The Hard Side of Software: The Difficulty of Patenting Software Amid Abstract Ideas

# INTRODUCTION

The United States Patent System is rooted in the Constitution and first laid out in law by the Patent Act of 1790.[[1]](#footnote-1) The first patent granted by the United States of America was to Samuel Hopkins for an improved method for creating pot ash and pearl ash.[[2]](#footnote-2) Today, patent law is codified in Title 35 of the United States Code as enacted Congress in 1952[[3]](#footnote-3), the United States Patent and Trademark Office (“USPTO”) has issued its ten millionth patent; computer and software related patents reign supreme, the byproducts of a global economy increasingly dependent on computer technology.[[4]](#footnote-4) Each year half of the patents issued by the USPTO are related to software.[[5]](#footnote-5) Despite the ubiquity of computer technology, software patents can be difficult to obtain and defend.[[6]](#footnote-6) [Per Arielle’s comment, give some context. Let’s make this intro YUGE] In the wake of the *Berkheimer v. HP* decision[[7]](#footnote-7), the USPTO issued the Berkheimer Memo, which severely limited how patent examiners reject patent applications for not meeting the requirements for patent eligibility contained and implied by 35 U.S.C. § 101.[[8]](#footnote-8) This change eased the burden on applicants seeking software patents, but also created a diverging standard between the judicial system and the USPTO’s standard for approval, which could lead to granting invalid patents. The patent system has too long shoe-horned software patents into an antiquated system designed to encourage innovation of only physical inventions. This note will guide readers through the legislative history and standards regarding software patents, the repercussions of the *Berkheimer* decision, and a possible solution to this patent software dilemma: updating the United States patent system.

# BACKGROUND: Hurdles & History of Software Patent

## The Easy Hurdle: Patentability

Patents may be obtained for “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.”[[9]](#footnote-9) This broad statement is qualified by the concepts of patentability and patent eligibility, which are defined by both statute and judicial rulings.[[10]](#footnote-10) Patentability describes the standards to receive a patent, requiring an invention to be novel and nonobvious, and disclosed in detail.[[11]](#footnote-11)[Discuss how patentability is actually usually pretty easy to get around and isn’t at issue here]. The second standard, patent eligibility, concerns what subject matter warrants the incentives and protections provided by patent law.[[12]](#footnote-12) These two standards are closely related and are often conflated by courts when patent validity is considered.[[13]](#footnote-13)

## Patent Eligibility: Laws of Nature, Natural Phenomena, and Abstract Ideas

The Supreme Court holds the statutory language “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof” contains an implicit exception disallowing patents for laws of nature, natural phenomena, and abstract ideas.[[14]](#footnote-14) These three exceptions prevent monopolies on foundational laws and concepts that many technologies may depend on, insuring that the limited monopoly provided for by law does not hinder innovation.[[15]](#footnote-15) However, too broad an interpretation of these exceptions would also impede the patenting of important discoveries, therefore an invention or discovery cannot be unpatentable merely because it contains natural phenomena or algorithm.[[16]](#footnote-16)

These three exceptions not always clearly defined or distinct from one another. Laws of nature include well known laws of physics such as gravity or Einstein’s famous “E = mc2”.[[17]](#footnote-17) Natural phenomena include more physical natural occurrences such as plants, minerals, lightning.[[18]](#footnote-18) The exceptions extend to even newly discovered uses of naturally occurring phenomenon.[[19]](#footnote-19) In *Funk Brothers Seed Co. v. Kalo Inoculant Co.* [finish citation], the disputed discovery was a mixture of bacteria for inoculating the seeds of several different types of plants at once, rather than separately.[[20]](#footnote-20) The court found the mixture ineligible for patent and therefore no infringement because the bacteria had not been altered; it was a natural phenomenon.[[21]](#footnote-21) In contrast, in *Diamond v. Chakrabarty*, a new species of bacteria that digested oil was upheld to be patentable because it was not naturally occurring and it was unpatentable simply because it was a living organism.[[22]](#footnote-22)The lines for abstract ideas are not as clearly drawn.

## Abstract Ideas: Definitions and Tests

The word “abstract” describes items that lack concrete existence.[[23]](#footnote-23) So perhaps it is fitting that the Supreme Court has not defined “abstract idea.” This has generated varying tests over the years to determine when a patent contains an “abstract idea.”[[24]](#footnote-24) [TALK ABOUT WHAT HAPPENED TO THE TESTS – machine or transformation, state street].

[Discuss abandoned state street test] – process produced a “useful, concrete and tangible result” - abandoned in favor of m-o-t (in re bilski)

The “machine or transformation test” was used as the sole test by the Federal Circuit to determine patent eligibility of a process.[[25]](#footnote-25) This test, articulated in *Benson* and affirmed in *Diehr*.[[26]](#footnote-26), required an applicant to show the claim was tied to a machine, or that it transformed an article.[[27]](#footnote-27) If either of these criteria was met, then the process was not an abstract idea and therefore patent eligible. A claim “tied to a particular machine” is only implemented on a specific machine. The second path of the machine-or-transformation test deems a process patent eligible if it transforms “particular article into a different state or thing”.[[28]](#footnote-28) In *Diehr*, the process included a mathematical formula, a perfect example of an abstract idea. Despite this, it met both criteria of the machine-or-transformation test and was therefore patent eligible.[[29]](#footnote-29) The formula calculated the time to cure rubber and was integrated into a process tied to a specific oven and technological set up. With these additional elements it was deemed patent eligible[[30]](#footnote-30) In contrast a few years prior to *Diehr*,in *Parker v. Flook*, the applicant had claimed a “Method for Updating Alarm Limits” which was a mathematical formula for updating alarm limits during catalytic conversion processes. There was no novel machine or physical connection and was deemed not patent eligible.[[31]](#footnote-31)

When first introduced this test was not the sole determining inquiry it became. In *Benson* the Supreme Court stated it was “*the* clue” to patent eligibility.[[32]](#footnote-32) Initially used with the caveat the a process may be valid even without meeting the machine-or-transformation tests, the test was reaffirmed several times and eventually was used without the caveat until eventually the Federal Circuit used it as the sole test.[[33]](#footnote-33) Soon afterwards the Supreme Court rejected the machine-or-transformation test, claiming it was never intended to be an exhaustive or exclusive test. The Supreme Court argued the machine-or-transformation test would create uncertainty as to the patentability of software[[34]](#footnote-34) Today there is no test for discerning abstract ideas[[35]](#footnote-35) and each patent must be considered on a case-by-case basis, comparing the invention at hand to others rather than applying a set of factors.[[36]](#footnote-36)

Algorithms and mathematical formulas are categorized as abstract ideas, but as laws of nature are frequently captured in formulaic terms, the exceptions often overlap.[[37]](#footnote-37) Limiting formulas to a particular technological environment will not make them patentable.[[38]](#footnote-38) Patents are not ineligible merely because they rely on a law of nature or algorithm.[[39]](#footnote-39)

To be patentable, inventors must do more than describe the idea or law and append the words “apply it”.[[40]](#footnote-40) [Give example] Patents must have additional steps outside of the patent ineligible concept that integrate the equation into the process as a whole.[[41]](#footnote-41) They must have an inventive concept outside of the patent ineligible idea.[[42]](#footnote-42)

Two Supreme Court cases illustrate these differences. In 1972, before the rise of the digital age, the Supreme Court heard arguments regarding a method for converting binary coded decimal to pure binary. In binary coded decimal (BCD) each digit of a number is represented by a four-digit binary segment e.g. 534 would be represented as 0101-0011-0100, where 0101, 0011, and 0100 are the numbers 5, 3, and 4 respectively in pure binary; in pure binary 534 would be represented as 1000010110.[[43]](#footnote-43) With no definition of abstract ideas, the Court began comparing the claims with previous cases and facts.[[44]](#footnote-44) However, at the time the patentability of computer programs was still in debate, and the patent was held invalid because it has no practical exception outside of a digital computer.[[45]](#footnote-45) Clearly the Court did not understand the importance digital (the more advanced counter-part to analog) computers would play in the future, and so they dismissed the patent for having no use outside of computers. Although the claims described hardware components which performed this algorithm, it was not sufficient to meet the Court’s requirements for patentability.

In 1980 the Supreme Court considered claims for a process for curing synthetic rubber. This process relied heavily on a formula known as the Arrhenius equation, and by continually taking temperature measurements, a digital computer was able to use the formula to provide an accurate cure time.[[46]](#footnote-46) Here the Supreme Court stated the claims must be considered as a whole, and that use of a mathematical formula did not disqualify a patent, and upheld the patent. This decision seemly reversed *Benson*, but the Supreme Court characterized the invention as a method for curing rubber, rather than a math formula. Upon examination, the Court found that the additional steps integrated the equation into a process as a whole and were therefore patentable. The patent did not seek to protect the formula, but rather the process of how the formula was used.[[47]](#footnote-47) Despite similar dependencies on mathematical formula, two different outcomes occurred, suggesting that physical transformation is required for patent eligibility[[48]](#footnote-48) and how an invention is labelled is critical to a patent surviving scrutiny.

## Software Patents & Abstract ideas

These exceptions cause difficulty in several areas: business methods, bio-technology, methods of medical treatment, and software.[[49]](#footnote-49) Software is not easily sorted into the statutory categories of 35 U.S.C. § 101: it is not a “machine, manufacture, or composition of matter”[[50]](#footnote-50), and must therefore be a “process”. The first three categories are physical and easily patentable, providing the invention meets requirements for patentability.[[51]](#footnote-51) Processes are not as tangible and therefore are more difficult to patent.[[52]](#footnote-52) Software as a member of the process category of patents, is similarly difficult to patent for several reasons: 1) it is intangible; 2) software frequently is made up of algorithms; and 3) it can be seen as a mere representation of an abstract idea.[[53]](#footnote-53) Many believe that this eligibility requirement is stifling innovation with its chilling effect on patents.[[54]](#footnote-54) These inherent difficulties require inventors to claim their inventions in specific ways. Early decisions relating to software patents seemed to require physical effects to make the software appear mechanical [[55]](#footnote-55), and more easily fit into the other categories. As previously mentioned, *Diehr* upheld the process for curing rubber, in spite of its reliance on a mathematical formula, because of the physical transformation that occurred in the rubber, but invalidated *Benson*’s conversion from BCD to binary.[[56]](#footnote-56)

[discuss the passing of the “machine or transformation test” in Bilski v. Kappos. ]

One such test was the

[Discuss abandoned state street test]

The traditional way to claim software is the Beauregard claim.[[57]](#footnote-57) These claims began in response to *In re Beauregard*, which quoted the Commissioner of Patents and Trademarks, who stated that software embodied in a tangible medium was patentable.[[58]](#footnote-58) Thus claims often contain a variation on the following, “A computer readable medium containing program instructions…”[[59]](#footnote-59) in an effort to connect the abstract nature of software with something tangible and real.

[explain the meaning of “directed to”] – Enfish

In 2012, the Supreme Court heard a petition concerning processes that help doctors who administer thiopurine drugs determine if a dosage is too low or too high. The improved process relied upon the relationships between the concentration of metabolites in the blood and drug dosage. The Supreme Court held that the process did not transform the natural laws into patent-eligible application. Mayo framework introduced a two-step process to determine if an invention claims “building blocks of human ingenuity, which are ineligible for patent protection” or if the patent integrates building blocks into something more. [What was the impact?]

[Fill in details and implications from journal articles]

[alice] In 2014, the patent world was rocked by *Alice Corp. Pty. Ltd. v. CLS Bank Intern*, in which the Supreme Court ruled that escrow software was a patent ineligible invention. The opinion created a two-step framework, based largely on the *Mayo* holding, to determine if an invention was patent eligible. In step one of the framework the Court must determine if the claims at issue are directed to a patent-ineligible concept; if yes then they proceed to step two which asks: “what else is there in the claim before us?”[[60]](#footnote-60) This second step is determining whether additional elements transform the nature of the claim into patent eligible application.[[61]](#footnote-61) The claim elements must be considered individually and in combination. [Insert more about the mechanics of the decision, and how the factors weighed in the case at hand]. In the month after *Alice*, 830 patent applications were withdrawn.[[62]](#footnote-62) In the year following the decision, the Federal Circuit used the two-step framework in ten cases[[63]](#footnote-63) and only found one to contain patent eligible subject matter.[[64]](#footnote-64)

[Discuss DDR Holdings].

# The Problem at Hand: Berkheimer

# The Nay Sayers (Those that think there’s not a problem)

# The Solution (Analysis)

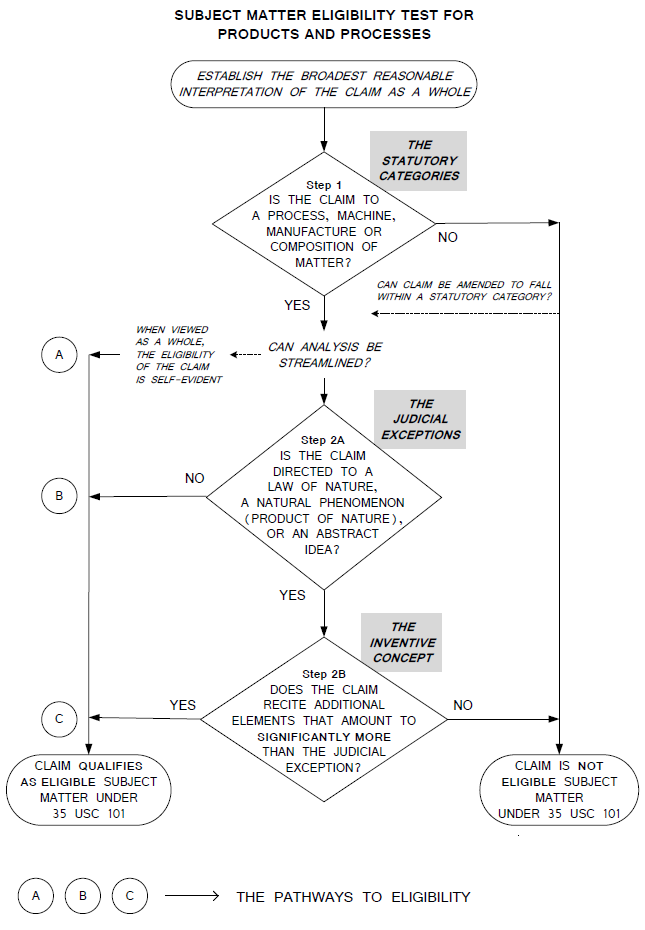


Figure 1 - https://www.uspto.gov/web/offices/pac/mpep/s2106.html

Pledge of Honesty

On my honor, I submit this work in good faith and pledge that I have neither given nor received improper aid in its completion.

/s/ Seth Guthrie

Good start. Watch out for ways to improve sentence structure and pay attention to your grammar. Your explanation of software patent history could use a bit more work for clarity. Make sure you include your prescription for patent system updates. Your analysis should include the argument of those who view the patent system as fine for software needs.

1. U.S. Const. art 1, § 8, cl. 8. [↑](#footnote-ref-1)
2. https://10millionpatents.uspto.gov/ [↑](#footnote-ref-2)
3. MPEP – INTRODUCTION. <https://www.uspto.gov/web/offices/pac/mpep/mpep-0020-introduction.html>. [HOW TO CITE MPEP?] [↑](#footnote-ref-3)
4. https://10millionpatents.uspto.gov/ [↑](#footnote-ref-4)
5. <https://www.ipwatchdog.com/2017/05/21/alice-over-half-u-s-utility-patents-issued-annually-software/id=83367/>; https://www.ificlaims.com/rankings-trends-2017.htm [↑](#footnote-ref-5)
6. *See e.g.* Benson, Berkheimer [↑](#footnote-ref-6)
7. Berkheimer [↑](#footnote-ref-7)
8. How in the world do you cite the Berkheimer memo? [↑](#footnote-ref-8)
9. 35 U.S.C. § 101 [↑](#footnote-ref-9)
10. 35 U.S.C. §§ 102, 103, 112; *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70, 132 S. Ct. 1289, 1293, (2012). [↑](#footnote-ref-10)
11. 35 U.S.C. §§ 102, 103, 112 [↑](#footnote-ref-11)
12. CITATION NEEDED [↑](#footnote-ref-12)
13. CITATION NEEDED [↑](#footnote-ref-13)
14. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70, 132 S. Ct. 1289, 1293, (2012) (restating the long-held exceptions 35 U.S.C. § 101: laws of nature, natural phenomena, and abstract ideas). [↑](#footnote-ref-14)
15. *Gottschalk v. Benson*, 409 U.S. 63, 67, 93 S. Ct. 253, 34 L.Ed.2d 273 (1972) (holding a method for converting binary-coded-decimals to binary unpatentable) [↑](#footnote-ref-15)
16. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70, 132 S. Ct. 1289, 1293, (2012) (restating the long-held exceptions 35 U.S.C. § 101: laws of nature, natural phenomena, and abstract ideas) [↑](#footnote-ref-16)
17. Diamond v. Chakrabarty, 447 U.S. 303 on page 309, [↑](#footnote-ref-17)
18. Diamond v. Chakrabarty, 447 U.S. 303 on page 309, [↑](#footnote-ref-18)
19. *Funk Bros. Seed Co. v. Kalo Inoculant Co*., 333 U.S. 127, 131, 68 S. Ct. 440, 442, 92 L. Ed. 588 (1948) [↑](#footnote-ref-19)
20. *Funk Bros. Seed Co. v. Kalo Inoculant Co*., 333 U.S. 127, 131, 68 S. Ct. 440, 442, 92 L. Ed. 588 (1948) [↑](#footnote-ref-20)
21. *Funk Bros. Seed Co. v. Kalo Inoculant Co*., 333 U.S. 127, 131, 68 S. Ct. 440, 442, 92 L. Ed. 588 (1948) [↑](#footnote-ref-21)
22. *Diamond v. Chakrabarty*, 447 U.S. 303, 304 (1980) [↑](#footnote-ref-22)
23. Google Definitions – find better source. [↑](#footnote-ref-23)
24. Citation needed – machine or transformation test; street test; See also State Street Bank & Trust v. Signature Financial Group; *In re Bilski;*  [↑](#footnote-ref-24)
25. *Bilski v. Kappos*, 561 U.S. 593, 603 (2010) [↑](#footnote-ref-25)
26. *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *In re Bilski*, 545 F.3d 943, 955 (Fed. Cir. 2008). [↑](#footnote-ref-26)
27. *In re Bilski*, 545 F.3d 943, 961 (Fed. Cir. 2008). [↑](#footnote-ref-27)
28. See Benson, 409 U.S. at 70. [↑](#footnote-ref-28)
29. *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008). [↑](#footnote-ref-29)
30. Diehr, 450 U.S. at 184, 187; *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008). [↑](#footnote-ref-30)
31. *Parker v. Flook*, 437 U.S. 584, 585 (1978). [↑](#footnote-ref-31)
32. *Benson*, 409 U.S. at 70 [↑](#footnote-ref-32)
33. In re Bilski, 545 F.3d 943, 956 (Fed. Cir. 2008), aff'd but criticized sub nom. Bilski v. Kappos, 561 U.S. 593, (2010) [↑](#footnote-ref-33)
34. Bilski v. Kappos, 561 U.S. 593, 605 (2010). [↑](#footnote-ref-34)
35. Robert Daniel Garza, Software Patents and Pretrial Dismissal Based on Ineligibility, 24 Rich. J.L. & Tech. 1, 41 (2018) [↑](#footnote-ref-35)
36. Robert Daniel Garza, Software Patents and Pretrial Dismissal Based on Ineligibility, 24 Rich. J.L. & Tech. 1, 87 (2018);

    See Amdocs (Isr.) Ltd. v. Openet Telecomm. Inc., 841 F.3d 1288, 1293-94 (Fed. Cir. 2016). [↑](#footnote-ref-36)
37. *See Diamond v. Dieher; and*  [↑](#footnote-ref-37)
38. In re Bilski [↑](#footnote-ref-38)
39. Diehr [↑](#footnote-ref-39)
40. Mayo, Quoting Benson [↑](#footnote-ref-40)
41. Mayo, quoting Diehr [↑](#footnote-ref-41)
42. Mayo, Quoting Parker v. Flook [↑](#footnote-ref-42)
43. Gottschalk v. Benson [↑](#footnote-ref-43)
44. *Gottschalk v. Benson* [↑](#footnote-ref-44)
45. *Gottschalk v. Benson* [↑](#footnote-ref-45)
46. *Diamond v. Diehr* [↑](#footnote-ref-46)
47. *Diamond v. Diehr* [↑](#footnote-ref-47)
48. *Diamond v. Diehr,* 450 U.S. 175, 184 (1981) (noting several times that the respondents claims involve transforming of raw rubber into a different state). [↑](#footnote-ref-48)
49. CITATION NEEDED [↑](#footnote-ref-49)
50. 35 U.S.C. § 101 [↑](#footnote-ref-50)
51. Randall Rader, Benjamin Christoff, Patent Law in a Nutshell 56 (3rd ed. 2018). [↑](#footnote-ref-51)
52. *See e.g.* [Alice, Mayo, Berkheimer, etc.]; *see* Kathleen Chapman, Esq. & Stephen Ball, Esq*., Challenges with Patenting Software,* Vt. B.J., Winter 2007/2008, at 36 [↑](#footnote-ref-52)
53. CITATIONS NEEDED [↑](#footnote-ref-53)
54. Paul R. Gugliuzza, Quick Decisions in Patent Cases, 106 Geo. L.J. 619, 622 (2018) [↑](#footnote-ref-54)
55. Kathleen Chapman, Esq. & Stephen Ball, Esq., Challenges with Patenting Software, Vt. B.J., Winter 2007/2008, at 36, 37 [↑](#footnote-ref-55)
56. *Diamond v. Diehr*; *Gottschalk v. Benson* [↑](#footnote-ref-56)
57. Intellectual Property Channeling for Digital Works; Preserving The Value Of Medical Device Patents During The Rise Of Three-Dimensional Printing – Westlaw Journal IP 2013 WL 5808127, at \*4 [↑](#footnote-ref-57)
58. *In re Beauregard*, 53 F.3d 1583, 1584 (Fed. Cir. 1995) [↑](#footnote-ref-58)
59. *See e.g.* *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011); *SEVEN Networks, LLC v. Google LLC*, No. 2:17-CV-441-JRG, 2018 WL 5263271, at \*30 (E.D. Tex. Oct. 23, 2018) [↑](#footnote-ref-59)
60. *Alice Corp. Pty. Ltd. v. CLS Bank Intern* [↑](#footnote-ref-60)
61. *Alice Corp. Pty. Ltd. v. CLS Bank Intern* [↑](#footnote-ref-61)
62. *See* Jasper L. Tran, Software Patents: A One-Year Review of Alice v. CLS Bank, 97 J. PAT. & TRADEMARK OFF. SOC'Y, 532, 539-540 (2015) [↑](#footnote-ref-62)
63. Robert Daniel Garza, Software Patents and Pretrial Dismissal Based on Ineligibility, 24 Rich. J.L. & Tech. 1, 28 (2018); *See* Versata Dev. Grp., Inc. v. SAP America, 793 F.3d 1306 (Fed. Cir. 2015); Intellectual Ventures I LLC v. Capital One Bank (USA), 792 F.3d 1363, 1367-68 (Fed. Cir. 2015); Internet Patents Corp. v. Active Network, Inc., 790 F.3d 1343, 1345 (Fed. Cir. 2015) OIP Techs., Inc. v. Amazon.com, Inc., 788 F.3d 1359, 1362-63 (Fed. Cir. 2012); Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat'l Ass'n, 776 F.3d 1343, 1346-47 (Fed. Cir. 2014); DDR Holdings, LLC v. Hotels.com, L.P., 773 F.3d at 1245, 1256; Ultramercial, Inc. v. Hulu, LLC, 772 F.3d 709, 721-22 (Fed. Cir. 2014); buySAFE, Inc. v. Google, Inc., 765 F.3d 1350, 1351 (Fed. Cir. 2014); Planet Bingo, LLC v. VKGS LLC, 576 F. Appx. 1005, 1006 (Fed. Cir. 2014); Digitech Image Techs. v. Elecs. for Imaging, 758 F.3d 1344, 1348-51 (Fed. Cir. 2014). [↑](#footnote-ref-63)
64. *See DDR Holdings*, LLC, 773 F.3d at 1245; Part IV (A) - A. DDR Holdings: Rooted in Computer Technology - The First Victory. [↑](#footnote-ref-64)