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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HONEYWELL INTERNATIONAL INC.
Patent Owner and Appellant

Appeal 2019-003778
Reexamination Control 90/020,121
United States Patent 8,204,717 B2
Technology Center 3900

Before JOHN A. JEFFERY, MARC S. HOFF, and ERIC B. CHEN, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. §§ 134 and 306 the Examiner's decision to reject claims 1–41. We have jurisdiction under 35 U.S.C. §§ 134 and 306, and we heard the appeal on December 2, 2019.

We AFFIRM.

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[1] Appellant identifies the real party in interest as Honeywell International, Inc. Appeal Br. 2.

STATEMENT OF THE CASE

This proceeding arose from a request for *ex parte* reexamination filed on December 1, 2017 of United States Patent 8,204,717 B2 ("the '717 patent"), issued to McLaughlin et al. on June 19, 2012.

The '717 patent describes using cloud computing in equipment for health monitoring applications. To this end, the system includes a computing cloud, with data storage and processing units, that provides a service. In one implementation, clients communicate with the computing cloud and transmit information associated with an industrial automation unit to the computing cloud so that the computing cloud's processor can determine the automation unit's status. *See* Abstract. Claim 1 is illustrative of the invention and is reproduced below:

> 1. A system comprising:
>
> a computing cloud comprising one or more data storage units and one or more processing units, wherein the computing cloud is configured to provide at least one service and shared hardware and software resources; and
>
> a plurality of clients;
>
> wherein the computing cloud is configured to provide the at least one service and the shared hardware and software resources for use by the clients;
>
> wherein each client is configured to communicate with the computing cloud and at least one industrial automation unit and to transmit information associated with the at least one industrial automation unit to the computing cloud; and
>
> wherein at least one of the one or more processing units in the computing cloud is configured to determine a status of the at least one industrial automation unit using the information provided by the clients.

THE REJECTIONS

The Examiner rejected claims 1–23, 25–29, 31–36, and 38–41 under 35 U.S.C. § 102(b) as anticipated by Karasawa (US 7,133,807 B2; issued Nov. 7, 2006). Final Act. 2–19.[2]

The Examiner rejected claims 24, 30, and 37 under 35 U.S.C. § 103(a) as unpatentable over Karasawa and Imai (US 2004/0220778 A1; published Nov. 4, 2004). Final Act. 19–21.

THE ANTICIPATION REJECTION

The Examiner finds that Karasawa discloses every recited element of independent claim 1 including a "computing cloud," namely vendor-side computer 26, that is configured to provide at least one service, namely restoration processing, and shared hardware and software resources, which are said to correspond to (1) storage section 29, databases 32–35, and communication lines 100 (shared hardware resources), and (2) software updates (shared software resources). Final Act. 2–4.

Appellant argues that not only is Karasawa's remote vendor-side computer not a computing cloud as the term is understood in the art, the vendor-side computer does not provide shared hardware or software resources, let alone divide data and processes with the plant-side computer.

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[2] Throughout this opinion, we refer to (1) the Final Rejection mailed July 17, 2018 ("Final Act."); (2) the Appeal Brief filed November 19, 2018 ("Appeal Br."); (3) the Examiner's Answer mailed January 29, 2019 ("Ans."); and (4) the Reply Brief filed March 29, 2019 ("Reply Br.").

Appeal Br. 9–16; Reply Br. 2–11.[3] According to Appellant, Karasawa's remote vendor-side computer lacks characteristics of a computing cloud that ordinarily skilled artisans would understand from the term's plain meaning, including (1) network access; (2) on-demand self service; (3) elasticity; and (4) resource pooling. Appeal Br. 17–20; Reply Br. 3–6. Appellant argues various other recited limitations summarized below.

ISSUES

Under § 102, has the Examiner erred by finding that Karasawa discloses:

(1) a computing cloud configured to provide at least one service and shared hardware and software resources for client use as recited in claim 1?

(2) the computing cloud supports a Service Oriented Architecture (SOA) as recited in claim 21?

(3) the system is configured to identify (1) first information to be stored locally at a client, and (2) second information to be stored at the computing cloud as recited in claim 22?

(4) the system is configured to use a model to allocate processes and data between a client and the computing cloud as recited in claim 23?

(5) a service bus configured to expose a set of service endpoints to clients, where the service bus is configured to direct, based on a configured

[3] Although the Reply Brief is unpaginated (unlike the Appeal Brief), we nonetheless refer to the Reply Brief's pages in the order that they appear in the record.

mapping, a request for service to an appropriate service provider either (a) locally on a client, or (b) on the computing cloudas recited in claim 25?

(6) the computing cloud comprises a physical database resource configured to privately store information associated with different automation units of a respective plurality of locations as recited in claim 26?

(7) at least one processing unit in the computing cloud is configured to apply a heuristic model to identify potential equipment failure of at least one industrial automation unit using the information provided by one or more clients as recited in claim 27?

(8)(a) providing, using a cloud computing node, shared hardware and software resources for use by plural clients; and (b) analyzing a received set of information associated an industrial unit, where the analysis comprises comparing the information set with one or more empirical sets of information obtained from plural industrial units as recited in claim 10?

(9) a computing cloud comprising a database with empirical information associated with failures of one or more industrial tools as recited in claim 16?

ANALYSIS

Claims 1–9

We begin by construing the key disputed limitation of claim 1 which recites, in pertinent part, a "computing cloud." The Specification does not define the term "computing cloud," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* '717 patent, col. 3, ll. 38–44; col. 8, ll. 4–33 (defining various terms explicitly).

The Specification does, however, note that cloud computing is an emerging technology in the information technology (IT) industry that allows for moving applications, services, and data from desktop computers back to a main server farm. *Id.*, col. 1, ll. 15–18. By relocating applications' execution, service deployment, and data storage, cloud computing offers a systematic way to manage costs of open systems, centralize information, enhance robustness, and reduce energy costs. *Id.*, col. 1, ll. 19–23.

To this end, Appellant's invention uses a "computing cloud" 108 that comprises processing unit 110 and data storage unit 112, both of which are accessible to clients 102, 104, 106 that can include thin clients, individual computers, or other communication devices. *Id.*, col. 2, ll. 46–50; col. 3, ll. 20–22; Fig. 1. Computing cloud 108 includes at least one computer that is accessible from a remote location, and can (1) store information, and (2) perform data functions on the information. *Id.*, col. 2, ll. 61–64. The computing cloud, which can be implemented on any general-purpose computer with sufficient processing power, memory resources, and network throughput capability, may comprise (1) hardware that is cost prohibitive to deploy and maintain at the individual clients, and (2) software that is cost prohibitive to install, deploy, and maintain at individual computing clouds. *Id.*, col. 3, ll. 1–6; col. 6, ll. 51–55. The computing cloud can, therefore, provide this hardware and software to the clients via secure connections. *Id.*, col. 3, ll. 6–8.

Although this description informs our understanding of the recited "computing cloud," the term is not so limited. Rather, we construe the term as it would have been understood by ordinarily skilled artisans *at the time of* *the invention* in light of this disclosure. *See E.I. du Pont De Nemours & Co. v. Unifrax I LLC*, 921 F.3d 1060, 1068 (Fed. Cir. 2019) ("The purpose of claim construction is to give meaning to claim terms according to how ordinarily skilled artisans would have understood them *at the time of the invention* in light of the entire patent, including the claims in which the terms appear and the specification.") (emphasis added).

Our emphasis underscores that our construction is based on how ordinarily skilled artisans would have construed the term "computing cloud" *at the time of Appellant's invention*, namely April 1, 2009. This temporal qualification is significant where, as here, the term's meaning in the art has evolved over time. *See* Peter Mell & Tim Grance, *Draft NIST Working Definition of Cloud Computing*, June 1, 2009 (Appeal Br. Evid. App. Ex. A) ("NIST Definition") (noting that "[c]loud computing is still an evolving paradigm," and that its "definitions, attributes, and characteristics will evolve and change over time"); *see also* Tyrone Grandison et al., *Towards a Formal Definition of a Computing Cloud*, SERVICES '10 PROC. OF THE 2010 6TH WORLD CONG. ON SERVICES 191–92, IEEE Comp. Soc'y (2010) (Appeal Br. Evid. App. Ex. B) ("IEEE Document") (noting in the Abstract that cloud computing "is still on its path to rigor and robustness"—a fact epitomized by its "numerous fuzzy articulations"). *Accord* Ans. 8 ("The IEEE Document actually appears to indicate that a 'computer [sic] cloud' was not in fact a term of art, but instead, a term in which there was no general consensus as to what it meant.") (emphasis omitted).

Although both the NIST Definition and IEEE Document inform our understanding of what a "computing cloud" would have meant to ordinarily skilled artisans at the time those documents were published, namely June 1, 2009 and July 5, 2010, respectively, they were nevertheless published *after* the date of Appellant's invention, namely April 1, 2009. *Accord* Declaration of Rohan McAdam In Support of Response to First Office Action dated June 4, 2018 ("McAdam Decl.") ¶ 15 (acknowledging that the NIST Definition was published two months after the '717 patent's effective filing date). While these temporal inconsistencies are not dispositive here, they nonetheless reduce these two documents' probative value, at least regarding their establishing the ordinary and customary meaning of the term "computing cloud" at the time of Appellant's invention, namely April 1, 2009.

We, therefore, construe the term "computing cloud" giving the term its broadest reasonable interpretation in light of the Specification and ordinarily skilled artisans' then-prevailing understanding of the term. To be sure, there was apparently no consistent definition of the term "cloud computing" at the time of Appellant's invention—a lack of consensus underscored by the different definitions of the term articulated by no fewer than *twenty-one* Enterprise IT experts in an article published on January 24, 2009 that attempted to articulate the best definitions of the term at that time. *See* Jeremy Geelan, *Twenty-One Experts Define Cloud Computing*, CloudEXPO Journal, Jan. 24, 2009, *at* http://cloudcomputing.sys-con.com/612375 ("Geelan"), at 1 (noting that the phenomenon of "cloud computing" "has as many definitions as there are squares on a chessboard").[4] Nevertheless, the twenty-one definitions articulated by the

[4] The IEEE Document cites this article on page 192.

experts in the Geelan article were intended "to bring welcome precision" by (1) narrowing down numerous attempts to define the term at that time, and (2) articulating the then-best definitions of the term. Geelan, at 1.

One such expert defines "cloud computing" as "the broad concept of using the internet to allow people to access technology-enabled services . . . [that] must be 'massively scalable' . . . ." *Id.* at 2. Another expert, however, notes that there "are only three types of services that are cloud based: ["Software as a Service"] SaaS, ["Platform as a Service"], and Cloud Computing Platforms. I am not sure being massively scalable is a requirement to fit into any one category." *Id.* at 3. Yet another expert notes that "[c]loud computing really is accessing resources and services needed to perform functions with dynamically changing needs. An application or service developer requests access from the cloud rather than a specific endpoint or named resource." *Id.* at 4. Still another expert notes that "[m]ost computer savvy folks have a pretty good idea of what the term 'cloud computing' means: outsourced, pay-as-you-go, on-demand, somewhere in the Internet, etc." *Id.* at 5. Another expert, however, views "cloud computing as a broad array of web-based services aimed at allowing users to obtain a wide range of functional capabilities on a 'pay-as-you-go' basis that previously required tremendous hardware/software investments and professional skills to acquire." *Id.* at 6.

In addition to these experts' definitions of "cloud computing" in January 2009, a noted computer dictionary from that year defines the term as "computing operations carried out over computers linked to the web. The users pay for computing as a service rather than pay for hardware purchases." Douglas Downing et al., BARRON'S DICTIONARY OF COMPUTER & INTERNET TERMS 95 (10th ed. 2009). Another special-purpose dictionary from 2006 notes that the term "cloud" can be the Internet, and cites a certain Microsoft initiative that "revolves around creating software programs that do not reside on any one computer but instead exist in the 'cloud' of computers that make up the Internet." Harry Newton, NEWTON'S TELECOM DICTIONARY 235 (22d ed. 2006) ("Newton's Telecom Dictionary"). *Accord id.* ("The cloud is particularly appropriate for illustration of the Internet, as it is a network of networks of uncertain definition."). Another technical dictionary defines the term "cloud" more generally as "an informal representation of a multi-access link." DICTIONARY OF COMPUTER SCIENCE, ENGINEERING, AND TECHNOLOGY 80 (Phillip A. Laplante ed. 2001). This dictionary adds that the purpose of this representation "is that what goes on inside is irrelevant to what is being discussed. When a system is connected to the cloud it can communicate with any other system attached to the cloud." *Id.*

In addition to these technical dictionaries and sources, the term "cloud computing" has also been considered by courts and other legal authorities as well, including the U.S. Supreme Court. *See Riley v. California*, 573 U.S. 373, 397 (2014) ("Cloud computing is the capacity of Internet-connected devices to display data stored on remote servers rather than on the device itself."). Although the Court articulated this definition approximately five years after Appellant's invention, the Court's definition nonetheless informs our understanding regarding the meaning of cloud computing at that time.

Other courts have also explained what "cloud computing" means,[5] as has this Board,[6] albeit after Appellant's invention.

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[5] *See, e.g.*, *Oracle America, Inc. v. United States*, 144 Fed. Cl. 88, 92 n.2 (2019) (quoting the U.S. Department of Defense's (DoD's) definition of "cloud" as "[t]he practice of pooling physical servers and using them to provide services that can be rapidly provisioned with minimal effort and time, often over the Internet"); *see also id.* (noting that, according to DoD, the term "cloud" "is applied to a variety of different technologies (often without clarifying modifiers), but, for the purpose of this document, cloud refers to physical computing and storage resources pooled to provide virtual computing, storage, or higher-level services"); *see also Amazon.com, Inc. v. Moyer*, No. C19-1176 RSM, 2019 WL 5455724, at *1 (W.D. Wash. 2019) ("Cloud computing is the on-demand delivery of computing power, software, storage, and other information technology services via the internet."); *see also id.* ("Cloud computing services essentially allow customers to 'rent' hardware and software that they can then access remotely. . . . This allows customers to avoid upfront computing costs and better account for fluctuations in their computing needs."); *Google, Inc. v. United States*, 95 Fed. Cl. 661, 664 n.6 (2011) (quoting the U.S. Government Accountability Office's definition of "cloud computing" as "an emerging form of computing where users have access to scalable, on-demand capabilities that are provided through Internet-based technologies, [with] the potential to provide information technology services more quickly and at a lower cost, but also to introduce information security risks"); *Kaavo Inc. v. Amazon.com Inc.*, No. 14-353-LPS-CJB, 2018 WL 3025040, at *3–4 (D. Del. 2018) (unpublished) (construing the term "initial cloud environment" as "initial potentially accessible computing resources available over a network" and noting that "[w]hile a cloud provider may operate the computing resources, there is no requirement that it do so"); *United States v. Patrakis*, 297 F.Supp. 3d 1123, 1124 n.1 (D. Haw. 2017) ("Cloud computing refers to applications and services offered over the Internet. These services are offered from data centers all over the world, which collectively are referred to as the 'cloud.'"); *University Accounting Serv. LLC v. ScholarChip Card LLC*, 2017 WL 4877418, at *2 (E.D. Wis. 2017) (unpublished) (noting that a company's cloud-based software platform means that any employee or customer could access the software remotely

Nevertheless, courts have also cited a 2009 law review article for explaining cloud computing, where the "cloud" was characterized as "a metaphor for the ethereal internet." *See, e.g., In re U.S.'s Application for a Search Warrant to Seize & Search Elec. Devices from Edward Cunnius*, 770 F. Supp. 2d 1138, 1144 n.5 (W.D. Wash. 2011) (internal quotations omitted) (quoting David A. Couillard, *Defogging the Cloud: Applying Fourth Amendment Principles to Evolving Privacy Expectations in Cloud Computing*, 93 MINN. L. REV. 2205, 2216 (2009)). That article explains:

> The term "cloud computing" is based on the industry usage of a cloud as a metaphor for the ethereal Internet. A cloud platform

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from any computer with an internet connection);; *IBM Corp. v. Visentin*, No. 11 Civ. 399(LAP), at *5 (S.D.N.Y. 2011) (unpublished) ("Cloud computing allows businesses and individuals to use the Internet to access software programs, applications, and data from computer data centers managed by providers . . . ."); *Les Fields/C.C.H.I. Insurance Services v. Hines*, No. 15-cv-03728-MEJ, 2016 WL 6873459, at *7 (N.D. Cal. 2016) (unpublished) ("With cloud computing, businesses access applications via the internet. It's called Software As A Service (or SaaS). Businesses are freed up from having to maintain or upgrade software and hardware. Just log on and get to work, from anywhere and, in many cases, any device."). *But see Payton v. Kale Realty, LLC*, No. 13 C 8002, 2015 WL 10374103, at *3 (N.D. Ill. 2015) (unpublished) (quoting a deponent's inability to explain the meaning of the term "cloud" in connection with cloud hardware and software, but it was nevertheless said to be "many things," for example, Internet-related hardware and software).

[6] *See SAP America, Inc. v. Lakshmi Arunachalam*, IPR2014-00413, 2015 WL 4941752, at *12 (PTAB Aug. 17, 2015) ("[C]loud computing is a type of Internet-based computing in which different services, such as servers, storage, and applications, are delivered to an organization's computers and devices through the Internet."); *see also id.* ("An Internet cloud application is construed to mean a software application that is never installed on a local computer, and instead is accessed via the Internet.").

> can either be external or internal. An external cloud platform is storage or software access that is essentially rented from (or outsourced to) a remote public cloud service provider, such as Amazon or Google. This software-as-a-service allows individuals and businesses to collaborate on documents, spreadsheets, and more, even when the collaborators are in remote locations. By contrast, an internal or private cloud is a cluster of servers that is networked behind an individual or company's own firewall. Cloud platforms give users "anywhere access" to applications and data stored on the Internet. Various companies are unveiling such platforms, allowing users to store backups of important files and access them from anywhere the Internet is available.

Id. (footnotes omitted).

The clear import of these authorities is that, in 2009, the internet was a key aspect of cloud computing, thus enabling users to access applications and data stored on the internet. Thus, under its broadest reasonable interpretation in light of the Specification and the foregoing authorities that inform the meaning of the term "computing cloud" at the time of Appellant's invention, we construe the term to mean at least one internet-based computer that enables users to access applications and data from that computer remotely. *Accord* '717 patent, col. 2, ll. 61–64 ("Computing cloud 108 is a computing cloud that is capable of both storing information and performing data functions on information. A computing cloud comprises at least one computer that is accessible from a remote location.").

We reach this conclusion despite the NIST Definition listing five essential characteristics of cloud computing, four of which, namely (1) network access, (2) on-demand self-service, (3) elasticity, and (4) resource pooling, are said to characterize the recited "computing cloud" as Dr.

McAdam declares. *See* McAdam Decl. ¶¶ 16–23. Leaving aside the fact that Dr. McAdam is an interested party—a fact that diminishes the declaration's probative value[7]—the term "computing cloud," as the term was understood at the time of Appellant's invention, is not limited to the NIST definition as noted previously. Not only was this definition published *after* Appellant's invention as Dr. McAdam acknowledges in paragraph 15 of his declaration, Appellant's proffered definition does not preclude a broader reasonable definition based on other sources supporting the agency's interpretation. *See, e.g., In re Morris*, 127 F.3d 1048, 1056 (Fed. Cir. 1997) ("Absent an express definition in their specification, the fact that appellants can point to definitions or usages that conform to their interpretation does not make the PTO's definition unreasonable when the PTO can point to other sources that support its interpretation.").

Although we appreciate Dr. McAdam's insights regarding his view of what the term "computing cloud" would have meant in light of the Specification and NIST Definition (*see* McAdam Decl. ¶¶ 16–23), nothing on this record precludes a broader reasonable interpretation of "computing cloud" at the time of Appellant's invention as at least one internet-based computer that enables users to access applications and data from that computer remotely.

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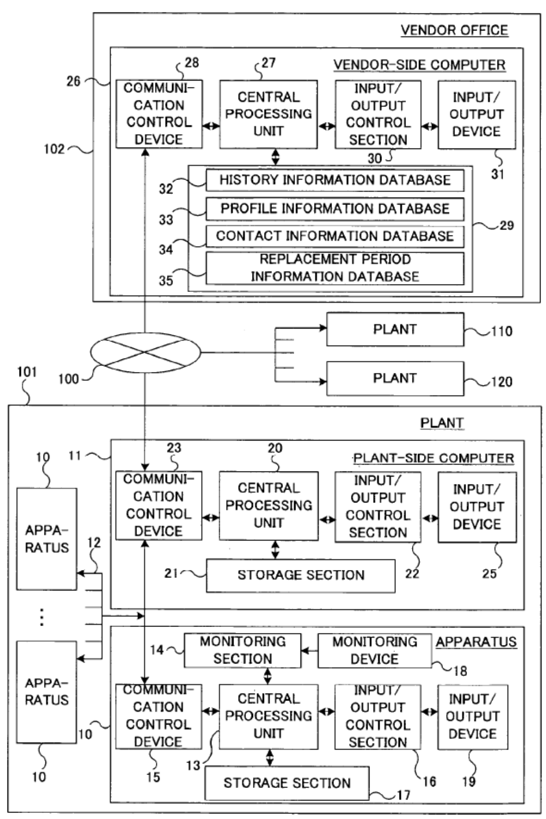
[7] Dr. McAdam is an Engineering Fellow at Honeywell Process Solutions—a subsidiary of the Patent Owner, Honeywell, and worked for Honeywell for over 25 years. *See* McAdam Decl. ¶¶ 1, 7–8. Because Dr. McAdam is an interested party, this fact reduces the probative value of his declaration. *See Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776, F.2d 281, 294 (Fed. Cir. 1985) (noting that an expert's interest in the outcome of the case is a factor in assessing the probative value of an expert opinion).

With this construction, we see no error in the Examiner's reliance on Karasawa for disclosing the recited computing cloud configured to provide at least one service and shared hardware and software resources for client use. As noted in Karasawa's Abstract, Karasawa's system enables monitoring an apparatus remotely. As shown in Karasawa's Figure 1 reproduced below, the system includes (1) a plant 101, such as a semiconductor manufacturing plant, that uses vendor-supplied apparatuses 10, namely computers (servers) that store data of various semiconductor manufacturing apparatus; and (2) a remote vendor office 102 that is connected to the plant via communication line 100. Karasawa, col. 6, ll. 28–49.



Plant and vendor office in Karasawa's Figure 1

The plant's central processing unit (CPU) 20 (1) monitors received operating state data, and (2) informs plant workers and the vendor of problems when an abnormal operating state is detected. Karasawa, col. 7, ll. 45–48. Operating state data is not only transmitted to the plant-side computer 11, but also to the vendor via the communication line—a line that can be the internet. Karasawa, col. 7, ll. 55–58; col. 8, ll. 29–31.

When abnormalities are detected, the plant's CPU downloads predetermined software from the vendor-side computer 26 to perform restoration processing automatically based on response information relating to the vendor's coping with the problem. *Id.*, col. 7, ll. 48–53. This restoration can include updating software. *Id.*, col. 7, ll. 53–54.

Based on this functionality, we see no error in the Examiner's mapping Karasawa's vendor-side computer to the recited "computing cloud" (Final Act. 2; Ans. 4) given the term's broadest reasonable interpretation noted previously, namely at least one internet-based computer that enables users to access applications and data from that computer remotely. Not only is Karasawa's vendor-side computer connected to the plant-side computers of each plant 101, 110, 120 via an *internet*-based high-speed communication line as indicated in column 8, lines 29 to 41 and Figure 1, but the vendor-side computer also provides at least one service, namely restoration processing as the Examiner indicates. Final Act. 2; Ans. 10. Moreover, Karasawa's vendor-side computer also provides shared (1) hardware resources, namely those associated with at least storage section 29 that stores databases 32–35, and communication line 100, and (2) software resources, namely those associated with software updates, where these shared resources are used by clients, namely the plant-side computers at each plant. Final Act. 2–3; Ans. 10.

Appellant's contention that Karasawa's vendor-side computer does not provide shared hardware resources (Appeal Br. 12–14) is unavailing. Not only are the Examiner's particular findings in this regard not persuasively rebutted as the Examiner indicates (Ans. 10), Appellant's contention regarding Karasawa's plant-side computer not using the vendor-side computer's computing capabilities, such as (1) server time; (2) processor resources; or (3) memory resources (Appeal Br. 12) is not commensurate with the scope of the claim that lacks these particular capabilities. And to the extent that Appellant contends that the shared hardware and software resources claimed must serve a "thin" client (*see* Appeal Br. 14), such capabilities are not claimed, nor will we import such limitations into the claim. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc) ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. . . . [C]laims may embrace different subject matter than is illustrated in the specific embodiments in the specification.") (citations and internal quotation marks omitted). That Appellant's Specification emphasizes that the described exemplary embodiments do not define or constrain the disclosed invention, and that alterations and permutations will be apparent to ordinarily skilled artisans (*see* '717 patent, col. 8, ll. 34–41) only underscores the scope and breadth of the claimed invention when read in light of this non-limiting disclosure.

In short, nothing in the claim precludes the Examiner's finding that Karasawa discloses the recited shared hardware resources. *See* Final Act. 2–3; Ans. 10. That Karasawa's vendor-side computer's storage section 29 stores operating state and maintenance data *received from the plant-side computer* in the storage section's history information database 32 as noted in column 9, lines 1 to 11 only underscores that the vendor-side computer shares at least some storage-based resources with the plant-side computers.

We reach this conclusion even if Karasawa's embodiment of Figure 1 requires a host computer at each plant for monitoring purposes as Appellant contends. *See* Appeal Br. 13. Leaving aside the fact that the passage from column 2, lines 19 to 21 that is relied upon to support this contention is from Karasawa's "Background Art" section—not the description of the Figure 1 embodiment on which the Examiner relies—the fact that a computer is used at each plant for monitoring, such as apparatus 10 in Figure 1, does not mean that hardware and software resources cannot be shared with a cloud-based computer, such as Karasawa's vendor-side computer. To the extent that Appellant contends otherwise, there is no persuasive evidence on this record to substantiate such a contention.

Appellant's contention that Karasawa's vendor-side computer does not provide shared software resources (Appeal Br. 14–16; Reply Br. 11–12) is likewise unavailing. Despite Appellant's arguments to the contrary, we see no error in the Examiner's finding that Karasawa's software updates that the plant's CPU downloads from the vendor-side computer in column 7, lines 48 to 54 are shared software resources that are provided by the vendor-side computer or "computing cloud" under the Examiner's mapping. *See* Final Act. 2–3; Ans. 12–13. Even assuming, without deciding, that these software updates are only installed and executed locally at the individual plant-side computers as Appellant contends (Appeal Br. 15–16; Reply Br. 11–12), the vendor-side computer nevertheless shares the software resources associated with these updates with the plant-side computers. Notably, this vendor-side computer functionality comports with the broadest reasonable interpretation of the term "computing cloud," namely at least one internet-based computer that enables users to access applications and data from that computer remotely, for this access is facilitated via the plant-side computers downloading software updates from the internet-based vendor-side computer.

To the extent that Appellant contends that this updated software must be maintained solely at the vendor-side computer for execution by the plant-side computers (*see* Appeal Br. 15–16; Reply Br. 11–12), such an argument is not commensurate with the scope of the claim that lacks such a requirement. Nor will we import such a requirement into the claim. *See Phillips*, 415 F.3d at 1323 ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. . . . [C]laims may embrace different subject matter than is illustrated in the specific embodiments in the specification.") (citations and internal quotation marks omitted). Although the '717 patent notes that (1) the computing cloud 108 *may* comprise software that is cost prohibitive to install, deploy, and maintain at individual computing clouds in column 3, lines 3 to 6, and (2) an advantage of the disclosed systems is to deploy new services or features to clients without the need to change the clients themselves in column 5, lines 4 to 7 as Appellant indicates (Appeal Br. 15; Reply Br. 11), these particular features are not claimed, nor will we import them into the claim. *See Phillips*, 415 F.3d at 1323. *Accord* Ans. 13. Although we appreciate Dr. McAdam's insights regarding Karasawa's alleged shortcomings with respect to the recited computing cloud's functionality based on his view of what the term "computing cloud" would have meant at the time of Appellant's invention (*see* McAdam Decl. ¶¶ 24–30), we nevertheless find these averments unpersuasive and not commensurate with the scope of the claim for the reasons noted previously.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 1, and claims 2–9 not argued separately with particularity.

Claim 21

We also sustain the Examiner's rejection of claim 21 reciting that the computing cloud supports an SOA. *See* Final Act. 13; Ans. 16–17.

The Specification does not define the term "SOA," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* '717 patent, col. 3, ll. 38–44; col. 8, ll. 4–33 (defining various terms explicitly). The Specification does, however, note that, in some embodiments, the computing cloud 108 may leverage a SOA to abstract consumers of cloud services from the location services themselves. '717 patent, col. 3, ll. 45–48. According to the Specification, when a cloud user at a given client invokes a function, such as a manufacturing execution system (MES) function, that function could be (1) performed by MES components local to that client, or (2) redirected to MES components running on a server in computing cloud 108. *Id.*, col. 3, ll. 48–52. This redirection is performed by a service bus that exposes a set of service endpoints to users who interact with these services as if the services were local. *Id.*, col. 3, ll. 52–54.

Although this description informs our understanding of what supporting a SOA means in the context of the disclosed invention, the claim is not so limited, nor does the Specification actually define the term "SOA." Despite the Examiner's characterizing the above disclosure as a "self-provided definition" of an SOA, the term has a definite meaning in the art, namely "an architectural style whose goal is to achieve loose coupling among interacting software agents." Newton's Telecom Dictionary, at 839. That dictionary explains that "[a] service is a unit of work done by a service provider to achieve desired end results for a service consumer. Both provider and consumer are roles played by software agents on behalf of their owners." *Id.*

Notably, Newton's Telecom Dictionary cites one definition of the term "agent" as "software that runs on a client computer for use by administrative software running on a server. Agents are typically used to support administrative actions, such as detecting system information or running services." *Id.* at 94.

Given the broad definition of SOA in the art, namely "an architectural style whose goal is to achieve loose coupling among interacting software agents" as noted above, we see no error in the Examiner's reliance on the functionality of Karasawa's vendor-side computer as a computing cloud that at least *supports* an SOA. Because Karasawa's vendor-side computer performs various services on behalf of clients associated with plant-side computers, such as (1) automatically performing restoration processing, including updating client software based on received information from the client, and (2) providing part replacement period information to the clients responsive to maintenance data received from the clients (*see, e.g.*, Karasawa col. 7, ll. 45–54; col. 10, ll. 49–60; col. 13, ll. 20–52; Fig. 10), this functionality at least supports an architectural style whose goal is to achieve loose coupling among interacting software agents, namely software that runs on a client computer for use by administrative software running on a server and that supports administrative actions. *Accord* Final Act. 13 (noting that the vendor-side computer provides services to the plant-side computer clients).

We reach this conclusion emphasizing the claim's high level of generality regarding the computing cloud's SOA support. Notably, claim 21 does not specify *how* an SOA is supported, let alone in the particular manner detailed in column 3, lines 45 to 63 of the '717 patent that merely states that, *in some embodiments,* the computing cloud *may* leverage an SOA to abstract consumers of cloud services from the location services themselves, including using a service bus to redirect clients to MES components running on a computing cloud server by exposing a set of service endpoints to users interacting with those services. To the extent that Appellant contends that the claim requires that the computing cloud must support an SOA in this particular way (*see* Appeal Br. 23–24; Reply Br. 16), there is no persuasive evidence on this record that the claim must be so limited, nor will we import such details into the claim. *See Phillips*, 415 F.3d at 1323. Appellant's arguments are, therefore, unavailing and not commensurate with the scope of the claim.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 21.

Claim 22

We also sustain the Examiner's rejection of claim 22 reciting that the system is configured to identify (1) first information to be stored locally at a client, and (2) second information to be stored at the computing cloud. Despite Appellant's arguments to the contrary (Appeal Br. 25–29; Reply Br. 16–17), Appellant does not persuasively rebut the Examiner's finding that Karasawa's system identifies (1) "first information", namely temperature data that is detected by temperature sensors S1–S5 and stored *temporarily* on the plant side, and (2) "second information," namely operation state data that is stored on the vendor-side computer's history information database 32. *See* Final Act. 13; Ans. 17 (citing Karasawa, Figs. 9, 13); *see also* Karasawa, col. 11, ll. 35–40; col. 14, l. 56 – col. 15, l. 12.

Our emphasis on Karasawa's *temporary* storage of detected temperature data above underscores that nothing in the claim precludes the temporary storage of temperature data on the plant side—transitory storage that Appellant acknowledges. *See* Appeal Br. 29 (acknowledging that Karasawa's data storage at the plant-side is "just temporary"). So even if all such data is ultimately transmitted to the vendor-side computer as Appellant contends, nothing in the claim precludes its *temporary* local storage on the plant side and its associated identification. Nor does Appellant squarely address—let alone persuasively rebut—the Examiner's finding that Karasawa's detecting and storing temperature data effectively *identifies* that data. *See* Ans. 17 (finding that detecting and storing are both acts of identifying data). In short, Appellant's contentions are unpersuasive and not commensurate with the scope of the claim.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 22.

Claim 23

We also sustain the Examiner's rejection of claim 23 reciting that the system is configured to use a model to allocate processes and data between a client and the computing cloud. Despite Appellant's arguments to the contrary (Appeal Br. 30–31; Reply Br. 17–18), we see no error in the Examiner's finding that Karasawa's system uses a client-server model to allocate (1) processes, such as temperature measurement with sensors S1–S5 in Figure 13 performed at the plant-side computer (client), and (2) data exchanged between the plant-side and vendor-side computer (server). *See* Final Act. 14; Ans. 17–18.

As the Examiner indicates (Ans. 18), not only does the claim fail to specify what particular kind of model is used apart to achieve the desired allocation result, the Specification likewise does not define the term "model," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* '717 patent, col. 3, ll. 38–44; col. 8, ll. 4–33 (defining various terms explicitly). To the extent that Appellant contends that the model noted in column 5, lines 54 to 57 and step 402 of Figure 4, as well as the "new model of providing equipment health services" that is provided by cloud computing noted in column 5, lines 50 to 57 somehow define the term "model" to so limit its interpretation (*see* Reply Br. 17–18), we disagree.

On this record, we see no error in the Examiner's interpreting the term "model" broadly, but reasonably, to include a client-server model (Final Act. 14; Ans. 17–18). We reach this conclusion noting that the Examiner's finding comports reasonably with the commonly-understood meaning of term "client server model" in the art where "[i]n most cases, the 'client' is a desktop computing device or program 'served' by another networked computing device. Computers are integrated over the network by an application, which provides a single system image. The server can be a minicomputer, workstation, or microcomputer with attached storage devices." Newton's Telecom Dictionary, at 232.

So even if the Specification distinguishes the recited allocation model from a cloud computing network architecture model as Appellant contends (Reply Br. 17–18), nothing in the claim precludes the recited model from reading on a client-server model under the Examiner's interpretation. In short, Appellant's contentions are unpersuasive and not commensurate with the scope of the claim.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 23.

Claim 25

We also sustain the Examiner's rejection of claim 25 reciting a service bus configured to expose a set of service endpoints to clients, where the service bus is configured to direct, based on a configured mapping, a request for service to an appropriate service provider either (1) locally on a client, or (2) on the computing cloud.

Appellant's Specification does not define the term "service," let alone "service bus" or "service endpoints," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* '717 patent, col. 3, ll. 38–44; col. 8, ll. 4–33 (defining various terms explicitly). Appellant's Specification does, however, note that when a cloud user at a given client invokes a function, such as an MES function, that function could be (1) performed by MES components local to that client, or (2) redirected to MES components running on a server in computing cloud 108. *Id.*, col. 3, ll. 48–52. This redirection is performed by a plant- or cloud-based service bus that exposes a set of service endpoints to users who interact with these services as if the services were local. '717 patent, col. 3, ll. 52–54, 58–60. The service bus directs requests for those services to the appropriate service providers either locally or in the cloud based on configured mapping. *Id.*, col. 3, ll. 54–57. Moreover, mapping can be done on a per service basis, allowing a mix of local and cloud-based services to be used. *Id.*, col. 3, ll. 57–58.

Although this description informs our understanding of what the recited "service bus" and exposed "service endpoints" mean in the context of the disclosed invention, the claim is not so limited, nor does the Specification detail the particulars of these elements apart from their intended function. We, therefore, construe these terms under their plain meaning in light of this disclosure. The term "service" is defined in a networking context as "specialized, software-based functionality provided by network servers—for example, directory services that provide the network equivalent of 'phone books' needed for locating users and resources." MICROSOFT COMPUTER DICTIONARY 475 (5th ed. 2002) ("Microsoft Computer Dictionary"). Another computer dictionary defines the term "service," quite broadly, as "any computation performed, or offered to be performed, by a server process on behalf of a separate client process." Dick Pountain, THE PENGUIN CONCISE DICTIONARY OF COMPUTING 395 (2003) (small capital letters changed to lower case). And, as noted previously, another special-purpose dictionary explains that "[a] service is a unit of work done by a service provider to achieve desired end results for a service consumer." Newton's Telecom Dictionary, at 839.

The term "bus" is defined as "a data path shared by many devices such as the input/output bus in a computer." Gilbert Held, DICTIONARY OF COMMUNICATIONS TECHNOLOGY 73 (3d ed. 1998). Another special-purpose dictionary defines the term "bus" as "a common pathway, or channel, between multiple devices." Alan Freedman, THE COMPUTER GLOSSARY 40 (9th ed. 2001) ("Computer Glossary").

Given these definitions considered in light of the Specification, a "service bus" is a common path for providing software-based functionality or computations on behalf of devices connected to that path.

The term "end point" is defined as "a network element (component) at the end of the network. In other words, a transmitter or receiver, or an originating or terminating device." Newton's Telecom Dictionary, at 354. Another special-purpose dictionary defines the term "end point" as "[t]he point at which a process, operation, interval, path, or sequence ends. For instance, a terminal of a communication channel, [or] the end of a series of computations . . . ." Steven M. Kaplan, WILEY ELECTRICAL & ELECTRONICS ENGINEERING DICTIONARY 257 (2004).

Given these definitions considered in light of the Specification, a "service endpoint" is the point at which (1) a service, including software-based functionality or computations performed on behalf of another device, or (2) a device providing such a service, ends.

With this interpretation, we see no error in the Examiner's reliance on Karasawa's vendor-side computer's CPU 27 and history information database in Figure 3 for collectively disclosing a "service bus," namely a common path for providing software-based functionality or computations on behalf of devices connected to that path. *See* Final Act. 14; Ans. 18–19.

As shown in Karasawa's Figure 1, the vendor-side computer includes CPU 27 and storage section 29 containing history information database 32 that stores operating state data and maintenance data received from the plant-side computer. Karasawa, col. 9, ll. 1–11, 27–39. Karasawa's Figure 3 shows exemplary maintenance data stored in the history information database, where this data is (1) transmitted from a plant-side apparatus 10 every time a part is replaced, and (2) stored for each delivery destination, plant, and serial number. Karasawa, col. 9, ll. 27–33.

Based on this received maintenance data, the CPU 27 not only calculates an optimal part replacement period that is transmitted to the plants periodically, but also orders replacement parts for the plants when needed. *See* Karasawa, col. 10, ll. 10–13, 49–60; col. 12, l. 61 – col. 14, l. 3; Fig. 10. After a part is replaced in a plant apparatus 10, a worker enters maintenance data, such as the kind of replaced part, date/time, period of use, etc., and this data is (1) stored in the apparatus' storage section 17; (2) transmitted to the plant-side computer; and then (3) transmitted to the vendor-side computer via communication line 10. Karasawa, col. 13, ll. 4–20.

As shown in steps S21 and S22 of Karasawa's Figure 10, after the vendor-side computer receives the maintenance data from the plant, the data is stored in the history information database. Karasawa, col. 13, ll. 21–28. The vendor-side computer then reads (1) the particular kind of replaced part from the stored maintenance data from the history information database, and (2) the corresponding part supplier's contact information from the contact information database 34 in Figure 6 to transmit order information to the relevant supplier. Karasawa, col. 13, ll. 29–34; Fig. 10 (step S23).

Based on this functionality, we see no error in the Examiner's finding that Karasawa's vendor-side computer's CPU 27 and history information database collectively disclose a "service bus." *See* Final Act. 14; Ans. 18–19. We reach this conclusion noting that these vendor-side computer components collectively provide a common path for providing software-based functionality or computations, including, among other things, part replacement and optimal part replacement period determinations, on behalf of devices, namely the plants and their associated apparatuses, connected to that path as shown in Karasawa's Figure 1. Appellant's contentions that Karasawa lacks a "service bus" (Appeal Br. 32–35; Reply Br. 18) are unavailing and not commensurate with the scope of the claim.

Nor are we persuaded of error in the Examiner's finding that Karasawa's "service bus" is configured to expose a set of "service endpoints," namely the points at which (1) services, including software-based functionality or computations performed on behalf of another device, or (2) devices providing such services, end consistent with our interpretation above. That the vendor-side computer and its "service bus" provide various services to plant-based clients including, among other things, part replacement and optimal part replacement period determinations, restoration processing involving software updates, etc., effectively exposes associated "service endpoints" at the vendor-side computer to those clients, at least in that sense.

The vendor-side computer "service bus" is also configured to direct a request for service, namely a part replacement request, to an appropriate vendor-based service provider based on a configured mapping despite Appellant's arguments to the contrary (Appeal Br. 32–35; Reply Br. 18). Although replacement part order information is transmitted from the vendor-side computer to the part supplier in step S23 of Karasawa's Figure 10, a key aspect of the Examiner's finding in this regard is that the service request associated with this replacement part order *originates from the plant client*. Final Act. 14; Ans. 18. This service request reasonably comports with the maintenance data that is transmitted from the plant to the vendor-side computer indicating that a part was replaced at a given plant apparatus. *See*

Karasawa, col. 13, ll. 4–34. Notably, the received maintenance data's part replacement indication effectively functions as a service request by triggering the vendor-side computer to order a replacement part from a supplier responsive to this received data. *See id.* Therefore, to the extent that Appellant contends that Karasawa's processor and history information database are used *only* to derive or calculate optimal replacement periods for an apparatus part (*see* Reply Br. 18), such an argument ignores other services provided by these components, including ordering replacement parts when needed as noted above.

Nor are we persuaded of error in the Examiner's finding that Karasawa's "service bus" is configured to direct Karasawa's part-replacement-based service request to a vendor-based service provider on the computing cloud, namely the vendor-side computer, where this direction is based on a configured mapping. We reach this conclusion noting that the term "configured mapping" is, like other disputed terms, not defined in the Specification.

According to the Specification, the service bus directs requests for those services to the appropriate service providers either locally or in the cloud based on configured mapping. '717 patent, col. 3, ll. 54–57. The Specification adds that mapping can be done on a per service basis, allowing a mix of local and cloud-based services to be used. *Id.*, col. 3, ll. 57–58. But apart from this disclosure, the Specification does not further explain what "configured mapping" means in the context of the disclosed invention, let alone define the term to so limit its interpretation.

We, therefore, interpret the term "configured mapping" with its plain meaning in the art. One special purpose dictionary defines the term "map," in pertinent part, as "[t]o make logical connections between two entities." John Daintith & Edmund Wright, THE FACTS ON FILE DICTIONARY OF COMPUTER SCIENCE 239 (Revised ed. 2006). The term "configure" is also defined, quite broadly, as "[t]o design, arrange, set up, or shape with a view to specific applications or uses." THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE 386 (4th ed. 2006) ("American Heritage Dictionary"). Based on these definitions considered in light of the Specification, we interpret the term "configured mapping" as logical connections between two entities that were set up, designed, or arranged.

Given this interpretation, we are not persuaded of error in the Examiner's finding that Karasawa's "service bus" is configured to direct Karasawa's part-replacement-based service request to a vendor-based service provider on the computing cloud, namely the vendor-side computer, where this direction is based on a configured mapping. That is, sending this request from the plant to the vendor-side computer via the communication line would involve relational mapping between at least associated plants and delivery destinations as the Examiner indicates. Ans. 19. In short, directing the service request to the vendor-side computer would involve logical connections between two entities, namely the plant-side and vendor-side computers and associated components, where these logical connections were at least set up, designed, or arranged. To the extent that Appellant contends that claim 25 requires directing service requests to both a local client and computing cloud (*see* Appeal Br. 35; Reply Br. 18), such an argument is not commensurate with the scope of the claim that does not preclude directing such requests to a service provider associated with the vendor-side computer, namely on the computing cloud. We reach this conclusion emphasizing that the claim's alternative recitation in this regard, namely that that the request is directed to a service provider that is *either* (1) locally on a client, *or* (2) on the computing cloud.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 25.

Claim 26

We also sustain the Examiner's rejection of claim 26 reciting that the computing cloud comprises a physical database resource configured to *privately* store information associated with different automation units of a respective plurality of locations. Final Act. 14; Ans. 19.

According to Appellant, Karasawa stores information *non-privately* by mixing information from different plants together in the same database without any provision for that data's privacy. Appeal Br. 36–40; Reply Br. 19. But despite Appellant's arguments, we see no error in the Examiner's finding that Karasawa's data storage section 29 stores the recited information privately, at least with respect to its limited access within the dedicated network of plants and the vendor office as the Examiner indicates. Final Act. 14; Ans. 19.

Notably, Appellant's Specification does not define the term "private," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* '717 patent, col. 3, ll. 38–44; col. 8, ll. 4–33 (defining various terms explicitly). Appellant's Specification does, however, note that the disclosed invention can be designed for multi-tenancy such that many companies can share the same physical database resources, but keep their data *entirely private*. '717 patent, col. 3, ll. 60–63.

But apart from this non-limiting description, the Specification does not specify the particular *way* or *means* by which the data is kept private, let alone define the term to so limit its interpretation. Nor does the claim specify the particular way or means by which the recited information is stored privately.

We, therefore, construe the term "private" with its plain meaning, namely "[b]elonging to a particular person or persons, as opposed to the public or the government." American Heritage Dictionary, at 1396.

With this construction, we see no error in the Examiner's reliance on Karasawa's data storage section 29 that stores databases 32–35 as shown in Figure 1 is a "physical database resource" configured to store the recited information privately, at least with respect to its limited access within the dedicated network of plants and the vendor office as the Examiner indicates. Final Act. 14; Ans. 19. That data can be exchanged between the plants and vendor office using a *dedicated circuit* as noted in Karasawa's column 8, lines 32 and 33 only further bolsters the Examiner's findings in this regard, for dedicated circuits are private—not public—communication lines. *See* Microsoft Computer Dictionary, at 150 (defining "dedicated line" as "[a] communications channel that permanently connects two or more locations. Dedicated lines are *private* or leased lines.") (emphasis added).

That Karasawa's history information database includes data from different plants as Appellant indicates (Appeal Br. 40; Reply Br. 19) does not change our conclusion, for this storage is still private given the term's scope and breadth. Not only is the stored information private with respect to its limited accessibility within the dedicated vendor/plant network as the Examiner indicates (Final Act. 14; Ans. 19), but the information is also stored privately in that the stored information belongs to the particular entities involved, namely the respective plants and vendor, as opposed to the public or government under the term's plain meaning. To the extent that Appellant contends that the claim requires a particular *way* or *means* by which information is stored privately, including using encryption, authentication, or otherwise, such specific privacy implementations are not claimed, nor will we import such limitations into the claim. *See Phillips*, 415 F.3d at 1323.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 26.

Claim 27

We also sustain the Examiner's rejection of claim 27 reciting that at least one processing unit in the computing cloud is configured to apply a *heuristic model* to identify potential equipment failure of at least one industrial automation unit using the information provided by one or more clients. Final Act. 15; Ans. 20–21.

Notably, Appellant's Specification does not define the term "heuristic model," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* ’717 patent, col. 3, ll. 38–44; col. 8, ll. 4–33 (defining various terms explicitly). *Accord* Ans. 20–21 (noting that the term “heuristic model” is not defined in the Specification). Appellant’s Specification does, however, note that the computing cloud may apply a model, such as a heuristic model, to identify potential equipment failure, thus allowing for proactive preventative equipment maintenance. ’717 patent, col. 5, ll. 21–24.

But apart from this non-limiting description, the Specification does not specify any particulars regarding the heuristic model, let alone define the term to so limit its interpretation. We, therefore, construe the term “heuristic model” with its plain meaning in the art. The term “model” is defined, quite broadly, as “[a] mathematical or graphical representation of something.” John Daintith & Edmund Wright, THE FACTS ON FILE DICTIONARY OF COMPUTER SCIENCE 140 (Revised ed. 2006). Another computer dictionary likewise defines the term broadly as “[a] mathematical representation of a device or process used for analysis and planning.” Computer Glossary, at 252.

The term “heuristic” is defined as “[a] method of solving a problem by using rules of thumb acquired from experience.” Bryan Pfaffenberger, QUE’S COMPUTER & INTERNET DICTIONARY 237 (6th ed. 1995). Therefore, a “heuristic model” is a mathematical or graphical representation that solves a problem by using rules of thumb or useful principles acquired from experience. *Accord* MERRIAM WEBSTER’S COLLEGIATE DICTIONARY 1024 (10th ed. 1993) (defining “rule of thumb” in pertinent part as “[a] useful principle having wide application but not intended to be strictly accurate or reliable in every situation"). American Heritage Dictionary, at 1522.

Based on this interpretation, we see no error in the Examiner's finding that Karasawa's calculating an optimal replacement period for each part in step S24 of Figure 10 by calculating (1) an "average using time," and (2) a "margin" is a heuristic model under the term's broadest reasonable interpretation, particularly since this model is updated and refined continually with new data. *See* Ans. 20–21. *Accord* Karasawa, col. 13, ll. 43–49 (noting that the derived optimal part replacement period is updated and stored so that the stored replacement periods are optimized every time new maintenance data is obtained). This iterative replacement period optimization technique based on a mathematical calculation is, therefore, a "heuristic model," for it is a mathematical representation that solves a problem, namely determining the optimum replacement period, by using rules of thumb or useful principles acquired from experience consistent with the term's broadest reasonable interpretation. Appellant's arguments to the contrary (Appeal Br. 40–42) are unavailing and not commensurate with the scope of the claim.

Although Appellant argues for the first time on page 20 of the Reply Brief that Karasawa's optimal replacement period does not meet the recited "potential equipment failure," these arguments were not raised in the Appeal Brief. *Compare* Appeal Br. 40–42 *with* Reply Br. 20. Therefore, Appellant's new arguments in the Reply Brief are waived as untimely. *See* 37 C.F.R. § 41.41(b)(2). Nor has good cause been shown to raise these new arguments in the first instance in the Reply Brief.

Nevertheless, even if these arguments were timely presented (which they were not), we still find them unpersuasive, for Karasawa's optimal part replacement period itself indicates at least a *potential* equipment failure if a part were not replaced—a part whose effective life cycle is determined by this calculation. *See* Karasawa, col. 13, l. 39–45. That this calculation is based on parts that were *repaired* or replaced as noted on Karasawa's column 13, lines 38 to 42 only underscores the model's potential equipment failure identification.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 27.

Claims 10–15 and 28–34

We also sustain the Examiner's rejection of independent claim 10 reciting, in pertinent part, (1) providing, using a cloud computing node, shared hardware and software resources for use by plural clients; and (2) analyzing a received set of information associated an industrial unit, where the analysis comprises comparing the information set with *one or more* empirical sets of information obtained from plural industrial units.

First, Appellant does not persuasively rebut the Examiner's finding regarding the recited cloud computing node functionality for the reasons noted previously in connection with claim 1.

Second, our emphasis on "one or more" in the analysis limitation above underscores that, to satisfy the claim, the prior art need only compare the received information set with *one* empirical information set obtained from plural industrial units. As shown in steps S11 and S12 of Karasawa's

Figure 9, operating state data is (1) received in real time from an apparatus 10, and (2) stored in the history information database. Karasawa, col. 11, ll. 36–40. After reading a parameter, for example, data based on temperature (change profile) in the operating state data received from the history information database, the vendor-side computer compares the reference profile relating to the temperature stored in the profile information database 33 with the profile of read or measured data. *Id.*, col. 11, ll. 41–48; Fig. 9 (steps S13 and S14). If the difference between the measured and reference profiles is not within a predetermined error range, the vendor-side computer determines that trouble occurred in the apparatus 10, and reports this occurrence to plant- and vendor-side workers. *Id.*, col. 11, ll. 53 – col. 12, l. 11; Fig. 9 (step S15 and S16).

Based on this functionality, we see no error in the Examiner's rejection. In the rejection, the Examiner maps the recited industrial units to the elements associated with numerals 36_1 to 41_j in Karasawa's Figure 11—a finding that is undisputed. *See* Final Act. 8 (referring to "industrial automation units" 36_1 through 41_j). As shown in Karasawa's Figure 11, these elements include Chemical Vapor Deposition (CVD) devices 36 and measuring devices 41. *See* Karasawa, col. 14, ll. 12–15. As shown in Karasawa's Figure 13, the CVD device 36 includes controller 400 that, as shown in Figure 14, includes a monitoring device 18 with temperature sensors S1–S5. *See* Karasawa, col. 14, ll. 56–66.

Based on this disclosure, the recited "industrial units" include the (1) CVD devices and their associated temperature sensors; (2) oxidizing devices

37_1 to 37_m; and (3) measuring devices 41_1 to 41_j *for a single plant apparatus 10* consistent with the Examiner's mapping. *See* Final Act. 8.

Given this mapping, nothing in the claim precludes comparing the received information set associated with an industrial unit, namely the CVD apparatus with its associated temperature sensors, with a *single* set of information, namely temperature data, from the sets of information obtained from plural industrial units, namely the CVD, oxidizing, and measuring devices 36_1 to 41_j in Karasawa's Figure 11. That is, these respective devices provide their own information sets that collectively constitute empirical sets of information obtained from plural industrial units. One of those sets, namely the temperature data associated with a CVD device noted above, is used as a basis for comparison consistent with the Examiner's mapping. *See* Final Act. 7–8. Notably, this set would be an empirical information set obtained from plural industrial units, for it is a subset of the set of information provided by the industrial units 36_1 to 41_j. For this reason alone, we are not persuaded of error in the Examiner's reliance on Karasawa for disclosing the recited information set comparison.

In addition, the operating state data on which the temperature profile comparison is made in Karasawa's Figure 11 can include physical quantities based on temperature, pressure, etc., collected for each (1) delivery destination, (2) plant to be used, and (3) individual serial number. *See* Karasawa, col. 9, ll. 13–26; col. 9, ll. 8–11 (noting that operating state data stored in the history information database is obtained from respective apparatuses 10 operating in plants 101, 110, and 120).

As shown in Karasawa's Figure 2, the operating state data includes data from different plants 101, 110, and 120, including stored temperature data. *Accord* Ans. 15 (noting that the measured data is derived from multiple plants, such as plants 110 or 120). Although Karasawa's temperature profile comparison in Karasawa's Figure 11 is for a single plant, this process nonetheless compares the received information set with *one* empirical set of information obtained from plural industrial units, namely those associated with different plants as shown in Figure 2. As with the respective information sets obtained from the *same* plant's industrial units 36_1 to 41_j noted above, the temperature-based subset on which the comparison is based is also a subset of the set of information provided by the *different* plants' industrial units. In short, the claim does not preclude either subset. Appellant's arguments are, therefore, unavailing and not commensurate with the scope of the claim.

Accordingly, we are not persuaded that the Examiner erred in rejecting claim 10, and claims 11–15 and 28–34 not argued separately with particularity.

Claims 16–20, 35, 36, and 38–41

We also sustain the Examiner's rejection of independent claim 16 reciting, in pertinent part, a computing cloud comprising a database with empirical information associated with failures of one or more industrial tools. Final Act. 10–11; Ans. 14–15.

First, Appellant's contention that Karasawa fails to disclose a computing cloud (Appeal Br. 22–23; Reply Br. 15) is unpersuasive for the reasons noted previously in connection with claim 1.

Second, although Appellants argue for the first time on page 15 of the Reply Brief that Karasawa does not *also* disclose a database with empirical information associated with *failures* of one or more industrial tools as claimed, these arguments were not raised in the Appeal Brief and are, therefore, waived as untimely. *See* 37 C.F.R. § 41.41(b)(2). Nor has good cause been shown to raise these new arguments in the first instance in the Reply Brief, particularly given the striking similarity between the Examiner's response to arguments in the Answer for claim 16 and the rejection. *Compare* Final Act. 10–11 *with* Ans. 15–16.

Nevertheless, we are still unpersuaded by Appellant's new arguments in the Reply Brief even if they were timely presented—which they were not. On this record, nothing in the claim precludes the Examiner's reliance on Karasawa's stored optimal replacement period information as being at least *associated with* an industrial tool failure, for this information conveys the timing for part replacement to *avoid* failure as the Examiner indicates. Final Act. 10; Ans. 16.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 16, and claims 17–20, 35, 36, and 38–41 not argued separately with particularity.

THE OBVIOUSNESS REJECTION

We also sustain the Examiner's obviousness rejection of claims 24, 30, and 37. Final Act. 19–21. Because this rejection is not argued separately with particularity, we are not persuaded of error in this rejection for the reasons previously discussed.

CONCLUSION

The Examiner's decision to reject claims 1–41 is affirmed.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–23, 25–29, 31–36, 38–41	102(b)	Karasawa	1–23, 25–29, 31–36, 38–41	
24, 30, 37	103	Karasawa, Imai	24, 30, 37	
Overall Outcome			1–41	

REQUESTS FOR EXTENSIONS OF TIME

Requests for extensions of time in this *ex parte* reexamination proceeding are governed by 37 C.F.R. § 1.550(c). *See* 37 C.F.R. § 41.50(f).

<u>AFFIRMED</u>

Ssc

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