UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/873,837	10/02/2015	Sanjiv Desai	007746-014-US-NPV	7187

149217 7590 06/08/2020

Burr Forman McNair
Northrop Grumman
Bank of America Plaza
101 South Tryon Street, Suite 2610
Charlotte, NC 28280

EXAMINER	
REICHERT, RACHELLE LEIGH	

ART UNIT	PAPER NUMBER
3686	

NOTIFICATION DATE	DELIVERY MODE
06/08/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mcnairip@mcnair.net

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SANJIV DESAI and SREELATHA GHANTA

Appeal 2019-004988
Application 14/873,837
Technology Center 3600

Before JOSEPH L. DIXON, DAVID M. KOHUT, and JON M. JURGOVAN, *Administrative Patent Judges*.

KOHUT, *Administrative Patent Judge.*

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–20.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42(a) (2018). Appellant identifies the real party in interest as Northrop Grumman Systems Corporation. Appeal Br. 1.

[2] Throughout this Decision we refer to the Final Rejection mailed September 28, 2018 ("Final Act."), the Appeal Brief filed February 21, 2019 ("Appeal Br."), the Examiner's Answer mailed April 12, 2019 ("Ans."), and the Reply Brief filed June 12, 2019 ("Reply Br.").

INVENTION

The present invention relates to "the employment of a system for healthcare information management in connection with drug discovery" for "provid[ing] a potential drug to disease link based on the mapping of drugs to biomarkers and the mapping of biomarkers to diseases using the biomarkers as a bridge." Spec. ¶ 1; Abstract. Appellant's invention performs drug discovery using (i) "a pharmaco-genomic mapper configured to provide a mapping of drugs to biomarkers based on extraction of information from . . . data sources [including a clinical research database providing results of clinical trials]" and (ii) "a genome connect module configured to provide a mapping of biomarkers to diseases based on extraction of information from the data sources." Spec. Abstract. Claim 1 is representative of the invention and is reproduced below.

1. A drug discovery system, the system comprising:

a data platform scalable to include a plurality of data sources, the data sources including at least a clinical research database providing matched data and not matched data from results of clinical trials; and

a drug discovery module comprising a pharmaco-genomic mapper configured to provide a mapping of drugs to biomarkers having a first mapping score based on extraction of information from the matched data and the not matched data, and

a genome connect module configured to provide a mapping of biomarkers to diseases having a second mapping score based on extraction of information from the matched data and the not matched data,

the drug discovery module comprising processing circuitry configured to provide a potential drug to disease link based on the mapping of drugs to biomarkers and the mapping

of biomarkers to diseases using the biomarkers as a bridge between respective mappings,

wherein the first and second mapping scores indicate a level of validation for each respective mapping.

Appeal Br. 13 (Claims App.).

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Hopkins et al.	US 2005/0060305 A1	Mar. 17, 2005
Chen et al.	US 2014/0121120 A1	May 1, 2014

REJECTIONS

Claims 1–20 stand rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Final Act. 2–8.

Claims 1–20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hopkins in view of Chen. Final Act. 8–15.

OPINION

Rejection under 35 U.S.C. § 101

Patent eligibility under § 101 is a question of law that may contain underlying issues of fact. "We review the [Examiner's] ultimate conclusion on patent eligibility de novo." *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1342 (Fed. Cir. 2018) (citing *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1365 (Fed. Cir. 2018)); *see also SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1331 (Fed. Cir. 2010) ("Whether a claim is drawn to patent-eligible subject matter is an issue of law that we review de novo.").

Accordingly, we review the Examiner's § 101 determinations concerning patent eligibility under this standard.

An invention is patent-eligible if it claims a "new and useful process, machine, manufacture, or composition of matter." 35 U.S.C. § 101. However, the Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: "[l]aws of nature, natural phenomena, and abstract ideas" are not patentable. *See, e.g.*, *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Supreme Court's two-step framework, described in *Mayo* and *Alice*. *Alice*, 573 U.S. at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is "directed to." *See Alice*, 573 U.S. at 219 ("On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.,* the use of a third party to mitigate settlement risk."); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) ("Claims 1 and 4 in petitioners' application explain the basic concept of hedging, or protecting against risk.").

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 69 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as "molding rubber products" (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); "tanning, dyeing, making water-proof cloth, vulcanizing India

rubber, smelting ores" (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1853))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

If the claim is "directed to" an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where "we must examine the elements of the claim to determine whether it contains an 'inventive concept' sufficient to 'transform' the claimed abstract idea into a patent-eligible application." *Alice*, 573 U.S. at 221 (quotation marks omitted). "A claim that recites an abstract idea must include 'additional features' to ensure 'that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].'" *Id.* (quoting *Mayo*, 566 U.S. at 77). "[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention." *Id.*

Patent Office Guidance

In January 2019, the U.S. Patent and Trademark Office (USPTO) published revised guidance on the application of § 101. 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 ("Guidance").[3] Under the Guidance, we first look to whether the claim recites:

> (1) (*see* Guidance at 54, Step 2A–Prong One) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human

[3] The Office issued a further memorandum on October 17, 2019 ("October 2019 Memorandum") clarifying guidance of the January 2019 Memorandum in response to received public comments. *See* https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf. Moreover, "[a]ll USPTO personnel are, as a matter of internal agency management, expected to follow the guidance." Guidance at 51; *see also* October 2019 Memorandum at 1.

> activity such as a fundamental economic practice, or mental processes); and
>
> (2) (*see* Guidance at 54–55, Step 2A–Prong Two) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)).

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim:

> (3) adds a specific limitation beyond the judicial exception that is not "well-understood, routine, conventional" in the field (*see* MPEP § 2106.05(d)); or
>
> (4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

See Guidance at 56, Step 2B.

ANALYSIS

At the outset, we determine that the claims are directed to statutory categories. *See* Guidance at 53. Claims 1–11 are directed to systems, and claims 12–20 are directed to methods. *See* Appeal Br. 13–16 (Claims App.). Thus, the pending claims are directed to recognized statutory categories of § 101. We next turn to Step 2A, Prong One, of the Guidance to determine whether the claims recite a judicial exception. *See* Guidance at 54.

Step 2A, Prong One: "recites a judicial exception"

The Examiner determines that claims 1–20 are not patent eligible as they are directed to a judicial exception without reciting significantly more. Final Act. 2–8; Ans. 5. Specifically, the Examiner determines that claims 1–20 are directed to

> the abstract idea of **using a data platform scalable to include a plurality of data sources, providing a mapping of drugs to biomarkers having a first mapping score based on extraction of information from data, providing a mapping of**

> **biomarkers to diseases having a second mapping score based on extraction of information, providing a potential drug to disease link based on the mapping of drugs to biomarkers**.

Final Act. 2–3. The Examiner considers the claims to be similar to the claims in *Electric Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016), which are directed to collecting information, analyzing the information, and obtaining and displaying certain results of the collection and analysis. Final Act. 4. In the Answer, the Examiner finds, under the Guidance, that "the claims can be categorized under the mental processes category" as "[t]he claims and/or specification does not make it clear that the amount of data is so large as to preclude the analysis being done in one's head." Ans. 5.

Appellant argues independent claims 1 and 12 together. Appeal Br. 4, 7–8. As a result, we select independent claim 1 as the representative claim and address Appellant's arguments thereto. *See* 37 C.F.R. § 41.37(c)(1)(iv). Independent claim 12 stands or falls with claim 1. *Id.*

Appellant argues the claims are not directed to an abstract idea because "the specific actions claimed define a specific means by which to improve the capability to discover drug to disease links" and "improve the relevant technology of drug discovery," by using "data that is normally discarded or ignored [such as data on drugs that do not exhibit positive characteristics relative to a target effect of a clinical trial] to identify potential uses for drugs" and to identify "useful drug interactions that were not the focus of a study that was already performed." Appeal Br. 5–7. Appellant argues that likening Appellant's claims to the claims in *Electric Power Grp.* misconstrues and oversimplifies Appellant's claims. Appeal Br.

5; Reply Br. 2–3. Appellant also argues "neither independent claim 1 nor independent claim 12 recites a mental process" and Examiner's assertion that "the claims can be categorized under the mental process category" is "without any support or evidence." Appeal Br. 8; Reply Br. 4.

Appellant's arguments do not persuade us that the claims do not recite an abstract idea, and we concur with the Examiner's conclusion that the claims recite an abstract idea. Final Act. 2–4; Ans. 5.

Under its broadest reasonable interpretation, claim 1 recites an abstract mental process of collecting/gathering information ("include a plurality of data sources, the data sources including at least a clinical research database providing matched data and not matched data from results of clinical trials" as recited in claim 1), analyzing it ("provide a mapping of drugs to biomarkers having a first mapping score based on extraction of information from the matched data and the not matched data" and "provide a mapping of biomarkers to diseases having a second mapping score based on extraction of information from the matched data and the not matched data," wherein "the first and second mapping scores indicate a level of validation for each respective mapping"), and providing results of the collection and analysis ("provide a potential drug to disease link based on the mapping of drugs to biomarkers and the mapping of biomarkers to diseases using the biomarkers as a bridge between respective mappings"). *See* Final Act. 4. Our reviewing court has concluded that mental processes include similar concepts of collecting, manipulating, and providing, data. *See Intellectual Ventures I LLC v. Capital One Fin. Corp.*, 850 F.3d 1332, 1340 (Fed. Cir. 2017) (the Federal Circuit held "the concept of . . . collecting data, . . . recognizing certain data within the collected data set,

and . . . storing that recognized data in a memory" ineligible); *see also Content Extraction & Transmission LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343, 1347 (Fed. Cir. 2014) (claims are drawn to the basic concept of data recognition and storage); *Electric Power Grp.*, 830 F.3d at 1353 (merely selecting information, by content or source, for collection, analysis, and display does nothing significant to differentiate a process from ordinary mental processes); *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1375 (Fed. Cir. 2011) (purely mental processes can be unpatentable, even when performed by a computer).

Thus, Appellant's arguments that claim 1 recites elements that cannot be characterized as mental steps or performed mentally, and that the claim recites more than an abstract idea, have not persuaded us the Examiner erred in finding the claim also recites an abstract idea. *See* Appeal Br. 5–8; *see also* Reply Br. 2–4.

We also remain unpersuaded by Appellant's argument that the Examiner's "statement [that the claims can be categorized under the mental process category] is made *without any support or evidence*." *See* Reply Br. 4 (emphasis added). The Examiner has provided support when the Examiner explained "the claims can be categorized under the mental processes category" because "[t]he claims and/or specification does not make it clear that the amount of data is so large as to preclude the analysis being done in one's head." *See* Ans. 5; *see also* Final Act. 4. Indeed, Appellant's claim 1 does not require more than one "mapping of drugs to biomarkers," one "mapping of biomarkers to diseases," and one "potential drug to disease link" based on two mappings. *See* Appeal Br. 13 (Claim 1). Thus, claim 1's drug discovery technique identifies correlations between

biomarkers, drugs, and diseases using operations readily performable in the human mind.

Having determined that representative claim 1 recites an abstract idea (mental process) identified in the Guidance, we turn to Step 2A, Prong Two, of the Guidance to determine whether the abstract idea is integrated into a practical application. *See* Guidance at 54–55.

Step 2A, Prong Two: "does not integrate that exception into a practical application"

The Examiner asserts that "the plain focus of the claims is not an improvement to computer functionality itself . . . the claims are merely using a computer to implement the abstract idea and there is no technological improvement," and "the additional elements of the claims do not integrate the abstract idea into a practical application." Ans. 3–5. We agree.

Under step one of the *Alice* framework, we "look at the 'focus of the claimed advance over the prior art' to determine if the claim's 'character as a whole' is directed to excluded subject matter." *Affinity Labs of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016) (quoting *Elec. Power Grp.*, 830 F.3d at 1353).

> The "directed to" inquiry . . . cannot simply ask whether the claims *involve* a patent-ineligible concept, because essentially every routinely patent-eligible claim involving physical products and actions *involves* a law of nature and/or natural phenomenon . . . . Rather, the "directed to" inquiry applies a stage-one filter to claims, considered in light of the specification, based on whether "their character as a whole is directed to excluded subject matter." *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015).

Enfish, LLC v. Microsoft Corp., 822 F.3d 1327, 1335 (Fed. Cir. 2016). In other words, the first step of the *Alice* framework "asks whether the focus of

the claims is on the specific asserted improvement in [the relevant technology] or, instead, on a process that qualifies as an 'abstract idea' for which computers are invoked merely as a tool." *Id.* at 1335–36; *see also* Guidance at 54–55.

The Specification provides evidence as to what the claimed invention relates to. In this case, the Specification discloses that the invention relates to "healthcare information management" and "employment of a system for healthcare information management in connection with drug discovery." Spec. ¶ 1. In order to perform drug discovery, "clinical trial data for unmatched drug and biomarker candidates is used (as wells[sic] as the clinical trial data for matched drug and biomarker candidates)," mapping scores "may be generated based on some indicator of data quantity and/or quality" determined from, e.g., sizes of clinical studies and the clinical datasets, and the mapping scores "may be combined or otherwise employed to define a potential drug to disease link using the biomarkers as a bridge" to "identify correlations (i.e., bridging links) that are direct links (e.g., a one-to-one association [between a drug and a disease]) or indirect links (e.g., not one-to-one associations [between a drug and a disease)]." Spec. ¶¶ 23, 103, 109–110.

We do not find persuasive Appellant's arguments that claim 1 is not directed to an abstract idea because: (i) the claim integrates a practical application for "creating mappings of links that can be used to identify potentially effective drugs in connection with test results that would have otherwise been completely discarded," thereby identifying "useful drug interactions that were not the focus of a study that was already performed" and "improv[ing] the capability to discover drug to disease links" (Appeal

Br. 5–6, 8); and (ii) the claim recites "an improved way to use information that, although previously available, would have been disregarded or discarded" (Reply Br. 4). Appellant also asserts, analogizing to *Core Wireless*, claim 1 recites "steps that achieve a function that was not previously done, and with data (and therefore mappings) that were not previously made or used," thus providing "steps not previously performed to achieve a function not previously capable of performance to thereby improve the relevant technology of drug discovery." Appeal Br. 6–7 (citing *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356 (Fed. Cir. 2018)); Reply Br. 3–4. Finally, Appellant asserts, analogizing to *McRO*, claim 1's "recitations, when read as an ordered combination, without ignoring the requirements of the individual steps, define a specific means by which to accomplish a function that is not a preemption of the function itself" and "the claimed invention is clearly not directed to an abstract idea following the instructions of McRO." Appeal Br. 5–6 (citing *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016)). We disagree, and distinguish the *McRO* and *Core Wireless* cases from the instant claims.

Claim 1 is not analogous to the claims in *McRO*. There, the Federal Circuit determined that the claims were directed to an improvement in computer animation, and, thus, did not recite a concept similar to previously identified abstract ideas. *McRO*, 837 F.3d at 1316. The court relied on the specification's explanation of how the claimed rules enabled the automation of specific animation tasks that previously could not be automated. *Id.* at 1313. The *McRO* court indicated that it was the incorporation of the particular claimed rules in computer animation that "improved [the] existing

technological process," unlike cases such as *Alice* where a computer was merely used as a tool to perform an existing process. *Id.* at 1314. Here, claim 1 is not directed to a process that could not previously be automated, rather, it is directed to a drug discovery technique that identifies correlations between biomarkers, drugs, and diseases by operations readily performable in the human mind. *See* Spec. ¶¶ 1, 23, 103, 109–111. We are not persuaded that the operations in claim 1 amount to "a specific means or method [e.g., patentable subject matter] *that improves the relevant technology*." *McRO*, 822 F.3d at 1314 (emphasis added). Rather, the recited operations merely describe determining a potential drug to disease link based on mapping of drugs to biomarkers and biomarkers to diseases. *See* Appeal Br. 13. These operations do not incorporate an improvement to the computer itself or other technological improvement. Ans. 3–4.

To be sure, claim 1 does utilize computer components such as a "data platform," "clinical research database," "module[s]," and "processing circuitry" for determining a potential drug to disease link. These components, however, are used in an ordinary manner, and for their ordinary functions, and claim 1 does not evidence any improvement to those components themselves. *See* MPEP § 2106.05(a). Claim 1 merely uses the computer components to store, provide, and analyze data. Hence, instead of a technical improvement, the claimed operations of providing mappings and a potential drug to disease link improve drug discovery using processes that are readily performable in the human mind. Such an improvement does not integrate the abstract idea into a practical application. *See OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363 (Fed. Cir. 2015) ("[R]elying on a

computer to perform routine tasks more quickly or more accurately is insufficient to render a claim patent eligible.").

We additionally note many of Appellant's arguments are not commensurate with the scope of claim 1. Claim 1 does not require "put[ting] the *not matched data to use* in a new way, which can lead to the discovery of useful drug interactions that were not the focus of a study that was already performed," as Appellant argues. *See* Appeal Br. 5–6 (emphasis added). Although claim 1 recites "providing . . . not matched data from results of clinical trials," claim 1 does not require the "*not matched data*" *to be used particularly for determining* the "mapping of drugs to biomarkers," the "mapping of biomarkers to diseases," and the "potential drug to disease link"; rather, claim 1 merely requires the mappings to be "*based on* extraction of information *from the matched data and the not matched data*." *See* Appeal Br. 13 (Claim 1 (emphases added)). Appellant's Specification also describes identification of a potential drug (A) to disease (B) link from "a first study [that] may identify a link between drug A and biomarker x1" and "another study [that] may identify a link between biomarker x1 and disease B," which, again, *does not evidence the actual use of not matched data* (i.e., data that regards biomarkers produced by drugs in a drug trial where the biomarkers did not match desired results for the condition or disease being studied from a drug trial). *See* Spec. ¶¶ 100, 110.

Claim 1 also does not recite or require "identify[ing] potentially effective drugs in connection with *test results that would have otherwise been completely discarded*," "us[ing] information that, although previously available, *would have been disregarded or discarded*," or "us[ing] *data that is normally discarded or ignored to identify potential uses for drugs*" as

Appellant argues. *See* Appeal Br. 5–6, 8 (emphases added); Reply Br. 4 (emphasis added).

Claim 1 is also not analogous to the claims in *Core Wireless.* The Federal Circuit determined that "[t]he asserted claims in [*Core Wireless*] are directed to an improved user interface for computing devices," particularly "those with small screens," by "bringing together 'a limited list of common functions and commonly accessed stored data,' which can be accessed directly from the main menu." *Core Wireless*, 880 F.3d at 1362–63. In contrast to *Core Wireless*, Appellant's claim 1 does not provide an improved user interface for accessing data. Rather, Appellant's claim 1 recites a drug discovery technique using steps that are readily performable in the human mind.

Appellant also argues claim 1 provides meaningful limitations regarding the use of "data that was previously discarded" and "the making and using of various linkages or mappings of data that would not have previously been made," not preempting or tying up the use of an abstract idea. Appeal Br. 5–6. This argument does not persuade us of Examiner error. Although preemption may denote patent ineligibility, its absence does not demonstrate patent eligibility. *See FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1098 (Fed. Cir. 2016); *see also* Ans. 4. For claims covering a patent-ineligible concept, preemption concerns "are fully addressed and made moot" by an analysis under the *Mayo*/*Alice* framework. *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015).

Accordingly, under Step 2A, Prong Two, we find claim 1 does not recite "additional elements that integrate the judicial exception into a

practical application," and is directed to an abstract idea in the form of a mental process because the claimed drug discovery identifies correlations between biomarkers, drugs, and diseases by operations readily performable in the human mind using thought processes of observation, evaluation, judgment, and opinion. Guidance, 84 Fed. Reg. at 52, 54; *see also* MPEP § 2106.05(a)–(c), (e)–(h).

Step 2B: "well-understood, routine, conventional"

We must now determine whether independent claim 1 recites any elements additional to the abstract idea that are *not* well-understood, routine, or conventional. *See* MPEP § 2106.05(d). We are unable to identify any.

The Examiner asserts,

> The claims do not include additional elements that are sufficient to amount to significantly more than the judicial exception because the additional elements, other than the abstract idea per se, when considered both individually and as an ordered combination, amount to no more than limitations consistent with what the courts have recognized, or those in the art would recognize, to be well-understood, routine, and conventional.

Final Act. 4–5. Appellant argues the claims recite "significantly more" because the claims demonstrate "improvement relative to the other conventional uses of computing devices" and "improve the capability of the system as a whole to increase the likelihood of discovering useful drugs by using data previously not used." Reply Br. 3; Appeal Br. 7. Appellant also argues the Examiner has not provided factual support or evidence for the "statement that the 'present claims merely implement an old practice in a new environment.'" Reply Br. 3–4.

Appellant's arguments are not persuasive. Particularly, we are not persuaded by Appellant's arguments that claim 1 demonstrates an

"improvement relative to the other conventional uses of computing devices" or "improve[s] the capability of the system as a whole to increase the likelihood of discovering useful drugs by using data previously not used." Reply Br. 3; Appeal Br. 7. As discussed *supra*, claim 1 does not recite or require "discovering useful drugs by using data previously not used." *See* Appeal Br. 7. Additionally, claim 1 does not recite more than generic and readily available computer components performing generic data storage and manipulation steps, and does not evidence an improvement over conventional uses of computing devices, as Appellant argues. *See* Reply Br. 3.

Appellant's argument that the Examiner has failed to produce factual support or evidence that claim 1 is conventional and "old practice" is also unpersuasive. *See* Reply Br. 3–4. The Examiner has noted that Appellant's Specification describes generic computer elements performing generic computer functions. Final Act. 6–7 (citing Spec. ¶ 94). The Examiner has also identified conventional techniques for performing drug discovery.[4] The Examiner further noted the claimed storage and data analysis are performed with basic computer functions, i.e., they are well-understood, routine, and conventional functions previously known to the industry. *See* Final Act. 7 (citing *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1321 (Fed. Cir. 2016) (receiving, screening, and distributing data over a computer network is well known)); *see also Versata Dev. Group, Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1334 (Fed. Cir. 2015) (receiving, storing, retrieving,

[4] For example, the Examiner has identified Hopkins as disclosing techniques for performing drug discovery using correlations between drugs, biomarkers, and diseases. *See* Hopkins ¶¶ 23, 30, 61, 63, 96, 102, 107, Fig. 3.

sorting, and eliminating information is well known); *OIP Techs.*, 788 F.3d at 1363 (storing data is well-understood, routine, and conventional); *Elec. Power Grp.*, 830 F.3d at 1356 (The claims "do not include any requirement for performing the claimed functions of gathering, analyzing, and displaying in real time by use of anything but entirely conventional, generic technology. The claims therefore do not state an arguably inventive concept . . . ."); *In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d 1303, 1316 (Fed. Cir. 2011) ("Absent a possible narrower construction of the terms 'processing,' 'receiving,' and 'storing,' . . . those functions can be achieved by any general purpose computer without special programming."). "[T]he use of generic computer elements like a microprocessor or user interface" to perform conventional computer functions "do not alone transform an otherwise abstract idea into patent-eligible subject matter." *FairWarning IP*, 839 F.3d at 1096 (citing *DDR Holdings, LLC, v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014)); *see also BSG Tech LLC v. Buyseasons, Inc.*, 899 F.3d 1281, 1286–87 (Fed. Cir. 2018) ("[C]laims are not saved from abstraction merely because they recite components more specific than a generic computer").

Considered as an ordered combination, the generic computer components of Appellant's claim 1 add nothing that is not already present when the data processing steps are considered separately. For example, claim 1 does not, as discussed above, purport to improve the functioning of the computer itself. Nor does it affect an improvement in any other technology or technical field. Instead, claim 1 amounts to nothing significantly more than an instruction to apply the abstract idea using a generic computer. That is not enough to transform an abstract idea into a

patent-eligible invention. *See Alice*, 573 U.S. at 225–26. "[A]fter *Alice*, there can remain no doubt: recitation of generic computer limitations does not make an otherwise ineligible claim patent-eligible." *DDR Holdings*, 773 F.3d at 1256; *see also SiRF Tech.*, 601 F.3d at 1333 ("In order for the addition of a machine to impose a meaningful limit on the scope of a claim, it must play a significant part in permitting the claimed method to be performed," rather than "function solely as an obvious mechanism for permitting a solution to be achieved more quickly, i.e., through the utilization of a computer for performing calculations.").

Appellant also argues the claims recite "significantly more" because "the claimed functions are clearly directed to a new application or function that was not known or obvious," and "the invention's novelty demonstrates its improvement relative to the other conventional uses of computing devices." Appeal Br. 7; Reply Br. 2–4. This improperly conflates the test for 35 U.S.C. § 101 with the separate tests for 35 U.S.C. §§ 102 and 103. *See, e.g.*, *Genetic Techs. Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1376 (Fed. Cir. 2016) ("[U]nder the *Mayo*/*Alice* framework, a claim directed to a newly discovered law of nature (or natural phenomenon or abstract idea) cannot rely on the novelty of that discovery for the inventive concept necessary for patent eligibility."); *see also* Ans. 5. As the Supreme Court emphasizes, "[t]he 'novelty' of any element or steps in a process, or even of the process itself, is of **no relevance** in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter." *Diehr*, 450 U.S. at 188–89 (emphasis added). Thus, a novel and nonobvious claim directed to a purely-abstract idea is, nonetheless, patent-ineligible. *See Mayo*, 566 U.S. at 89–91.

Because Appellant's representative claim 1, and grouped claim 12 are directed to a patent-ineligible abstract concept and do not recite an "inventive concept" under the second step of the *Alice* analysis, we sustain the Examiner's § 101 rejection of independent claims 1 and 12, and their dependent claims 2–11 and 13–20.

Rejection under 35 U.S.C. § 103

The Examiner finds the combination of Hopkins and Chen renders obvious claims 1–20. Final Act. 8–15; Ans. 5–7. Appellant contends, however, that Hopkins fails to teach or suggest "employing a drug discovery module to provide a mapping of drugs to biomarkers having a first mapping score based on the information from the matched data and the not matched data" and "employing the drug discovery module to provide a mapping of biomarkers to diseases having a second mapping score based on the information from the matched data and the not matched data" as required by claim 1, because "Hopkins fails to provide any discussion regarding the usage of not matched data from clinical trials." Appeal Br. 9–10. Appellant's contention does not persuade us of error in the Examiner's rejection, for the reasons described below.

Initially, we note that we agree with Appellant that the Specification describes multiple kinds of data, including the claimed "matched data" (which may be "clinical trial data for matched drug and biomarker candidates," *see* Spec. ¶ 23) and the claimed "not matched data from results of clinical trials" (which is "data regarding biomarkers produced by drugs in a drug trial where the biomarkers did not match desired results for the condition or disease being studied from a drug trial," *see* Spec. ¶ 100).

Reply Br. 5; Appeal Br. 9. However, we agree with the Examiner that "[t]he terms 'matched and not matched data' is non-functional, and therefore, is given little patentable weight" in the context of claim 1. Ans. 5.

First, we note that claim 1 does not recite or require "a mapping of potential links, *particularly for the not matched data*" or "identify[ing] (*from information that is normally discounted and effectively discarded*) potential drug to disease correlations" as Appellant represents. *See* Appeal Br. 9. Particularly, claim 1 does not require the "*not matched data*" *to be used for determining* the "mapping of drugs to biomarkers," the "mapping of biomarkers to diseases," and the "potential drug to disease link"; rather, claim 1 broadly requires the mappings to be "*based on extraction of information from the matched data and the not matched data*." *See* Appeal Br. 13 (Claim 1 (emphases added)). Appellant's Specification also describes identification of a potential drug (A) to disease (B) link from "a first study [that] may identify a link between drug A and biomarker x1" and "another study [that] may identify a link between biomarker x1 and disease B," which again *does not evidence the actual use* of *not matched data from results of clinical trials*. *See* Spec. ¶¶ 100, 110.

Second, to the extent Appellant is contending the claimed "not matched data" has different informational content than the "matched data" (*see* Reply Br. 5; Appeal Br. 9), claim 1 does not recite the informational content of the "not matched data" as functionally related to the claimed mappings of drugs to biomarkers and biomarkers to diseases. *See In re Distefano*, 808 F.3d 845, 850–51 (Fed. Cir. 2015) (printed matter, i.e., "claimed for what it communicates," has no patentable weight unless functionally or structurally related to the claimed invention.). As discussed

supra, claim 1 does not require the mappings to map links for *biomarkers in not matched data* (i.e., biomarkers produced by drugs in a drug trial where the biomarkers did not match desired results for the condition or disease being studied from a drug trial). *See* Appeal Br. 13 (Claim 1); *see also* Spec. ¶ 100. Although Appellant's drug discovery technique provides a potential drug to disease link based on the mappings, the *not matched data* is not applied in a way that creates a patentable distinction from Hopkins' drug discovery technique. The *content of the not matched data* is nonfunctional descriptive material that does not distinguish claim 1 from the prior art. Ans. 5. Particularly, this *content* does not reconfigure the claimed provision of mappings and drug to disease link to perform a different function than that disclosed in the prior art. For example, Hopkins teaches using various data sources to provide mappings of drugs to biomarkers and of biomarkers to diseases, and potential drug to disease links based on the mappings. *See* Hopkins ¶ 107, Fig. 3; Final Act. 9–10 (citing Hopkins ¶¶ 23, 30, 61, 63, 96, 102, 107); *see also* Hopkins ¶¶ 61 (describing the use of "[v]arious data sources . . . provided by a single, combined or federated database of information (for example the MEDLINE collection of biomedical literature), by single entry additions, by feeds of non-database information, such as news-wires, by proprietary documents or results, (e.g. internal company reports) and so on," for drug discovery), 96 (describing the use of "various sources relevant to drug discovery (e.g. research papers, internal company reports, books, clinical trial results, regulatory filings, etc.)" for drug discovery).

We, therefore, agree with the Examiner that Hopkins teaches and suggests "a drug discovery module comprising a pharmaco-genomic mapper

configured to provide a mapping of drugs to biomarkers having a first mapping score based on extraction of information from the matched data and the not matched data" and "a genome connect module configured to provide a mapping of biomarkers to diseases having a second mapping score based on extraction of information from the matched data and the not matched data," as recited in claim 1.

Appellant further contends "Hopkins also fails to teach or suggest providing a potential drug to disease link based on the mapping of drugs to biomarkers and the mapping of biomarkers to diseases using the biomarkers as a bridge between respective mappings" as recited in claim 1. Appeal Br. 11. Appellant argues:

> Hopkins maps or plots all three parameters of disease, target and compound in three dimensional space on the same plot. Any one of the three can be used to search the plot for other parameters. However, in all cases, *all three are plotted (or mapped) together in a single plot. There is no disclosure in Hopkins regarding two separate mappings, much less using biomarkers as a bridge between two separate mappings* to identify drug to disease links. To the extent a biomarker is considered analogous to a target, and the target was used as a parameter for a query or hypothesis in Hopkins to find a compound and disease, *the target is plotted with the compound and disease within the same three dimensional plot, and there is not any bridging* between separate mappings as claimed.

Id. at 10–11 (emphases added).

We are not persuaded by Appellant's arguments and agree with the Examiner's findings that Hopkins' "linkages [provided] between a specified entity on a first axis and each of the set of entities on a second axis" teach (i) two separate mappings as claimed and (ii) "a potential drug to disease link based on the [two] mapping[s] . . . using the biomarkers as a bridge between

respective mappings" as claimed. Final Act. 10 (citing Hopkins ¶¶ 30, 107); Ans. 6 (citing Hopkins ¶¶ 63, 180, 212, 233–238). For example, Hopkins' Figure 3 teaches: (i) the claimed providing a *mapping of drugs to biomarkers* ("a drug or compound (C1) is found that interacts with the target T1" (a biomarker), which "defines a second line in the matrix, represented in FIG. 3 by line B," *see* Hopkins ¶ 107); (ii) the claimed providing a *mapping of biomarkers to diseases* ("starting with the discovery or recognition of a disease (D1), a target (T1) is identified that is relevant to this disease" and "[t]he combination of D1 and T1 defines a line in the matrix, illustrated in FIG. 3 by line A . . . [that] runs parallel to the compound axis and passes through the coordinate (D1, T1, C=0)," *see id.*); and (iii) the claimed providing *a potential drug to disease link* based on the two mappings *using the biomarkers as a bridge between respective mappings* ("[t]he intersection of lines A and B, corresponding to the vector I=(D1, T1, C1), then identifies the possibility of using compound C1 as a drug for treating disease D1 by interacting with target T1," *see id.*).

We additionally note that Appellant's arguments—that Hopkins does not use "biomarkers *as a bridge between two separate mappings*" because "[Hopkins'] target is plotted with the compound and disease within the same three dimensional plot, and *there is not any bridging* between separate mappings"—are not commensurate with the scope of claim 1. *See* Appeal Br. 10–11 (emphases added). Claim 1 merely recites "using the biomarkers as a bridge between respective mappings" and does not specify details of the claimed *bridging*. Claim 1's *bridging* does not exclude the use of biomarkers to search for correlations to drugs and diseases in a 3D plot of diseases, drugs, and biomarkers (as in Hopkins). Furthermore, claim 1's

provision of *mappings* (of drugs to biomarkers and of biomarkers to diseases) does not exclude searching a 3D plot for biomarker-drug correlations and biomarker-disease correlations (as in Hopkins).[5] Thus, Appellant has not persuaded us that the claimed use of biomarkers as a bridge between mappings would preclude Hopkins' use of biomarker coordinates in a 3D plot to perform drug discovery.

Therefore, for all the reasons stated *supra*, we sustain the Examiner's rejection under 35 U.S.C. § 103 of independent claim 1, independent claim 12 for which Appellant provides the same arguments, and dependent claims 2–6, 10, 11, and 13–17 that are not argued separately. Appeal Br. 9–11.

With respect to dependent claims 7–9 and 18–20, Appellant contends the rejection of these claims is in error for the same reasons as base claims 1 and 12. Appeal Br. 11. Appellant also refers to "the features of claims 7 and 18, which generally relate to the incorporation of data quality into the mapping scores" and "the features of claims 8 and 19 . . . [and] the features of claims 9 and 20, each of which provide specific definitions for the

[5] We further note Appellant's Specification does not provide explicit and exclusive definitions for the claimed terms "mapping" and "bridge," and merely provides discussion of non-limiting examples of mappings and using biomarkers as a bridge between mappings. *See* Spec. ¶¶ 22 ("biomarkers may be used as a bridge to connecting drugs to diseases that such drugs may be effective to treat"), 23 ("identify biomarker to disease mapping such that links between drugs and diseases can be made"), 100 ("The mapping between drugs and biomarkers may be formed by extracting correlations between drugs and biomarkers"), 110 ("the mappings may be used by the drug discovery module 500 to identify correlations (i.e., bridging links) that are direct links (e.g., a one-to-one association) or indirect links (e.g., not one-to-one associations[)]"), 113 (describing "bridging or linking biomarkers").

indicator of data quality," arguing that Examiner's "cited passages [in Hopkins], and indeed all of Hopkins, are completely silent as to any indicator of data quality either literally or in any subtle way that could be construed as being analogous to an evaluation or indication of data quality." *Id.* at 11–12.

Appellant's arguments, however, have not rebutted the Examiner's specific findings regarding how Hopkins teaches and suggests the "indicator of data quality" features recited in claims 7–9 and 18–20. We have reviewed the Examiner's findings and the cited portions of Hopkins, and we concur with the Examiner's findings that: (i) Hopkins' ordering a listing of entity associations (e.g., linkages between drugs, biomarkers, and/or diseases) "according to confidence" or "relevance" teaches a mapping score including an indicator of data quality as recited in claims 7 and 18 (*see* Hopkins ¶¶ 31, 57; Final Act. 13 (citing Hopkins ¶¶ 31, 57); Ans. 7 (citing Hopkins ¶ 213)); (ii) Hopkins' search results (for a disease, such as malaria, and for targets/biomarkers listed in a database) presented by target, "with those targets that are mentioned in most information items at the top of the list," teaches an indicator of data quality defined based on an assessment of a number of biomarkers associated with a disease as recited in claims 8 and 19 (*see* Hopkins ¶ 171; Final Act. 13 (citing Hopkins ¶ 171); Ans. 7); and (iii) Hopkins' identification of classes of interaction (between particular targets/biomarkers, and drugs and diseases) using previously recognized or recently identified "targets or compounds that might be useful as a biomarker for that disease," teaches an indicator of data quality defined based on an assessment of an identity of biomarkers associated with a

disease as recited in claims 9 and 20 (*see* Hopkins ¶¶ 33, 212; Final Act. 13 (citing Hopkins ¶¶ 33, 212); Ans. 7).

Accordingly, Appellant's arguments have not persuaded us of error in the Examiner's rejection of claims 7–9 and 18–20, and we sustain the Examiner's rejection under 35 U.S.C. § 103 of claims 7–9 and 18–20.

CONCLUSION

The Examiner's decision rejecting claims 1–20 under 35 U.S.C. § 101 is affirmed.

The Examiner's decision rejecting claims 1–20 under 35 U.S.C. § 103 is affirmed.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–20	101		1–20	
1–20	103	Hopkins, Chen	1–20	
Overall Outcome			1–20	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED