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Paper 26
Date: October 29, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROFRAC HOLDING CORPORATION and
U.S. WELL SERVICES, LLC,
Petitioner,

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner.

PGR2023-00023
Patent 11,373,058 B2

Before HUBERT C. LORIN, JAMES L. MAYBERRY, and BRENT M. DOUGAL, *Administrative Patent Judges.*

DOUGAL, *Administrative Patent Judge*.

JUDGMENT
Determining All Challenged Claims Unpatentable
35 U.S.C. § 328(a)

PGR2025-00060
TankLogix, LLC v. SitePro, Inc.
TankLogix's Exhibit 1013
EX1013, Page 1

I. INTRODUCTION

A. Background and Summary

Petitioner, ProFrac Holding Corporation and U.S. Well Services, LLC, requested that we institute a post-grant review challenging the patentability of claims 1–20 (the "challenged claims") of U.S. Patent 11,373,058 B2 (Ex. 1001, "the '058 patent"). Paper 2 ("Petition" or "Pet."). Patent Owner, Halliburton Energy Services, Inc., argued that Petitioner's request was deficient. Paper 6 ("Preliminary Response" or "Prelim. Resp."). Applying the standard set forth in 35 U.S.C. § 324(a), we instituted a post-grant review of all challenged claims. Paper 9 ("Dec.").

During the course of the proceeding, Patent Owner filed a Response (Paper 14, "PO Resp.") and a Sur-reply (Paper 21, "Sur-reply"), and Petitioner filed a Reply (Paper 16, "Reply"). An oral hearing was held on August 14, 2024, and a copy of the transcript is in the record. Paper 25 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 328(a) and 37 C.F.R. § 42.73 as to the patentability of the challenged claims. Having reviewed the arguments and supporting evidence, we determine that Petitioner has shown by a preponderance of the evidence, that claims 1–20 are unpatentable.

B. The '058 Patent

The '058 patent is titled "System and Method for Treatment Optimization." Ex. 1001, code (54). The '058 patent discloses "techniques for optimizing well treatments using representative system models selected according to formation responses to stimuli indicated by sensor data." *Id.* at 2:12–15. Techniques are described that generate a sequence of stimuli for application to a well environment in order to produce a response from the

formation. *Id.* at 2:12–22. Sensor data in response to the generated sequence of stimuli can then be received from sensors deployed throughout the well (*e.g.*, surface sensors, downhole sensors, wireline sensors, etc.). *Id.* The stimuli and response combination "can be mapped to respective system models maintained in an accessible data store." *Id*. at 3:44–49. The representative system model is then used to "control fracturing operations," such as the settings on an electric fracturing pump. *Id.* at 4:8–12, 8:45–49.

C. Illustrative Claim

Of the challenged claims, claims 1, 9, and 16 are independent, and claim 1 is representative:

> 1. A computer-implemented method for controlling electrical fracturing equipment for fracturing a well, the method comprising:
>
> generating a sequence of stimuli for application to a well environment, the sequence of stimuli comprising one or more of particulate concentrations, chemical concentrations, or a pump rate control;
>
> receiving formation response data comprising data from one or more downhole sensors or surface sensors;
>
> selecting a representative system model based on the received formation response data and sequence of stimuli; and
>
> controlling an electrical fracturing pump based on the representative system model.

Ex. 1001, 11:54–67.

D. Evidence

Petitioner's grounds of unpatentability rely on the following evidence:

Name	Patent Document	Exhibit
Pankaj	U.S. 2018/0230782 A1 (Aug. 16, 2018)	1005
Payne	U.S. 2016/0258267 A1 (Sept. 8, 2016)	1006
Dawson	U.S. 10,378,333 B2 (Aug. 13, 2019)	1024
Lecerf	U.S. 10,087,722 B2 (Oct. 2, 2018)	1027
Klumpen	U.S. 8,352,227 B2 (Jan. 8, 2013)	1019

E. Asserted Grounds

Petitioner asserts the following grounds of unpatentability (Pet. 24), supported by the declarations of Michael Nikolaou. (Exs. 1003, 1050):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–20	101	Eligibility
1–4, 6, 7, 9–12, 14, 16–19	103	Pankaj, Payne
5, 6, 13	103	Pankaj, Payne, Dawson
8, 15, 20	103	Pankaj, Payne, Lecerf
3, 11, 18	103	Pankaj, Payne, Klumpen

II. ANALYSIS

A. Introduction

We note at the outset that Petitioner bears the burden to demonstrate unpatentability. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Further, the '058 patent's eligibility for post-grant review is not disputed. *See* Pet. 2; *see generally* PO Resp.

In our below analysis, we first review the level of ordinary skill in the art and claim construction, before turning to subject matter eligibility under 35 U.S.C. § 101 and the obviousness grounds under 35 U.S.C §103.

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the

invention. *Graham v. John Deere Co.*, 383 U.S. 1, 13, 17 (1966). Petitioner asserts that a person of ordinary skill in the art (POSITA):

> would have had a B.S. in Chemical Engineering, Mechanical Engineering, Materials Science, or Metallurgical Engineering or an equivalent field and at least two years of academic or industry experience in the oil and gas industry, including experience with process control systems. Further, a person with additional education but less professional experience, and vice-versa, may qualify.

Pet. 23–24 (citing Ex. 1003 ¶ 4). Patent Owner adopts Petitioner's definition. PO Resp. 6.

We are persuaded, on the present record, that Petitioner's proposal is consistent with the problems and solutions in the '058 patent and prior art of record. We adopt Petitioner's definition of the level of skill for the purposes of this Decision.

C. Claim Construction

In post-grant review, we construe claims using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.200(b) (2022).

Neither Petitioner, nor Patent Owner, provides constructions of any claim terms. Pet. 25; PO Resp 6–7. We determine that no terms need to be construed. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Legal Standard under 35 U.S.C § 101 – Eligibility

1. Section 101

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 U.S. Supreme Court states that § 101 includes the implicit exceptions of: "[l]aws of nature, natural phenomena, and abstract ideas." *E.g.*, *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we use the Court's two-part framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). 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.").

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, 67 (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))).

The claim in *Diehr* recited a mathematical formula, but the Court held that "a claim drawn to subject matter otherwise statutory does not become

nonstatutory simply because it uses a mathematical formula." *Diehr*, 450 U.S. at 187; *see also id.* at 191 ("We view respondents' claims as . . . a process for molding rubber products and not as an attempt to patent a mathematical formula."). However, the Court also indicated that a claim "seeking patent protection for that formula in the abstract . . . is not accorded [patent protection] . . . by attempting to limit the use of the formula to a particular technological environment." *Id.* (citation omitted) (citing *Benson* and *Flook*).

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. "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.* (alterations in original) (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.*

2. USPTO Section 101 Guidance (MPEP)

Office policy dictates that the Board follow the 2019 Revised Guidance on the application of § 101. 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) ("2019 Revised Guidance"). The Office issued further guidance on October 17, 2019, clarifying the 2019 Revised Guidance.[1] These have been incorporated into

[1] USPTO, *October 2019 Update: Subject Matter Eligibility* (the "October 2019 Update") (available at https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf).

the Manual of Patent Examination Procedure ("MPEP"). *See* MPEP, Ninth Edition, Revision 07.2022, published February 2023; Section 2106 Patent Subject Matter Eligibility.

According to the guidance set forth in the MPEP, we look to see whether a claim is directed to a judicial exception. MPEP 2106.04 Eligibility Step 2A. "Step 2A is a two-prong inquiry, in which [the Board] determine[s] in Prong One whether a claim recites a judicial exception, and if so, then determines in Prong Two if the recited judicial exception is integrated into a practical application of that exception. Together, these prongs represent the first part of the Alice/Mayo [framework], which determines whether a claim is directed to a judicial exception." *Id*.

Step 2B of the Office's eligibility analysis is the second part of the *Alice/Mayo* framework. "Step 2B asks: Does the claim recite additional elements that amount to significantly more than the judicial exception?" MPEP 2106.05 Eligibility Step 2B.

E. 35 U.S.C § 101 – Claims 1, 9, 16

Petitioner argues that claim 1 is representative of each of independent claims 1, 9 and 16. Pet. 86–87 (citing *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass'n*, 776 F.3d 1343, 1348 (Fed. Cir. 2014) ("The Board may consider a representative claim when other claims are 'substantially similar and linked to the same abstract idea.'")). As "Patent Owner agrees" (PO Resp. 7), we address claim 1 as representative.

1. Step 1

Step 1 asks whether the claimed subject matter falls within the four statutory categories of patentable subject matter identified by 35 U.S.C. § 101: process, machine, manufacture, or composition of matter.

Claim 1 recites "[a] computer-implemented method for controlling electrical fracturing equipment for fracturing a well," and corresponding steps. Ex. 1001, 11:54–55. Claim 1 falls within the process category. *See* PO Resp. 10; Pet. 93 n.7.[2]

2. Step 2A, Prong One

In order to determine whether claim 1 is directed to an abstract idea, under Step 2A, Prong One, we first determine whether claim 1 recites an abstract idea (i.e., mathematical concepts, certain methods of organizing human activity such as a fundamental economic practice, or mental processes).

The Petition argues that claim 1 is directed to a mental process. *Id.* at 91. In our Institution Decision, we reviewed each of the claimed method steps, and Petitioner's evidence, and determined that the record preliminarily supported a finding that the steps of "receiving formation response data comprising data from one or more downhole sensors or surface sensors" and "selecting a representative system model based on the received formation response data and sequence of stimuli" are mental processes. Dec. 23–24 (citing Pet. 91; Ex. 1001, 1:9–26). Concerning the "controlling" step, we

[2] Our analysis throughout focuses on the Petition, while not addressing many of the arguments in Petitioner's Reply. This is because the Reply largely ignores the positions in the Petition on patent eligibility and offers new theories and evidence. We decline to address these late and new arguments.

implicitly agreed with Patent Owner that this was not a mental process. *Id.* at 21–22, 24.

In response, Patent Owner continues its focus on the "controlling" step, arguing that "controlling electrical fracturing equipment for fracturing a well is a far cry from an abstract mental process." PO Resp. 27 (referring to Ex. 1001, 66–67); *see also id.* at 33 ("to the extent the steps of "receiving formation response data . . ." and "selecting a representative system model . . ." are deemed to recite mental processes, the additional element of "controlling an electrical fracturing pump . . ." integrates them into a practical application."). Patent Owner also argues that "[t]he Petition does not allege that 'generating a sequence of stimuli for application to a well environment' as claimed can be performed in the human mind" and that "controlling the settings on an electrical fracturing pump is not something that can be performed in the human mind" *Id.*

Patent Owner does not address whether the steps of "receiving formation response data comprising data from one or more downhole sensors or surface sensors" and "selecting a representative system model based on the received formation response data and sequence of stimuli" are mental processes. We determine that the record supports that they are.

The Background of the '058 patent supports our finding that these steps are mental processes. In particular, the '058 patent teaches that it was known that "*a technician may review sensor data*" and that "*a representative system model may be used for determining pump settings based on sensor information*; however, the representative system model is typically *manually selected by a technician based on observed sensor data*." *Id.* at 22 (quoting Ex. 1001, 1:9–26); *see also* Dec. 23–24 (preliminarily finding these claimed

steps to be mental processes); Pet. 91 (discussing the teachings of the '058 patent).

Regarding the claimed step of "controlling an electrical fracturing pump based on the representative system model," Patent Owner does argue, and we agree, that it is not a mental process in that one of ordinary skill in the art would not have performed it in the human mind. PO Resp. 27. We also agree that the Petition does not expressly argue that the step of "generating a sequence of stimuli for application to a well environment" is a mental process.

However, the '058 patent explains that these two steps may be performed via a generic computer. Ex. 1001, 6:6–36, 6:65–7:33, 8:56–9:28. Requiring the use of a computer does not change the focus of the claim away from being directed towards an abstract idea. "[T]he inability for the human mind to perform each claim step does not alone confer patentability." *FairWarning IP, LLC v. Iatric Sys*., 839 F.3d 1089, 1098 (Fed. Cir. 2016) ("As we have explained, 'the fact that the required calculations could be performed more efficiently via a computer does not materially alter the patent eligibility of the claimed subject matter.'" (quoting *Bancorp Servs. v. Sun Life Assur. Co.,* 687 F.3d 1266, 1278 (Fed. Cir. 2012)). *See* also *Miller Mendel, Inc. v. City of Anna, Texas*, 107 F.4th 1345, 1353 (Fed. Cir. 2024). ("We are not persuaded that claim 1 cannot be directed to an abstract idea even if certain steps cannot be completed in the mind or by pen and paper. . . . [R]equiring the use of a computer alone does not change the focus of a claim directed towards an abstract idea into one directed towards 'a specific improvement to computer functionality.' *In re TLI Commc'ns LLC Pat. Litig*., 823 F.3d 607, 612 (Fed. Cir. 2016)."

Having determined that claim 1 recites a mental process we advance to the next step under *Alice*.

3. Step 2A, Prong Two

Under Step 2A, Prong Two, if a claim recites a judicial exception, we determine whether the recited judicial exception is integrated into a practical application of that exception by (a) identifying whether there are any additional elements recited in the claim beyond the judicial exception(s); and (b) evaluating those additional elements individually and in combination to determine whether they integrate the exception into a practical application. 2019 Revised Guidance, 84 Fed. Reg. at 54–55. If the recited judicial exception is integrated into a practical application, the claim is not directed to the judicial exception. *Id.*

The additional elements, beyond the judicial exception are:

> generating a sequence of stimuli for application to a well environment, the sequence of stimuli comprising one or more of particulate concentrations, chemical concentrations, or a pump rate control;
>
> . . . and
>
> controlling an electrical fracturing pump based on the representative system model.

Ex. 1001, 11:57–67.

In our Institution Decision, and in response to Patent Owner argument, we preliminarily determined that "[t]he controlling step generically applies the selected representative system model to the electrical fracturing pump without adding anything specific to the control. Thus, it would appear to merely link the judicial exception to a technical field." Dec. 26. For this reason, we determined that this step does not add '"a meaningful limitation' to the claim." *Id.* The "generating" step similarly, generically lists

multiple different stimuli to be applied to a well to link the judicial exception to a technical field.

Patent Owner argues that the steps "are inextricably tied to steps that involve physically stimulating a given formation[3] in the Earth using a sequence of stimuli in order to determine how the formation responds to the sequence of stimuli." PO Resp. 27. Patent Owner further argues that "the additional element of 'controlling an electrical fracturing pump based on the representative system model' integrates [the mental processes] into a practical application" based on an example in the October 2019 Update.

However, Patent Owner's own characterization of the claimed advance of the '058 patent shows why these additional elements do not do anything more than link the judicial exception to a technical field. Patent Owner characterizes the claimed advance of the '058 patent as "selection of a representative system model that more accurately reflects the well to which it is applied, thereby improving fracturing operations." *Id.* at 12; *see also id.* at 18 ("part of the claimed advance . . . is enabling the selection of a more accurate representative system model to use for controlling electrical fracturing pumps"). Patent Owner argues that this provides "an improved approach for controlling an electrical fracturing pump." *Id.*

Patent Owner's analysis focuses on the representative system model and on how critical it is to select such a "model that accurately reflects the well to which it is applied." *Id.* at 15 (citing Ex. 2014, 22:1–23:6 (Patent Owner's Declarant making similar statements)); *see also id.* at 16–17. Patent

[3] We note that the actual claim language is "generating a sequence of stimuli for application to a well environment." Ex. 1001, 11:57–58. Claim 1 does not expressly require "physically stimulating a given formation in the Earth" and we take no position on the full extent of the scope of that limitation.

Owner further states that the '058 patent solves the known "problem[s] by 'provid[ing] techniques for optimizing well treatments using representative system models selected according to formation responses to stimuli indicated by sensor data.'" *Id.* (quoting Ex. 1001, 2:12–16).

Patent Owner's arguments support a finding that the mental processes of "receiving formation response data comprising data from one or more downhole sensors or surface sensors" and "selecting a representative system model based on the received formation response data and sequence of stimuli" are the focus of the claimed advance and that the other steps do not integrate the exception into a practical application, but rather apply it to a technical field. *See also* Reply 19; *Contour IP Holding LLC v. GoPro, Inc*., 113 F.4th 1373, 1379 (Fed. Cir. 2024) ("At *Alice* step one, we determine whether the claims are directed to patent ineligible subject matter. We often examine the "focus of the claimed advance over the prior art." *Affinity Labs of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016); *see* also *Enfish, LLC v. Microsoft Corp*., 822 F.3d 1327, 1335 (Fed. Cir. 2016). We conduct this analysis by ascertaining the "basic character" of the claimed subject matter. *Trinity Info Media, LLC v. Covalent, Inc*., 72 F.4th 1355, 1361 (Fed. Cir. 2023) (citations omitted).").

Patent Owner also points to Example 45 in Appendix 1 to the October 2019 Update as supporting its position that claims include meaningful limitations other than the mental process. PO Resp. 34. However, this Example is distinguishable from the present claims. Patent Owner states that the "control" aspects of claim 2 in the Example render it eligible because it adds a meaningful limitation, and that these limitations are similar to the claimed "control" step. *Id.*

Similar to the Example, Patent Owner argues that "[t]he controlling step in claim 1 . . . adds a meaningful limitation because it employs the information provided by the alleged judicial exception (the selected representative system model) to 'control[] an electrical fracturing pump based on the representative system model' and thereby achieve more favorable subsurface conditions for fracturing operations." *Id.* (citing Ex. 1001, 11:66–67).

However, claim 2 in Example 45 does not merely "employ" the judicial exception in a generic control function. Claim 2 requires a controller configured to "send control signals to the injection molding apparatus once the polyurethane has reached a target percentage, the control signals instructing the apparatus to open the mold and eject the molded polyurethane from the mold." October 2019 Update, 20. "Controlling an electrical fracturing pump based on the representative system model," does not add any similar additional limitations. Rather, it simply applies the selected representative system model to a pump.

As is discussed later, the present claims are dissimilar to many Federal Circuit cases where the claims were found eligible because of this contrast between specific requirements and generic controlling.

4. Step 2B

Under Step 2B, 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, [and] conventional" in the field; 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. 2019 Revised Guidance, 84 Fed. Reg. at 56.

Petitioner argues that "the claims 'amount to nothing more than applying the … abstract idea using techniques that are, whether considered individually or as an ordered combination, well-understood, routine, and conventional.' *cxLoyalty Inc. v. Maritz Holdings Inc*., 986 F.3d 1367, 1377 (Fed. Cir. 2021)." Pet. 97.

The Petition cites the Background of the '058 patent to support its argument that the specification admits that many of the claimed steps were known. *Id.* at 91.

> In the oil and gas industry, electric frac pumps are often controlled in order to achieve certain downhole environment responses. However, typically *settings are performed manually based on manually appraised information retrieved from the downhole environment*. For example, *a technician may review sensor data* and, based on experience, *adjust various settings* such as flow rate, pressure values, chemical compositions, etc., *on an electric frac pump*. In some cases, *a representative system model may be used for determining pump settings based on sensor information*; however, the representative system model is typically *manually selected by a technician based on observed sensor data*. Additionally, the representative system model may be a static construct and may not accurately reflect the well to which it has been deployed.

Ex. 1001, 1:9–26 (emphasis added). From the above, it will be understood that much of claim 1 was well-understood, routine, and conventional, whether considered individually or as an ordered combination.

The above paragraph makes clear that "controlling an electrical fracturing pump based on the representative system model" was known and conventional. In addition, adjusting settings on an electrical fracturing pump is also how the '058 patent teaches to generate a sequence of stimuli. Ex. 1001, 2:25–33 ("A given stimulus of the sequence of stimuli can be achieved by adjusting . . . flow rates . . . . In some examples, a sequence can include a

particular stimulus (e.g., injection rate) being stepped through a sequence of various amplitudes (e.g., high, medium, low, etc.).”). Thus, generating a sequence of stimuli is also acknowledged as being known in the Background. *See also* Dec. 22–23 (preliminarily finding that these limitations were known).

Petitioner provides additional argument that other references also show that these limitations were known. *See e.g.*, Pet. 94. However, it is not necessary for us to review these in view of the express acknowledgement of the state of the art in ’058 patent.

Based on the record, we determine that claim 1 does not include any specific limitation beyond the judicial exception that is not “well-understood, routine, [and] conventional” in the field.

In view of the above sections of analysis, and based on a preponderance of the evidence, we determine that independent claims 1, 9, and 16 are directed to a mental process without significantly more, i.e., a patent ineligible abstract idea.

5. Comparing Caselaw

The Petition also argues that claim 1 is “directed to the abstract idea of ***selecting a plan*** (“representative system model”) ***for a desired result*** (“controlling” a pump) ***based on information received*** (“response data”) ***in response to one or more inquiries*** (“sequence of stimuli”).” Pet. 87. The Petition uses this theory to compare the present claims with Federal Circuit cases where the claims have been found to be abstract. *Id.* at 88–90.

Having determined that the Petition establishes that the independent claims are directed to mental processes, it is unnecessary for us to address this alternative approach to determine whether the claims include patent

eligible subject matter. At the same time, we do analyze the noted case law addressed by the parties.

The Petition argues that the claims are "the type that has been 'repeatedly been found abstract by the Federal Circuit.'" Pet. 87–88 (discussing *TDE Petroleum Data Solutions, Inc. v. AKN Enter*., 657 F. App'x 991 (Fed. Cir. 2016) and *FairWarning IP, LLC v. Iatric Sys*., 839 F.3d 1089 (Fed. Cir. 2016)). Relevant to our analysis, the Petition provides the following discussion of *TDE Petroleum Data Solutions*:

> In *TDE Petroleum Data Solutions, Inc. v. AKN Enter*., the claim was directed to an "automated method for determining the state of a well operation." 657 F. App'x 991, 992 (Fed. Cir. 2016). The claim required "storing a plurality of states for a well operation," "receiving mechanical and hydraulic data … from a plurality of systems" (which the specification described as including "receiving data from sensors deployed on the oil well"), "determining that at least some of the data is valid by comparing [it] … to at least one limit," and, if the data is valid, "based on the mechanical and hydraulic data, automatically selecting one of the states as the state of the well operation." *Id*.
>
> The *TDE Petroleum* claim is therefore in the same field as the '058 patent claims and closely matches claim 1 thereof. The Federal Circuit, addressing *Alice* step one, noted that claims "generally reciting 'collecting information, analyzing it, and displaying certain results of the collection and analysis' are a 'familiar class of claims 'directed to' a patent-ineligible concept." *Id*. at 993 (citing *Elec. Power*, 830 F.3d at 1354). The Court thus held that the *TDE Petroleum* claim "is the sort of data gathering and processing claim that is directed to an abstract idea." *Id*. at 993.

Pet. 88–89.

In our Institution Decision, we preliminarily found *TDE Petroleum Data Solutions* to be "informative given the similarity between the "receiving," "determining" and "selecting" steps in that case and at least the

"receiving" and "selecting" steps in claim 1." Dec. 21 (internal citation omitted). Though we noted that it was "not a perfect fit" because of the lack of a '"controlling' step." *Id.*

We determine that *TDE Petroleum Data Solutions* supports our determination that claim 1 is directed to an abstract idea.

Similar to *TDE Petroleum Data Solutions*, we find that the steps of "receiving formation response data" and "selecting a representative system model based on the received formation response data and sequence of stimuli" are "ordinary of steps in data analysis" that merely involve "collecting information" and "analyzing it." *TDE Petroleum Data Solutions*, 657 Fed. App'x. at 993. Having determined that the "generating" and "controlling" steps in claim 1 are known and conventional steps that do not render the claim patent eligible, this limits the differences between the present claims and those in *TDE Petroleum Data Solutions*. Though Patent Owner asserts that the claims at issue here "recite[] *significantly more* than collecting and analyzing data" (PO Resp. 46), we are not aware of (and Patent Owner does not identify) any significant differences that would render the claims patent eligible.

Patent Owner identifies a number of similar cases, none of which address mental processes, but which Patent Owner argues show that the claims are patent eligible. PO Resp. 37–43. These cases are exemplified by *EcoServices, LLC v. Certified Aviation Services, LLC*, 830 Fed. App'x. 634, 636 (Fed. Cir. 2020).

Patent Owner argues that the claims are "closely analogous" to the claims found patent eligible in *EcoServices*. PO Resp. 37–38. However, those claims are distinguishable in that they are directed to physical hardware of "a washing unit," "an information detector," and "a control

unit." *Id.* The present claims are directed to a "computer-implemented method" and even the system of claim 9 only requires "a memory." Ex. 1001, 11:54, 12:39. The present claims do not include the types of physical hardware (without any identified mental processes) highlighted by Patent Owner.

Patent Owner further argues that "the step of 'controlling an electrical fracturing pump based on the representative system model' closely mirrors the [patentable] functionality of *EcoServices'* control unit configured to regulate the washing unit according to washing parameters associated with the washing program." PO Resp. 38. However, as we have found herein, this step is acknowledged as conventional in the Background of the '058 patent. *See also* Reply 16 ("any identified hardware [in the claims] is used in its conventional manner"). It "cannot transform a patent-ineligible abstract idea into a patent-eligible invention." *Alice*, 1573 U.S. at 208.

We further determine that the above caselaw supports our determination that independent claims 1, 9, and 16 are directed to an abstract idea and are therefore ineligible patent subject matter.

F. 35 U.S.C § 101 – Dependent Claims

1. Claims 3, 6–8, 11, 14–15, 18, 20

The Petition argues that dependent claims 3, 6–8, 11, 14–15, 18, and 20 are also patent ineligible under 35 U.S.C. § 101. Pet. 99–101, 103–105. Patent Owner does not address these arguments.

We have reviewed the arguments and evidence, and determine based on a preponderance of the evidence, that these claims are directed to ineligible patent subject matter.

2. Claims 2, 10, 17

The Petition argues that dependent claims 2, 10, and 17 are also patent ineligible under 35 U.S.C. § 101. Pet. 99. Patent Owner argues that the Petition has not shown that these claims are "well understood, routine, or conventional," and thus these claims are patent eligible. PO Resp. 55–56.

The Petition argues that:

> These claims require that the "system model is retrieved from a data store based [on] the received formation response data." EX-1001, claims 2, 10, 17. The specification describes the "data store" as a "local memory, or a remote data store, such as networked memory or storage." *Id*. [7:20-21]. Thus, the data store is conventional computer memory (whether local or remote), and cannot transform the claims into ones that are patent eligible. *Alice*, 573 U.S. at 226 (holding that a "data storage unit" is "purely functional and generic" and does not offer a "meaningful limitation beyond generally linking" the use of the method to "implementation via computers"). Moreover, data stores for storing well models were well-known in the art. *See* Rashid, EX-1018, Fig. 6; [0067]; Ex. 1003, ¶¶ 192–193.

Pet. 99.

Patent Owner faults this analysis as not addressing "how the data store is used in the claim." PO Resp. 56. In particular, Patent Owner argues that the Petition does not address "how models are retrieved, let alone that they are retrieved based on formation response data." *Id.*

It is unclear what additional disclosure is necessary. The independent claims already require that selection of the representative system model be "based on the received formation response." Thus, the system model retrieved from a data store would be based on the received formation response data.

Patent Owner does not contest that data stores and retrieving models from data stores were known and conventional. Based on the evidence of

record, we agree with Petitioner that the data store is conventional computer memory and that it was known to retrieve "selected" representative system models from a data store. *See* Ex. 1001, 7:20–21; Ex. 1018, Fig. 6, ¶ 67; Ex. 1003 ¶¶ 192–193; Ex. 1050 ¶¶ 39–43.

Thus, we determine based on a preponderance of the evidence, that the claims 2, 10, and 17 are directed to ineligible patent subject matter.

3. Claims 4, 12, 19

The Petition argues that dependent claims 4, 12, and 19 are also patent ineligible under 35 U.S.C. § 101. Pet.101–102. Patent Owner argues that the Petition has not shown that these dependent claims are "well understood, routine, or conventional," and thus these claims are patent eligible. PO Resp. 57. Patent Owner's argument does not address the position of the Petition.

Claim 4 states:

> The method of claim 1, wherein selecting the representative system model further comprises:
>
> determining one of a linear or a non-linear relationship between the sequence of stimuli and received formation response data; and
>
> updating the one of the linear or the non-linear relationship based on multiple iterations of the generated sequence of stimuli.

Ex. 1001, 12:7–14. Claims 12 and 19 include similar limitations. *Id.* at 12:57–66, 14:9–17.

The Petition argues that these claims are "the epitome of abstractness because the relationship between two quantities can only be either linear or non-linear." Pet. 101. The Petition continues: "[a]dding that the relationship is then updated based on multiple iterations is just as abstract, because a POSITA would understand that if the relationship is not regularly updated the data and model will quickly be outdated and unreliable." *Id.*

The Petition argues that "[t]he 058 specification . . . provides no detail concerning ***how*** the additional steps of claims 4, 12, and 19 are performed" and that these claims "effectively seek to improperly monopolize determining and updating ***both of*** a linear or non-linear relationship between the stimuli and response data." *Id.* at 102.

As Patent Owner does not address the ground in the Petition, it is uncontested that claims 4, 12, and 19 are directed to an abstract idea. Patent Owner's position that these limitations are unconventional, even if true, does not convert an abstract claim into a non-abstract claim.

We agree with Petitioner and determine, based on a preponderance of the evidence, that the claims 4, 12, and 19 are directed to ineligible patent subject matter for the reasons discussed above.

4. Claims 5, 13

The Petition argues that dependent claims 5 and 13 are also patent ineligible under 35 U.S.C. § 101. Pet. 102–103. Patent Owner argues that the Petition has not shown that these dependent claims are "well understood, routine, or conventional," and thus these claims are patent eligible. PO Resp. 57–58.

Claim 5 states:

> The method of claim 1, wherein the data from the one or more downhole sensors or surface sensors is used to determine changes in flow distribution in response to a diverter drop, the changes in flow distribution used to determine the representative system model.

Ex. 1001, 12:15–19. Claim 13 includes a similar limitation. *Id.* at 12:65–13:2.

The Petition argues that "the use of diverters and sensors to determine a diverter drop was conventional and well-known." Pet. 102. In support,

Petitioner points to Dawson as teaching the use of pressure sensors and "pressure signals to assess effectiveness of a diverter in a stimulation wellbore." *Id.* at 103 (citing Ex. 1024, Abstr.). Petitioner argues that "[a] POSITA would have recognized that these pressure changes . . . represent 'changes in flow distribution' based on the effectiveness of that diverter using sensors to measure the pressure changes." *Id.* (citing Ex. 1003 ¶¶ 192–193).

The Petition argues that though Pankaj doesn't disclose the use of a diverter, "[a] POSITA would have understood that fracturing operations, such as described in Pankaj, commonly use diverter drops." Pet. 66 (citing Ex. 1003 ¶ 154; Ex. 1024, 1:16–50). The Petition argues that similar to Dawson, "Pankaj discloses the "dynamic measurement of the fluid properties through the wellbore, which a POSITA would have understood represent the 'changes in flow distribution' through the wellbore." *Id.* at 102 (citing Ex. 1005 ¶ 53). Petitioner further argues that "Pankaj discloses that these fluid properties are used to match the resulting predicted values versus the observed data to confirm the model is correct, e.g., to 'determine the representative system model.'" *Id.* (citing Ex. 1005 ¶¶ 76–77; Ex. 1003 ¶¶ 192–193). For all of these reasons, the Petition argues that the limitations of claims 5 and 13 are merely known and conventional.

Patent Owner does not address the teachings of the references. Thus, it is uncontested that Dawson teaches that it was known to use "the data from the one or more downhole sensors or surface sensors . . . to determine changes in flow distribution in response to a diverter drop." Pet. 103; Ex. 1024, Abstr. Further it is uncontested that Pankaj teaches that it was known to use "changes in flow distribution used to determine the representative system model." Pet. 102; Ex. ¶¶ 76–77.

Patent Owner solely argues that relying on two references to "show disclosure of this claim element undermines the Petition's assertion that the subject matter of these claims was even known, let alone well-known, routine, and conventional." PO Resp. 58.

Patent Owner cites no precedent and provides no additional legal reasoning for why the use of two references would mandate a finding that a claim limitation is not known or conventional. No such rule exists.

A patent application is not a dictionary that defines every common element known in the relevant industry. The disclosure of '058 patent related to diverters is a great example of this. Though the disclosure mentions diverters, it does not provide a detailed discussion of the particulars of diverters. *See e.g.*, Ex. 1001, 2:28, 4:15, 7:38, 8:48. Rather, one of skill in the art would need to look elsewhere for that information. The lack of disclosure in the'058 patent does not mean that diverters were not well-known, routine, and conventional at the time of invention.

Based on the preponderance of the evidence, we determine that the limitations of claim 5 and 13 add merely routine and conventional limitations to the abstract idea of the independent claims. Thus, we determine that claims 5 and 13 are directed to ineligible patent subject matter.

G. 35 U.S.C. § 103

Petitioner argues that claims 1–20 are also unpatentable as obvious. Pet. 25–82. Patent Owner disagrees. PO Resp. 58–80.

We have already determined that claims 1–20 are unpatentable as directed to ineligible subject matter under 35 U.S.C. § 101. Thus, this Decision addresses all claims challenged under multiple grounds. *See* 35 U.S.C. § 328(a) ("If a post-grant review is instituted and not dismissed under

this chapter, the Patent Trial and Appeal Board shall issue a final written decision with respect to the patentability of any patent claim challenged by the petitioner."). We decline to separately assess these additional asserted grounds of unpatentability.

III. CONCLUSION[4]

For the foregoing reasons, we determine, based on the preponderance of the evidence, that Petitioner has proven that all of the challenged are unpatentable, as summarized in the following table:

Claims	35 U.S.C. §	Reference(s) /Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–20	101	Eligibility	1–20	
1–4, 6–7, 9–12, 14, 16–19	103[5]	Pankaj, Payne		
5, 6, 13	103	Pankaj, Payne, Dawson		
8, 15, 20	103	Pankaj, Payne, Lecerf		
3, 11, 18	103	Pankaj, Payne, Klumpen		
Overall Outcome			1–20	

[4] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

[5] As explained above, because we determined that the challenged claims are unpatentable under § 101, we decline to address the grounds under § 103.

IV. ORDER

In consideration of the foregoing, it is hereby ORDERED that:

Claims 1–20 of U.S. Patent 11,373,058 B2 have been shown to be unpatentable; and

Because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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