory product." If the product

claim is classified as being a non-statutory product on the basis of the underlying process, Office personnel should emphasize that they have considered all claim limitations and are basing their finding on the analysis of the underlying process.

(b)   Statutory Processes   [Guidelines § I.B.1.(c)(iii)]

A claim that requires one or more acts to be performed defines a process. Not all processes, however, are processes that fall within the definition of a *statutory process* under § 101. A *statutory* process is a series of one or more acts that manipulate physical matter or energy resulting in some form of a physical transformation.[28] Accordingly, a claimed process is statutory if it:

-    manipulates some form of physical matter or energy; and

-    results in a transformation or reduction of the subject matter manipulated into a different state or into a different thing to achieve a practical application.

(i)   Appropriate Subject Matter for Manipulation Steps of a Process

Consistent with the expansive Congressional intent behind § 101, Office personnel shall consider any form of physical "matter" or "energy" to be the appropriate subject matter of the manipulation steps of a process. Importantly, the subject matter manipulated by a process does not have to be a physical object; it may be "intangible subject matter representative of or constituting physical activity or objects."[29] Thus, an electrical signal representing data corresponding to a physical object or physical activity is appropriate subject matter for manipulation by a process. If the "acts" of a process manipulate only numbers, abstract concepts or ideas, the acts are not being applied to appropriate subject matter. Thus, a process consisting solely of mathematical operations does not manipulate appropriate subject matter and thus cannot constitute a statutory process.

(ii) Transformation or Reduction to a Different State or Thing

To be statutory, the claimed process when practiced must *physically transform* the subject matter manipulated--something must happen other than manipulating concepts or converting numbers to different numbers. The required transformation can take place during any step of the process (e.g., if a process requires three "acts" and only the last "act" transforms the subject matter to a different state or thing, a sufficient transformation has occurred). If the process does not result in any physical transformation, it is not statutory.

(iii) Examples of Statutory Computer-Implemented Processes

Three exemplary computer-performed processes that fully satisfy the requirements of § 101:

- A process that requires physical acts to be performed independent of the steps to be performed by a programmed computer, where those acts involve the manipulation of tangible physical objects and result in the object having a different physical attributes or structure;[30]

- A process that requires acts to be performed *on* the physical components of a computer (i.e., the process manipulates the components of the computer rather than data representing something external to the computer system) and the effect of the process is that the computer *operates* differently (such as an operating system process); and

- A process that requires acts to be performed *by* a computer on data in the form of an electrical or magnetic signal, where the data represents a physical object or activities external to the computer system (e.g., physical characteristics of a chemical compound or a person's heart rate), and where the process causes some transformation of the physical but intangible representation of the physical object or activities.[31]

3. Non-Statutory Processes

In practical terms, claims define non-statutory processes if they:

- consist solely of mathematical operations (i.e., a "mathematical algorithm"); or

- simply manipulate abstract ideas without some practical application (e.g., a bid, a bubble hierarchy).

(a) Mathematical Algorithm That Defines a Law of Nature or Natural Phenomenon or Describes an Abstract Idea

A process that consists solely of mathematical operations is non-statutory. Mathematical algorithms do not manipulate physical matter and cannot cause a physical effect. Courts have, however, recognized a distinction between types of mathematical algorithms, namely, some *define* a "law of nature" in mathematical terms and others merely *describe* an "abstract idea."[32]

Certain mathematical algorithms have been held non-statutory because they represent a mathematical definition of a law of nature or a natural phenomenon. For example, the formula $E=mc^2$ is a "law of nature"--it defines a "fundamental scientific truth"

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(i.e., the relationship between energy and mass). To comprehend how the law of nature relates to any object, one invariably has to perform certain steps (e.g., multiplying a number representing the mass of an object by the square of a number representing the speed of light). If an applicant defines a process to consist solely of those steps that one must follow to solve the mathematical representation of the law of nature, the "process" is indistinguishable from the law of nature and would "preempt" the law of nature. A patent cannot be granted on such a process.

Other mathematical algorithms have been held non-statutory because they merely describe an abstract idea. An "abstract idea" may simply be *any* sequence of mathematical operations that are combined to solve a mathematical problem. The concern addressed by holding such subject matter non-statutory is that the mathematical operations merely describe an idea and do not define a process that represents a practical application of the idea.

Accordingly, when a claim is found to define non-statutory subject matter because of a mathematical algorithm, it is important to determine whether the subject matter is a law of nature or natural phenomenon or abstract idea. A rejection under § 101 should indicate the type of deficiency relied upon to support the rejection.

(b)   Evaluation of Certain Language Related to Mathematical Operation Steps of a Process

(i)   Intended Use or Field of Use Statements

Claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim. Such language often will be presented in the preamble of claim, but may appear elsewhere in the body of the claim. Intended or field of use language appearing in the preamble will in most instances not limit the claim scope, and as such, Office personnel should be careful to properly interpret such language. For example, a claimed mathematical process "to be used in seismic prospecting..." is not limited by the seismic prospecting use statement (i.e., none of the steps were explicitly or implicitly limited to application to seismic prospecting activities).[33] In such a case, Office personnel should identify the claim language that constitutes the intended use or field of use statements and provide the basis for their findings. This will shift the burden to applicant to demonstrate otherwise.

(ii) Necessary Antecedent Step to Performance of A Mathematical Operation or Independent Limitation on a Claimed Process

In rare situations, certain acts of "collecting" or "selecting" data for use in a process consisting of one or more mathematical operations will not further limit a claim beyond the specified mathematical operation step(s). Such acts "merely determine values for the variables used in the mathematical operations used in making the calculations."[34] In other words, the acts are dictated by nothing other than the performance of a mathematical operation.[35]

If a claim requires acts to be performed to *create* data that will then be used in a process representing a *practical application* of one or more mathematical operations, those acts *must* be treated as further limiting the claim beyond the mathematical operation(s) per se. Such acts are data gathering steps not dictated by the algorithm but by other limitations which require certain antecedent steps and as such constitute an independent limitation on the claim.

Examples of acts that independently limit a claimed process involving mathematical operations include:

-   a method of conducting seismic exploration which requires generating and manipulating signals from seismic energy waves *before* "summing" the values represented by the signals;[36] and

-   a method of displaying X-ray attenuation data as a signed gray scale signal in a "field" using a particular anti-aliasing algorithm, where the antecedent steps require generating the data using a particular machine (e.g., a computed tomography scanner).[37]

Examples of steps that do not independently limit one or more mathematical operation steps include:

-   "perturbing" the values of a set of process inputs, where the subject matter "perturbed" was a number and the act of "perturbing" consists of substituting the numerical values of variables;[38] and

-   selecting a set of "arbitrary measurement point" values.[39]

Such steps do not impose independent limitations on the scope of the claim beyond those required by the mathematical operation limitation.

(iii) Post-Mathematical Operation Step Uses Solution or Merely Conveys Result of Operation

In rare instances, certain kinds of post-solution "acts" will not further limit a process claim beyond the performance of the preceding mathematical operation step even if the acts are recited in the body of a claim. If, however, the claimed acts represent some *use* of the solution, those acts will invariably impose an independent limitation on the claim. Thus, if a claim requires that the direct result of a mathematical operation be evaluated and transformed into something else, Office personnel cannot treat the subsequent steps as being *indistinguishable* from the performance of the mathematical operation and thus not further limiting on the claim. For example, acts that require the conversion of a series of numbers representing values of a wavefunction equation for a chemical compound into values representing an image that conveys information about the three dimensional structure of the compound cannot be treated as being part of the mathematical operations that yield the wavefunction numbers. Office personnel should be especially careful when reviewing claim language that requires the performance of "post-solution" steps to ensure that actual claim limitations are not ignored.

Examples of steps found not to independently limit a process involving one or more mathematical operation steps include:

- step of "updating an alarm limit" found to constitute changing the number value of a variable to represent the result of the calculation;[40]

- final step of "magnetically recording" the result of a calculation;[41]

- final step of "equating" the process outputs to the values of the last set of process inputs found to constitute storing the result of calculations;[42]

- final step of displaying result of a calculation "as a shade of gray rather than as simply a number" found to not constitute distinct step where the data were numerical values that did not represent anything; [43] and

- step of "transmitting electrical signals representing" the result of calculations.[44]

Office personnel are reminded to rely on the applicant's characterization of the significance of the "acts" being assessed to resolve questions related to their relationship to the mathematical operations recited in the claim and the invention as a whole.[45]

**(c)   Manipulation of Abstract Ideas Without A Practical
       Application**

A process that consists solely of the manipulation of an
abstract idea without any limitation to a practical application is
non-statutory.[46]

In order to determine whether the claim is limited to a
practical application of an idea, Office personnel must analyze
the claim as a whole, in light of the specification, to understand
what subject matter is being manipulated and how it is being
manipulated. During this procedure, Office personnel must
evaluate any statements of intended use or field of use, any data
gathering step and any post-manipulation activity. *See* section
(b) above.

**IV.   Issues Related to Compliance with Section 112, First and
       Second Paragraphs [Guidelines § I.B.2.]**

Section 112 serves to ensure that the claims are clearly
defined and are fully supported by the disclosure. Office
personnel should focus their assessment of applications for
compliance with § 112 on determining if the disclosure and claims
clearly convey what the applicant has invented, permit others to
determine what rights have been provided to the patentee, and
enable one skilled in the art to the practice the invention
without undue experimentation.

When evaluating applications, Office personnel must always
remember to use the perspective of one of ordinary skill in the
art. Claims and disclosures are not to be evaluated in a vacuum.
If elements of an invention are well known in the art, the
applicant does not have to provide a disclosure that describes
those elements.

Similarly, the applicant need not explicitly recite in the
claims every feature of the invention. Rather, if the claims,
interpreted in light of the disclosure reasonably apprise those of
ordinary skill in the art what the invention is, they satisfy the
requirements of § 112, second paragraph. For example, if an
applicant indicates that the invention is a particular computer,
the claim does not have to recite every element or feature of the
computer. In fact, it is preferable for the claim to be drafted
in a form that emphasizes what the applicant has invented (e.g.,
what is new rather than old).[47]

If deficiencies are discovered with respect to § 112, Office
personnel must be careful to rely on the appropriate paragraph of
§ 112. Deficiencies under the second paragraph of § 112 exist if
it is unclear what the claim defines (i.e., the claim fails to
particularly point out and distinctly claim the invention),[48] or

the claim as cast does not define what applicant has indicated to be the invention.[49] Deficiencies under the first paragraph of § 112 can arise where there is not an adequate written description that serves to identify what the applicant has invented, or the disclosure does not enable one skilled in the art to make and use the invention as claimed without undue experimentation. Deficiencies related to disclosure of the best mode for carrying out the claimed invention are not usually encountered during initial examination of an application.

A.   Specification Fails to Show How to Make or Use Programmed Computer Element of Invention [Guidelines § I.B.2.(b)]

The disclosure must enable a person skilled in the art to configure the computer to possess the requisite functionality, and, if relevant, integrate the computer with other elements to yield the claimed invention, without the exercise of undue experimentation. If the specification fails to identify *how* to configure a computer to possess the requisite functionality or *how* to integrate the programmed computer with other elements of the invention, the claim is likely to be deficient under § 112, first paragraph.

For many computer-implemented inventions, it is not unusual for the claimed invention to involve more than one field of technology. For such inventions, the disclosure must satisfy the enablement standard for each aspect of the invention.[50] As such, the disclosure must teach a person skilled in each art how to make and use the relevant aspect of the invention without undue experimentation. For example, to enable a claim to a programmed computer that determines and displays the three-dimensional structure of a chemical compound, the disclosure must

- enable a person skilled in the art of molecular modeling to understand and practice the underlying molecular modeling processes; and

- enable a person skilled in the art of computer programming to create a program that directs a computer to create and display the image representing the three-dimensional structure of the compound.

In other words, the disclosure corresponding to each aspect of the invention must be enabling to a person skilled in each respective art.

B. Programmed Computer Is Defined As Composite of Functional Elements

In many instances, an applicant will describe a programmed computer by outlining the significant elements of the programmed computer using a functional block diagram. Office personnel should review the specification to ensure that along with the functional block diagram the disclosure provides information that adequately describes each "element" in hardware or software. If the functionally labeled elements of a programmed computer are not described further in the specification and one skilled in the art would not know what the elements are or how to make or use them to yield the claimed invention, a claim defining an invention requiring the use of that programmed computer is likely to be deficient under one or more requirements of § 112.

C. Elements of a Machine Defined Using Means Plus Function Language [Guidelines § I.B.2.(a) & (b)]

Where means plus function language is used to define the characteristics of a machine or manufacture invention, claim elements must be interpreted to read on only the structures or materials disclosed in the specification, and "equivalents thereof."[51] Thus, at the outset Office personnel must attempt to correlate means elements to some description of the elements in the written specification and drawings.

As noted earlier, there are many appropriate ways of describing the elements of a programmed computer. If the description makes it clear that a means element corresponds to the physical structure of a computer or computer component, that description will sufficiently define the claimed means element. Thus, a means element may be defined to be:

- a programmed computer with a particular functionality;

- a logic circuit or other component of a programmed computer that performs a series of specifically identified operations dictated by a computer program; or

- a computer memory encoded with executable instructions representing a computer program that can cause a computer to function in a particular fashion.

A claim patterned after a functional block diagram and defined using means plus function language may fail to particularly point out and distinctly claim the invention if the disclosure does not describe the specific materials or structures that correspond to the means elements. The scope of a "means" element is defined as the corresponding structure or material (e.g., a specific logic circuit) set forth in the written

description and its equivalents. Where no structure or material
is disclosed, the claim fails to particularly point out and
distinctly claim the invention. For example, if the applicant
discloses only the function to be performed and provides no
description of hardware or software that performs the function,
the application has not disclosed any "structure" to correspond to
the means. Such a claim should be rejected under § 112, second
paragraph. In contrast, if the corresponding structure is
disclosed to be a memory or logic circuit that has been configured
in some manner to perform that function (e.g., using a computer
program), the claim satisfies § 112, second paragraph. Further
guidance in interpreting the scope of equivalents of means
elements is provided in the *Examination Guidelines For Claims
Reciting A Means or Step Plus Function Limitation In Accordance
With 35 U.S.C. 112, 6th Paragraph*.[52]

**D.   Claim Does Not Define Applicant's Invention [Guidelines §
        I.B.2.(a)]**

To satisfy the second paragraph of § 112, the claims must
define the invention in a manner consistent with the applicant's
written description of the invention. If the applicant asserts a
practical utility for the invention, Office personnel should
review the entire disclosure to determine the features necessary
to accomplish the asserted practical utility. When the claim
recites a practical utility but fails to recite the necessary
features to accomplish the asserted practical utility, the claim
should be rejected under § 112, second paragraph. If a claim is
so broad as to encompass non-statutory subject matter, the claim
should be rejected under § 112 ¶ 2, as well as § 101. For
example, if applicant has described the invention as a computer-
implemented process, but the claim is broad enough to cover the
mental performance of the process, then it should be rejected
under both § 112 ¶ 2 and § 101.[53]

A claim <u>as a whole</u> that defines non-statutory subject matter
is deficient under § 101, and under § 112, second paragraph.

Determining the scope of a claim as a whole requires a clear
understanding of what the applicant regards as the invention.
If the invention as disclosed in the written description is
statutory, but the claims define subject matter that is not, the
deficiency can be corrected by an appropriate claim amendment.[54]
Therefore, reject the claims under §§ 101 and 112, second
paragraph, but identify the features of the invention that, if
recited in the claim, would render the claimed subject matter
statutory.

**E.   Claim Defined Using Only Computer Program Code [Guidelines §
       I.B.2.(a)]**

A claim defined *entirely* in computer program code, whether in
source or object code format, may be deficient under § 112 ¶ 2 if
one of ordinary skill in the art would not be able to ascertain
the metes and bounds of the claimed invention. Such a claim
should also be objected to under 37 CFR 1.52(a).[55] A computer
programming language is not the English language, despite the fact
that English words may be used in that language.

In certain circumstances, as where self-documenting
programming code is employed, use of programming language in a
claim would be permissible, since such program source code
presents sufficiently high-level language and descriptive
identifiers to make it universally understood to others in the art
without the programmer having to insert any comments.[56]

Applicants should be encouraged to functionally define the
steps the computer will perform rather than simply providing
source or object code.

V.   Issues Related to Compliance with § 103 [Guidelines § I.B.3.]

As is the case for inventions in any field of technology,
assessment of a claimed computer-implemented invention for
compliance with § 103 begins with a comparison of the claimed
subject matter to what is known in the prior art. Once
distinctions are identified between the claimed invention and the
prior art, those distinctions must be assessed and resolved in
light of the knowledge possessed by a person of ordinary skill in
the art. Against this backdrop, one must determine whether the
invention would have been obvious at the time the invention was
made. If not, the claimed invention satisfies § 103. Factors and
considerations dictated by law governing § 103 apply without
modification to inventions in this field of technology.

If the difference between the prior art and the claimed
invention is limited to information stored on or employed by a
machine, one must determine what role the information plays with
regard to the invention considered as a whole. Where the
information imparts some degree of functionality to the claimed
invention taken as a whole, it represents a critical element of
the invention. As such, the information must be considered and
addressed incident to application of § 103.   Thus, a rejection of
the claim as a whole under § 103 is inappropriate unless the
functionality imparted by the information would have been
suggested by the prior art. To establish a *prima facie* case of
obviousness, Office personnel must explain *why* it would have been
obvious to a person of ordinary skill in the art, at the time the

invention was made, to impart the functionality of the programmed computer with that specific information.

However, where the information imparts no functionality to achieve the specific utility of the invention, it cannot serve to render the claimed invention, considered as a whole, non-obvious. Generally speaking, situations where information imparts no functionality will be limited to the following:

-   a computer readable storage medium that differs from the prior art solely with respect to information encoded on the medium that does not alter its functionality considered as a whole,

-   a computer that differs from the prior art solely with respect to information whose content does not alter how the machine functions (i.e., the information does not reconfigure the computer), or

-   a process that differs from the prior art only with respect to information that does not alter *how* the process steps are to be performed to achieve the utility of the invention.

Thus, if the prior art suggests storing a song on a disk, merely choosing a *particular* song to store on the disk would be presumed to have been obvious as being well within the level of ordinary skill in the art at the time the invention was made. Such a difference is simply a rearrangement of non-functional information.

VI. Conclusion

Once Office personnel have concluded an analysis of the claimed invention under all the statutory provisions, including §§ 101, 112, 102 and 103, when composing any Official action, they should review all the proposed rejections and their bases to confirm their correctness. Only then should any rejection be imposed.

1   *See Request for Comments on Proposed Examination Guidelines for Computer-Implemented Inventions*, 60 Fed. Reg. 28,778 (June 2, 1995).

2   *In re Freeman*, 573 F.2d 1237, 1245, 197 USPQ 464, 471 (CCPA 1978); *In re Walter*, 618 F.2d 758, 767, 205 USPQ 397, 406-07 (CCPA 1980); *In re Abele*, 684 F.2d 902, 905-07, 214 USPQ 682, 685-87 (CCPA 1982).

3   As the courts have repeatedly reminded the Office: "The goal is to answer the question "'What did applicants invent?'" *In re Abele,* 684 F.2d at 907, 214 USPQ at 687 (CCPA 1982). *Accord, e.g.*, *Arrhythmia Research Tech. v. Corazonix Corp.*, 958 F.2d 1053, 1059, 22 USPQ2d 1033, 1038 (Fed. Cir. 1992).

4*See Brenner v. Manson*, 383 U.S. 519, 534, 148 USPQ 689, 695 ("Whatever weight is attached to the value of encouraging disclosure and of inhibiting secrecy, we believe a more compelling consideration is that a process patent in the chemical field, which has not been developed and pointed to the degree of *specific utility*, creates a monopoly of knowledge which should be granted only if clearly commanded by the statute.")(emphasis added). *See also Nelson v. Bowler*, 626 F.2d 853, 856, 206 USPQ 881, 883 (CCPA 1980) (Specific utility is also called "practical utility.").

5   *E.g., In re Alappat*, 33 F.3d 1526, 1543, 31 USPQ2d 1545, 1556-57 (Fed. Cir. 1994) (in banc) (quoting *Diamond v. Diehr,* 450 U.S. 175, 192, 209 USPQ 1, 10 (1981)). *See also id*. at 1579 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing *O'Reilly v. Morse,* 56 U.S. (15 How.) 62 (1854)); Arrhythmia 958 F.2d at 1057, 22 USPQ2d at 1036.

6   60 Fed. Reg. 36,263 (July 14, 1995).

7   *Arrythmia,* 958 F.2d at 1057, 22 USPQ2d at 1036:

It is of course true that a modern digital computer manipulates data, usually in binary form, by performing mathematical operations, such as addition, subtraction, multiplication, division, or bit shifting, on the data. But this is only how the computer does what it does. Of importance is the significance of the data and their manipulation in the real world, i.e., what the computer is doing.

8 Many computer-implemented inventions do not consist solely of a computer. Thus, Office personnel should identify those claimed elements of the computer-implemented invention that are not part of the programmed computer, and determine how those elements

relate to the programmed computer. Office personnel should look
for specific information that explains the role of the programmed
computer in the overall process or machine and how the programmed
computer is to be integrated with the other elements of the
apparatus or used in the process.

9   *Markman v. Westview Instruments*, 52 F.3d 967, 980, 34 USPQ2d
1321, 1330 (Fed. Cir. 1995)(in banc).

10   *See, e.g., In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671,
1674 (Fed. Cir. 1994) (inventor may define specific terms used to
describe invention, but must do so "with reasonable clarity,
deliberateness, and precision" and, if done, must "'set out his
uncommon definition in some manner within the patent disclosure'
so as to give one of ordinary skill in the art notice of the
change" in meaning) (quoting *Intellicall, Inc. v. Phonometrics,
Inc.*, 952 F.2d 1384, 1387-1388, 21 USPQ2d 1383, 1386 (Fed. Cir.
1992)).

11   *See, e.g., In re Zletz*, 893 F.2d 319, 321-322, 13 USPQ2d
1320, 1322 (Fed. Cir. 1989) ("During patent examination the
pending claims must be interpreted as broadly as their terms
reasonably allow. . . . The reason is simply that during patent
prosecution when claims can be amended, ambiguities should be
recognized, scope and breadth of language explored, and
clarification imposed. . . . An essential purpose of patent
examination is to fashion claims that are precise, clear, correct,
and unambiguous. Only in this way can uncertainties of claim scope
be removed, as much as possible, during the administrative
process.").

12   *See, e.g., In re Paulsen*, 30 F.3d at 1480, 31 USPQ2d at 1674
(although specification can be used to interpret what the patentee
meant by a word or phrase in the claim, cannot add extraneous
limitation from the specification when limitation is not needed to
interpret any particular words or phrases in the claim).

13   *See, e.g., Diamond v. Diehr*, 450 U.S. at 188-189, 209 USPQ
at 9 ("In determining the eligibility of respondents' claimed
process for patent protection under § 101, their claims must be
considered as a whole. It is inappropriate to dissect the claims
into old and new elements and then to ignore the presence of the
old elements in the analysis. This is particularly true in a
process claim because a new combination of steps in a process may
be patentable even though all the constituents of the combination
were well known and in common use before the combination was
made.").

14   *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09, 206 USPQ 193,
196-97 (1980):

In choosing such expansive terms as "manufacture" and
"composition of matter," modified by the comprehensive "any,"
Congress plainly contemplated that the patent laws would be
given wide scope. The relevant legislative history also
supports a broad construction. The Patent Act of 1793,
authored by Thomas Jefferson, defined statutory subject
matter as "any new and useful art, machine, manufacture, or
composition of matter, or any new or useful improvement
[thereof]." Act of Feb. 21, 1793, § 1, 1 Stat. 319. The Act
embodied Jefferson's philosophy that "ingenuity should
receive a liberal encouragement." 5 Writings of Thomas
Jefferson 75-76 (Washington ed. 1871). See *Graham v. John
Deere Co.*, 383 U.S. 1, 7-10 (1966). Subsequent patent
statutes in 1836, 1870, and 1874 employed this same broad
language. In 1952, when the patent laws were recodified,
Congress replaced the word "art" with "process," but
otherwise left Jefferson's language intact. The Committee
Reports accompanying the 1952 Act inform us that Congress
intended statutory subject matter to "include anything under
the sun that is made by man." S. Rep. No. 1979, 82d Cong., 2d
Sess. 5 (1952); H.R. Rep. No. 1923, 82d Cong., 2d Sess. 6
(1952).

This perspective has been embraced by the Federal Circuit:

The plain and unambiguous meaning of § 101 is that any new
and useful process, machine, manufacture, or composition of
matter, or any new and useful improvement thereof, may be
patented if it meets the requirements for patentability set
forth in Title 35, such as those found in §§ 102, 103, and
112. The use of the expansive term "any" in § 101 represents
Congress's intent not to place any restrictions on the
subject matter for which a patent may be obtained beyond
those specifically recited in § 101 and the other parts of
Title 35. . . . Thus, it is improper to read into § 101
limitations as to the subject matter that may be patented
where the legislative history does not indicate that Congress
clearly intended such limitations. [*In re Alappat,* 33 F.3d
at 1542, 31 USPQ2d at 1556.]

15   35 U.S.C. § 101 (1994).

16   *See* 35 U.S.C. § 100(b) ("The term "process" means process,
art, or method, and includes a new use of a known process,
machine, manufacture, composition of matter, or material.").

17   *E.g., In re Alappat*, 33 F.3d at 1542, 31 USPQ2d at 1556; *In re
Warmerdam*, 33 F.3d at 1358, 31 USPQ2d at 1757.

18   *See, e.g., Rubber-Tip Pencil v. Howard*, 87 U.S. 498, 507
(1874)("idea of itself is not patentable, but a new device by

which it may be made practically useful is"); *Mackay Radio & Telegraph Co. v. Radio Corp. of America*, 306 U.S. 86, 94 (1939) ("While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be."); *In re Warmerdam*, 33 F.3d 1354, 1360, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994) ("steps of 'locating' a medial axis, and 'creating' a bubble hierarchy ... describe nothing more than the manipulation of basic mathematical constructs, the paradigmatic 'abstract idea'").

[19]   The concern over preemption was expressed as early as 1852. *See Le Roy v. Tatham*, 55 U.S. 156, 175 (1852)("A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right."); *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 132, 76 USPQ 280, 282 (1988) (combination of six species of bacteria to be non-statutory subject matter).

[20]   *In re Ziegler*, 992 F.2d 1197, 1200-1203, 26 USPQ2d 1600, 1603-1606 (Fed. Cir. 1993); *Brenner v. Manson*, 383 U.S. at 528-536, 148 USPQ at 693-696.

[21]   *See, e.g., In re Musgrave*, 431 F.2d 882, 893, 167 USPQ 280, 289-90 (CCPA 1970), cited with approval in *In re Schrader*, 22 F3d 290, 297 (Fed. Cir. 1994) (Newman, J., dissenting). The definition of "technology" is the "application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions, or at least to improve human efficiency in some respect." Computer Dictionary 384 (2d ed. Microsoft Press 1994).

[22]   *E.g., In re Waldbaum*, 457 F.2d 997, 1003, 173 USPQ 430, 434 (CCPA 1972) ("The phrase "technological arts," as we have used it, is synonymous with the phrase "useful arts" as it appears in Article I, Section 8 of the Constitution.").

[23]   *See, e.g., In re Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (holding non-statutory a claim to a data structure *per se*).

[24]   Computer Dictionary 210 (2d ed. Microsoft Press 1994):

The meaning of data, as it is intended to be interpreted by people. Data consists of facts, which become information when they are seen in context and convey meaning to people. Computers process data without any understanding of what that data represents.

[25]   *See, e.g., In re Lowry*, 32 F.3d 1579, 1583, 32 USPQ2d 1031, 1034-1035 (Fed. Cir. 1994); *In re Warmerdam*, 33 F.3d at 1361-1362, 31 USPQ2d at 1760.

26   *In re Warmerdam*, 33 F.3d at 1359, 31 USPQ2d at 1759 (claim to computer having specific memory defined using product-by-process format).

27   *In re Lowry*, 32 F.3d at 1583-1584, 32 USPQ2d at 1035.

28   *Diamond v. Diehr*, 450 U.S. at 183, 209 USPQ at 6 ("A statutory process is . . . a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. . . . The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.").

29   *In re Schrader*, 22 F.3d 290, 295, 30 USPQ2d 1455, 1459 (Fed. Cir. 1994).

30   *Diamond v. Diehr*, 450 U.S. at 187, 209 USPQ at 8.

31   *Arrythmia*, 958 F.2d at 1058-59, 22 USPQ2d at 1037-38.

32   *See, e.g., In re Meyer,* 688 F.2d 789, 794-95, 215 USPQ 193, 197 (CCPA 1982) ("Scientific principles, such as the relationship between mass and energy, and laws of nature, such as the acceleration of gravity, namely, $a=32$ ft./sec.^{2}, can be represented in mathematical format. However, some mathematical algorithms and formulae do not represent scientific principles or laws of nature; they represent ideas or mental processes and are simply logical vehicles for communicating possible solutions to complex problems. The presence of a mathematical algorithm or formula in a claim is merely an indication that a scientific principle, law of nature, idea or mental process may be the subject matter claimed and, thus, justify a rejection of that claim under 35 USC 101; but the presence of a mathematical algorithm or formula is only a signpost for further analysis."). *Cf. In re Alappat*, 33 F.3d at 1543 n.19, 31 USPQ2d at 1556 n.19 in which the Federal Circuit recognized the confusion:

> The Supreme Court has not been clear . . . as to whether such subject matter is excluded from the scope of § 101 because it represents laws of nature, natural phenomena, or abstract ideas. *See Diehr*, 450 U.S. at 186 (viewed mathematical algorithm as a law of nature); *Benson*, 409 U.S. at 71-72 (treated mathematical algorithm as an "idea"). The Supreme Court also has not been clear as to exactly what kind of mathematical subject matter may not be patented. The Supreme Court has used, among others, the terms "mathematical algorithm," "mathematical formula," and "mathematical equation" to describe types of mathematical subject matter

not entitled to patent protection standing alone. The Supreme Court has not set forth, however, any consistent or clear explanation of what it intended by such terms or how these terms are related, if at all.

[33]   *In re Walter*, 618 F.2d at 769, 205 USPQ at 409 ("Although the claim preambles relate the claimed invention to the art of seismic prospecting, the claims themselves are not drawn to methods of or apparatus for seismic prospecting; they are drawn to improved mathematical methods for interpreting the results of seismic prospecting.").

[34]   *In re Richman*, 563 F.2d 1026, 1030, 195 USPQ 340, 343 (CCPA 1977) ("In the present case too, notwithstanding that the antecedent steps are novel and unobvious, they merely determine values for the variables used in the mathematical formulae used in making the calculations. Thus, such antecedent steps do not suffice to render the claimed methods, considered as a whole, statutory subject matter.").

[35]   In *In re Sarkar,* 588 F.2d 1330, 1335, 200 USPQ 132, 139 (CCPA 1978), the court explained why this approach must be followed:

No mathematical equation can be used, as a practical matter, without establishing and substituting values for the variables expressed therein. Substitution of values dictated by the formula has thus been viewed as a form of mathematical step. If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a "process" under § 101. Consideration of whether the substitution of specific values is enough to convert the disembodied ideas present in the formula into an embodiment of those ideas, or into an application of the formula, is foreclosed by the current state of the law.

[36]   *In re Taner*, 681 F.2d 787, 788, 214 USPQ 678, 679 (CCPA 1982).

[37]   *In re Abele*, 684 F.2d at 908, 214 USPQ at 687 ("The specification indicates that such attenuation data is available only when an X-ray beam is produced by a CAT scanner, passed through an object, and detected upon its exit. Only after these steps have been completed is the algorithm performed, and the resultant modified data displayed in the required format.").

[38]   *In re Gelnovatch*, 595 F.2d 32, 41 n.7, 201 USPQ 136, 145 n.7 (CCPA 1979) ("Appellants' claimed step of perturbing the values of a set of process inputs (step 3), in addition to being a mathematical operation, appears to be a data-gathering step of the type we have held insufficient to change a nonstatutory method of

calculation into a statutory process. . . . In this instance, the perturbed process inputs are not even measured values of physical phenomena, but are instead derived by numerically changing the values in the previous set of process inputs.").

[39]   *In re Sarkar*, 588 F.2d at 1331, 200 USPQ at 135.

[40]   *Parker v. Flook,* 437 U.S. 584, 585, 198 USPQ 193, 195 (1978).

[41]   *In re Walter*, 618 F.2d at 770, 205 USPQ at 409 ("If § 101 could be satisfied by the mere recordation of the results of a nonstatutory process on some record medium, even the most unskilled patent draftsman could provide for such a step.").

[42]   *In re Gelnovatch*, 595 F.2d at 41 n.7, 201 USPQ at 145 n.7.

[43]   *In re Abele*, 684 F.2d at 909, 214 USPQ at 688 ("This claim presents no more than the calculation of a number and display of the result, albeit in a particular format. The specification provides no greater meaning to "data in a field" than a matrix of numbers regardless of by what method generated. Thus, the algorithm is neither explicitly nor implicitly applied to any certain process. Moreover, that the result is displayed as a shade of gray rather than as simply a number provides no greater or better information, considering the broad range of applications encompassed by the claim.").

[44]   *In re de Castelet*, 562 F.2d 1236, 1244, 195 USPQ 439, 446 (CCPA 1967) ("That the computer is instructed to transmit electrical signals, representing the results of its calculations, does not constitute the type of "post solution activity" found in Flook, supra, and does not transform the claim into one for a process merely *using* an algorithm. The final transmitting step constitutes nothing more than reading out the result of the calculations.").

[45]   *See In re Sarkar*, 588 F.2d at 1332 n.6, 200 USPQ at 136 n.6 ("post-solution" construction that was being modeled by the mathematical process not considered in deciding § 101 question because applicant indicated that such construction was not a material element of the invention).

[46]   *E.g., In re Warmerdam*, 33 F.3d at 1359, 31 USPQ2d at 1759. *See also Schrader*, 22 F.3d at 295, 30 USPQ2d at 1458-59 (although the court determined that the subject matter was simply a mathematical algorithm, Schrader's process merely manipulated an abstract idea).

[47]   *See, e.g., Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 941-43, 15 USPQ 2d 1321, 1328-1330 (Fed. Cir. 1990) (judgment of invalidity reversed for clear error where expert

testimony on both sides showed that a programmer of reasonable skill could write a satisfactory program with ordinary effort based on the disclosure); *DeGeorge v. Bernier*, 768 F.2d 1318, 1334, 226 USPQ 758, 762-63 (Fed. Cir. 1985) (invention was adequately disclosed for purposes of enablement even though all of the circuitry of a word processor was not disclosed, since the undisclosed circuitry was deemed inconsequential because it did not pertain to the claimed circuit); *In re Phillips*, 608 F.2d 879, 882-83, 203 USPQ 971, 975 (CCPA 1979) (computerized method of generating printed architectural specifications dependent on use of glossary of predefined standard phrases and error-checking feature enabled by overall disclosure generally defining errors); *In re Donohue*, 550 F.2d 1269, 1271, 193 USPQ 136, 137 (CCPA 1977) ("Employment of block diagrams and descriptions of their functions is not fatal under 35 U.S.C. § 112, first paragraph, providing the represented structure is conventional and can be determined without undue experimentation."); *In re Knowlton*, 481 F.2d 1357, 1366-68, USPQ 486, 493-94 (CCPA 1973) (examiner's contention that a software invention needed a detailed description of all the circuitry in the complete hardware system reversed).

[48]   *See Miles Labs v. Shandon, Inc.*, 997 F.2d 870, 875, 27 USPQ2d 1123, 1126 (Fed. Cir. 1993) ("test for definiteness is whether one skilled in the art would understand the bounds of the claim when read in light of the specification").

[49]   *In re Prater*, 415 F.2d 1393, 1404, 162 USPQ 541, 550 (CCPA 1969) (holding that claim did not comply with 35 U.S.C. § 112 ¶ 2 because it was admittedly beyond that which "applicant regard[ed] as his invention").

[50]   *See In re Naquin*, 398 F.2d 86, 866, 158 USPQ 317, 319 (CCPA 1968) ("When an invention, in its different aspects, involves distinct arts, that specification is adequate which enables the adepts of each art, those who have the best chance of being enabled, to carry out the aspect proper to their specialty."). *See also Ex parte Zechnall*, 194 USPQ 461, 461 (Bd. App. 1973) ("appellants' disclosure must be held sufficient if it would enable a person skilled in the electronic computer art, in cooperation with a person skilled in the fuel injection art, to make and use appellants' invention").

[51]   Two *in banc* decisions of the Federal Circuit have made clear that the Office is to interpret means plus function language according to 35 U.S.C. § 112 ¶ 6. In the first, *In re Donaldson*, 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1848 (Fed.Cir. 1994), the court held:

> The plain and unambiguous meaning of paragraph six is that one construing means-plus-function language in a claim must look to the specification and interpret that language in

light of the corresponding structure, material, or acts described therein, and equivalents thereof, to the extent that the specification provides such disclosure. Paragraph six does not state or even suggest that the PTO is exempt from this mandate, and there is no legislative history indicating that Congress intended that the PTO should be. Thus, this court must accept the plain and precise language of paragraph six.

Consistent with *Donaldson*, in the second decision, *In re Alappat*, 33 F.3d at 1540, 31 USPQ2d at 1554, the Federal Circuit held:

Given Alappat's disclosure, it was error for the Board majority to interpret each of the means clauses in claim 15 so broadly as to "read on any and every means for performing the function" recited, as it said it was doing, and then to conclude that claim 15 is nothing more than a process claim wherein each means clause represents a step in that process. Contrary to suggestions by the Commissioner, this court's precedents do not support the Board's view that the particular apparatus claims at issue in this case may be viewed as nothing more than process claims.

52   1162 O.G. 59 (May 17, 1994).

53   For example, in *In re Prater*, 415 F.2d at 1403-04, 162 USPQ at 549-50, the court considered a claim that was found to encompass both the mental and physical performance of a series of calculations (i.e., the claim was not limited to performance of a calculation on a machine). The applicant had argued that the invention was to be practiced using a machine. *Id.* The court found that while the claims defined a statutory process, they were deficient under the second paragraph of § 112. *Id.* The court emphasized that:

[W]hen read in the light of the specification, claim 9 does read on a mental process augmented by pencil and paper markings. We find no express limitation in claim 9 which, even when interpreted in the light of the specification, would support the conclusion that the claim is limited to a "machine process" or "machine-implemented process." This is particularly important in this case since the board noted that, in their brief before the board, appellants acknowledged that "[though] not practical for most of the needed applications, their method, theoretically, can be practiced by hand." . . . Inasmuch as claim 9, 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," we feel that the claim fails to comply with 35 USC 112 which requires that

"[the] specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." (Emphasis added.) This is true notwithstanding appellants' disclosure of a machine-implemented process. [*Id.*]

The basis of this type of rejection is that the claim, as cast, is incomplete.

[54] If the invention, both as disclosed and as claimed, is not statutory subject matter, reject the claims under § 101 for being drawn to non-statutory subject matter, and under § 112, second paragraph, for failing to particularly point out and distinctly claim an invention entitled to protection under U.S. patent law.

[55] *See* 37 CFR § 1.52(a) ("The application, any amendments or corrections thereto, and the oath or declaration must be in the English language except as provided for in §1.69 and paragraph (d) of this section . . . .").

[56] *See* Computer Dictionary 353 (Microsoft Press 1994).

APPENDIX

I. Guidelines for Examination of Computer-Implemented Inventions

(Proposed)
60 Fed. Reg. 28,778 (June 2, 1995)

A. General Considerations

The following guidelines have been developed to assist Office personnel in their review of applications drawn to computer-implemented inventions. These guidelines respond to recent changes in the law that governs the patentability of computer-implemented inventions, and set forth the official policy of the Office regarding inventions in this field of technology.

It is essential that patent applicants obtain a prompt yet complete examination of their applications. The Office can best achieve this goal by raising any issue that may affect patentability in the initial action on the merits. Under the principles of compact prosecution, each claim should be reviewed for compliance with every statutory requirement of patentability in the initial review of the application, even if one or more claims is found to be deficient with respect to one statutory requirement. Deficiencies should be explained clearly, particularly when they serve as a basis of a rejection. Where possible, examiners should indicate how rejections may be overcome and problems resolved. A failure to follow this approach can lead to unnecessary delays in the prosecution of the application.

B. Procedures to be Followed When Evaluating Computer-Implemented Inventions

The following procedures should be used when reviewing applications drawn to computer-implemented inventions.

1. <u>Determine what the applicant has invented by reviewing the written description and the claims</u>.

    (a) Identify any specific embodiments of the invention that have been disclosed, review the detailed description of the invention and note the specific utility that has been asserted for the invention.

    (b) Analyze each claim carefully, correlating each claim element to the relevant portion of the written description that describes that element. Give claim elements their broadest reasonable interpretation that is consistent with the written description. If elements of a claimed invention are defined in means plus function format, review the written description to identify the specific structure, materials or acts that correspond to each such element.

(c) Considering each claim as a whole, classify the
     invention defined by each claim as to its statutory
     category (i.e., process, machine, manufacture or
     composition of matter). Rely on the following
     presumptions in making this classification.

     (i) A computer or other programmable apparatus whose
          actions are directed by a computer program or other
          form of "software" is a statutory "machine."

     (ii) A computer readable memory that can be used to
          direct a computer to function in a particular
          manner when used by the computer [1] is a statutory
          "article of manufacture".

     (iii)A series of specific operational steps to be
          performed on or with the aid of a computer is a
          statutory "process".

          A claim that clearly defines a computer-implemented
     process but is not cast as an element of a computer
     readable memory or as implemented on a computer should
     be classified as a statutory "process." [2] If an
     applicant responds to an action of the Office based on
     this classification by asserting that subject matter
     claimed in this format is a machine or an article of
     manufacture, reject the claim under 35 U.S.C. § 112,
     second paragraph, for failing to recite at least one
     physical element in the claims that would otherwise
     place the invention in either of these two "product"
     categories. The Examiner should also object to the
     specification under 37 CFR 1.71(b) if such an assertion
     is made, as the complete invention contemplated by the
     applicant has not been cast precisely as being an
     invention within one of the statutory categories.

          A claim that defines an invention as any of the
     following subject matter should be classified as non-
     statutory:

     -    a compilation or arrangement of data, independent
          of any physical element;

     -    a known machine-readable storage medium that is
          encoded with data representing creative or artistic
          expression (e.g., a work of music, art or
          literature)[3],[4];

     -    a "data structure" independent of any physical
          element (i.e., not as implemented on a physical

component of a computer such as a computer readable memory to render that component capable of causing a computer to operate in a particular manner); or

- a process that does nothing more than manipulate abstract ideas or concepts (e.g., a process consisting solely of the steps one would follow in solving a mathematical problem [5]).

Claims in this form are indistinguishable from abstract ideas, laws of nature and natural phenomena and may not be patented. Non-statutory claims should be handled in the manner described in section (2)(c) below.

2. <u>Analyze each claim to determine if it complies with § 112, second paragraph, and with § 112, first paragraph</u>.

(a) Determine if the claims particularly point out and distinctly claim the invention. To do this, compare the invention as claimed to the invention as it has been described in the specification. Pay particular attention to the specific utility contemplated for the invention—features or elements of the invention that are necessary to provide the specific utility contemplated for that invention must be reflected in the claims. If the claims fail to accurately define the invention, they should be rejected under § 112, second paragraph. A failure to limit the claim to reflect features of the invention that are necessary to impart the specific utility contemplated may also create a deficiency under § 112, first paragraph.

If elements of a claimed invention are defined using "means plus function" language, but it is unclear what structure, materials or acts are intended to correspond to those elements, reject the claim under § 112, second paragraph. A rejection imposed on this basis shifts the burden to the applicant to describe the specific structure, material or acts that correspond to the means element in question, and to identify the precise location in the specification where a description of that means element can be found. Interpretation of means elements for § 112, second paragraph purposes must be consistent with interpretation of such elements for §§ 102 and 103 purposes.

Computer program-related elements of a computer-implemented [6] invention may serve as the specific structure, material or acts that correspond to an element of an invention defined using a means plus function limitation. For example, a series of operations

performed by a computer under the direction of a computer program may serve as "specific acts" that correspond to a means element. Similarly, a computer-readable memory encoded with data representing a computer program that can cause a computer to function in a particular fashion, or a component of a computer that has been reconfigured with a computer program to operate in a particular fashion, can serve as the "specific structure" corresponding to a means element.

Claims must be defined using the English language. See, 37 CFR 1.52(a). A computer programming language is not the English language, despite the fact that English words may be used in that language. Thus, an applicant may not use computer program code, in either source or object format, to define the metes and bounds of a claim. A claim which attempts to define elements of an invention using computer program code, rather than the functional steps which are to be performed, should be rejected under § 112, second paragraph, and should be objected to under 37 CFR 1.52(a)

(b) Construe the scope of the claimed invention to determine if it is adequately supported by an enabling disclosure. Construe any element defined in means plus function language to encompass all reasonable equivalents of the specific structure, material or acts disclosed in the specification corresponding to that means element. Special care should be taken to ensure that each claim complies with the written description and enablement requirements of 35 U.S.C. § 112.

(c) A claim _as a whole_ that defines non-statutory subject matter is deficient under § 101, and under § 112, second paragraph. Determining the scope of a claim as a whole requires a clear understanding of what the applicant regards as the invention. The review performed in step 1 should be used to gain this understanding.

   (i) If the invention as disclosed in the written description is statutory, but the claims define subject matter that is not, the deficiency can be corrected by an appropriate claim amendment. Therefore, reject the claims under §§ 101 and 112, second paragraph, but identify the features of the invention that, if recited in the claim, would render the claimed subject matter statutory.

   (ii) If the invention, both as disclosed and as claimed, is not statutory subject matter, reject the claims under § 101 for being drawn to non-statutory

subject matter, and under § 112, second paragraph, for failing to particularly point out and distinctly claim an invention entitled to protection under U.S. patent law.

An invention is not statutory if it falls within any of the non-statutory claim categories outlined in section (1)(c) above. Also, in rare situations, a claim classified as a statutory machine or article of manufacture may define non-statutory subject matter. Non-statutory subject matter (i.e., abstract ideas, laws of nature and natural phenomena) does not become statutory merely through a different form of claim presentation. Such a claim will (a) define the "invention" not through characteristics of the machine or article of manufacture claimed but exclusively in terms of a non-statutory process that is to be performed on or using that machine or article of manufacture, and (b) encompass any product in the stated class (e.g., computer, computer readable memory) configured <u>in any manner</u> to perform that process.

3.   <u>Determine if the claimed invention is novel and nonobvious under §§ 102 and 103</u>. When evaluating claims defined using "mean plus function" language, refer to the specific guidance provided in the <u>In re Donaldson</u> guidelines [1162 OG 59] and section (3)(a) above.

C.   Notes on the Guidelines

[1]   Articles of manufacture encompassed by this definition consist of two elements: (1) a computer readable storage medium, such as a memory device, a compact disc or a floppy disk, and (2) data encoded on that storage medium in such a way that the storage medium causes a computer to operate in a specific and predefined manner. The composite of the two elements is a storage medium with a particular physical structure and function (e.g., one that will impart the functionality represented by the data onto a computer).

[2]   For example, a claim that is cast as "a computer program" but which then recites specific steps to be implemented on or using a computer should be classified as a "process." A claim to simply a "computer program" that does not define the invention in terms of specific steps to be performed on or using a computer should not be classified as a statutory process.

[3]   The specific words or symbols that constitute a computer program represent the expression of the computer program and

as such are a literary creation.

[4]   A claim in this format should also be rejected under § 103, as being obvious over the known machine-readable storage medium standing alone.

[5]   A claim to a method consisting solely of the steps necessary to converting one set of numbers to another set of numbers without reciting any computer-implemented steps would be a non-statutory claim under this definition.

[6]   This includes the software and any associated computer hardware that is necessary to perform the functions directed by the software.

Outline of § 101 Evaluation Process
for Computer-Implemented Inventions

Determine What the Applicant Has Invented and Claimed

Classify the Claimed Invention

Information (e.g., data structure per se, computer program per se, music, literary work, mere data)

or

A natural phenomenon (e.g., energy or magnetism)

A specific machine or manufacture?

A series of steps to be performed on a computer?

No[*]   **Yes**

Non-Statutory Product

* Claim encompasses any machine or manufacture embodiment of process

Statutory Product

Evaluate process to determine if it...

Manipulates Abstract Ideas?

Merely Solves a Purely Mathematical Problem?

Transforms physical material, or data representing physical phenomena, into different state or thing, to achieve a practical application ?

Non-Statutory Process

Statutory Process