

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTINGHOUSE AIR BRAKE TECHNOLOGIES CORPORATION
(d/b/a WABTEC CORPORATION),
Petitioner,

v.

SIEMENS MOBILITY, INC.,¹
Patent Owner.

Case IPR2017-00580
Patent 9,233,698 B2

Before KRISTEN L. DROESCH, MEREDITH C. PETRAVICK, and
TIMOTHY J. GOODSON, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a), 37 C.F.R. § 42.73

¹ Patent Owner represents that on June 1, 2018, Siemens Industry, Inc. transferred ownership of the patent at issue to Siemens Mobility, Inc. See Paper 58. Siemens Mobility, Inc. is represented by the same counsel that previously represented Siemens Industry, Inc. in this proceeding. See *id.*

I. INTRODUCTION

A. Background

We have authority to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has not shown by a preponderance of the evidence that claims 1, 2, 5, 10, 11, 14, 17, and 18 (“challenged claims”) of U.S. Patent No. 9,233,698 B2 (“’698 Patent”) are unpatentable.

B. Procedural History

Westinghouse Air Brake Technologies Corporation (d/b/a Wabtec) (“Petitioner”) filed a Petition (Paper 2, “Pet.”) for *inter partes* review of the challenged claims of the ’698 Patent. *See* 35 U.S.C. §§ 311–312. Siemens Mobility, Inc. (“Patent Owner”) filed a Preliminary Response (Paper 10, “Prelim. Resp.”). Pursuant to 35 U.S.C. § 314, we instituted trial on July 20, 2017, as to some of the challenged claims of the ’698 Patent (Paper 12, “Institution Decision” or “Dec.”).

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 20, “PO Resp.”), to which Petitioner filed a Reply (Paper 26, “Reply”). Patent Owner also filed a Contingent Motion to Amend (Paper 21, “Mot. to Amend”), to which Petitioner filed an Opposition (Paper 27), to which Patent Owner filed a Reply (Paper 33).

Petitioner relies on a Declaration of Samuel Phillip Pullen, Ph.D. (Ex. 1002) to support its Petition, and a second Declaration of Dr. Pullen (Ex. 1038) as well as a Declaration of Richard M. Goodin (Ex. 1027) to support its Reply. Patent Owner relies on Declarations of Shukri Souri, Ph.D. (Ex. 2004, Ex. 2012) to support its Patent Owner Response. Petitioner

also relies on a Declaration of Jeff Kernwein (Ex. 1040) to support its Opposition to Patent Owner's Contingent Motion to Amend. All witnesses were cross-examined during the trial, and transcripts of their depositions are in the record. Ex. 1031 (Souri Deposition); Exs. 2025, 2033 (Pullen Depositions); Ex. 2031 (Goodin Deposition); Ex. 2032 (Kernwein Deposition).

Patent Owner filed a Motion to Exclude Exhibit 1027 (Goodin Declaration) (Paper 36, "PO Mot. Excl."), to which Petitioner filed an Opposition (Paper 44, "Opp. Mot. Excl."), to which Patent Owner filed a Reply (Paper 47, "Reply Mot. Excl."). Patent Owner also filed a Motion for Observations Regarding Cross-Examination of Petitioner's Expert Richard Goodin (Paper 37, "PO Mot. Obs."), to which Petitioner filed a Response (Paper 45).

Petitioner also filed a Motion to Exclude Exhibit 2029 (Paper 40), to which Patent Owner filed an Opposition (Paper 43), to which Petitioner filed a Reply (Paper 48).

Oral argument was held on April 17, 2018. A transcript of the oral argument is included in the record. Paper 54 ("Tr.").

Following oral argument, on April 27, 2018, pursuant to *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348, 1358 (2018), we modified the Institution Decision to institute review of all challenged claims on all grounds presented in the Petition (Paper 49, "SAS Order"). Accordingly, this *inter partes* review involves the challenge to claims 1, 2, 5, 10, 11, 14, 17, and 18 as unpatentable under 35 U.S.C. § 103 in view of U.S. Patent Application Publication No. 2014/0172205 A1 (filed Sept. 20, 2013, published June 19, 2014) (Ex. 1011, "Ruhland"). See Dec. 28; SAS Order 2.

The Chief Administrative Patent Judge then granted a good cause extension of the one-year period for issuing a Final Written Decision. See Paper 51; *see also* Paper 52 (order extending pendency of proceeding up to six months). We authorized the parties to file supplemental briefing to address claims 5 and 14, which were not part of the partial institution in our initial Institution Decision. Paper 53.

Patent Owner filed a Supplemental Response (Paper 55), to which Petitioner filed a Supplemental Reply (Paper 62). Patent Owner also filed a Supplemental Contingent Motion to Amend (Paper 57), to which Petitioner filed an Opposition (Paper 61), to which Patent Owner filed a Reply (Paper 66). Dr. Pullen was cross-examined again following the SAS Order, and a transcript of this deposition is in the record. Ex. 2034.

Petitioner also submitted Supplemental Information (Paper 63, “Pet. Suppl. Info.”), to which Patent Owner filed a Response (Paper 65).

Supplemental oral argument was held on August 17, 2018. A transcript of the oral argument is included in the record. Paper 71 (“Suppl. Tr.”).

C. Related Matters

The parties indicate the ’698 Patent is asserted in *Siemens Industry, Inc. v. Westinghouse Air Brake Technologies Corp.*, Case No. 1:16-cv-00284 (D. Del.). Pet. 26; Paper 5, 1; Paper 6, 2; Paper 8, 1. The parties also indicate that a petition for *inter partes* review, which was denied, was filed for the ’698 Patent in Case IPR2017-00581. Paper 5, 1; Paper 6, 2; Paper 8, 1. The parties further indicate a petition for *inter partes* review, which was denied, was filed for related U.S. Patent No. 8,714,494, Case IPR2017-00584. Paper 5, 1; Paper 6, 2; Paper 8, 1.

D. The '698 Patent (Ex. 1001)

The '698 Patent issued from an application filed on April 16, 2014 as a continuation-in-part of Application No. 13/608,313, filed on September 10, 2012, now U.S. Patent No. 8,714,494 (“’494 Patent”). Ex. 1001, (22), (63). The '698 Patent discloses a railway safety critical application system and method that substitutes commercial off-the-shelf (COTS) hardware and/or software for railway-domain specific product components, yet is validated to conform to railway safety critical system failure-free standards. *See id.* at Abstract, 2:46–53. The train includes an onboard train management system (TMS), onboard unit (OBU), onboard data recording system (DRS), crew human-machine interface (HMI), wireless data/communications system, navigation position system, train location detection system, wireless data/communications system, drive system, throttle control, and brake system. *See id.* at 4:63–5:51, Fig. 1. Each of the TMS, OBU, DRS, and HMI have internal computer/controller platforms of known design that communicate with each other via a data bus. *See id.* at 5:52–56. “However[,] the number of computer controllers, their location and their distributed functions may be altered as a matter of design choice.” *Id.* at 5:56–58.

Figure 2 of the '698 Patent is reproduced below:

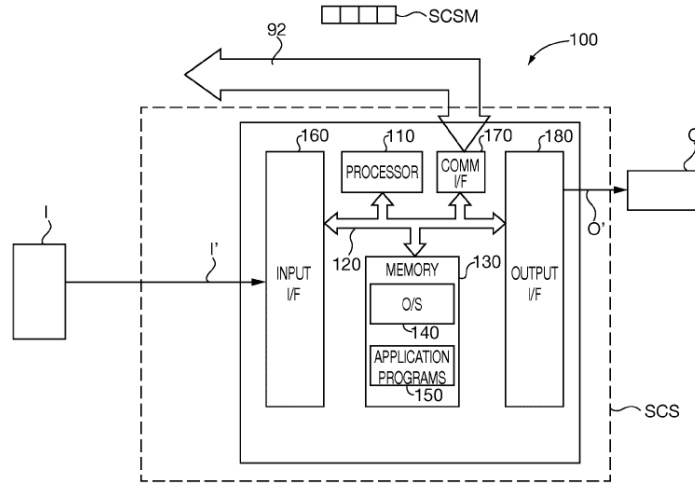


Figure 2 depicts a physical or virtual controller platform 100 including processor 110, controller bus 120, and internal or external memory 130 that includes operating system 140 and application program 150 software module instruction sets that are accessed and executed by the processor, and cause its respective control device (e.g., TMS, OBU, DRS, HMI) to perform control operations. See Ex. 1001, 6:3–12.

Figure 4 of the '698 Patent is reproduced below:

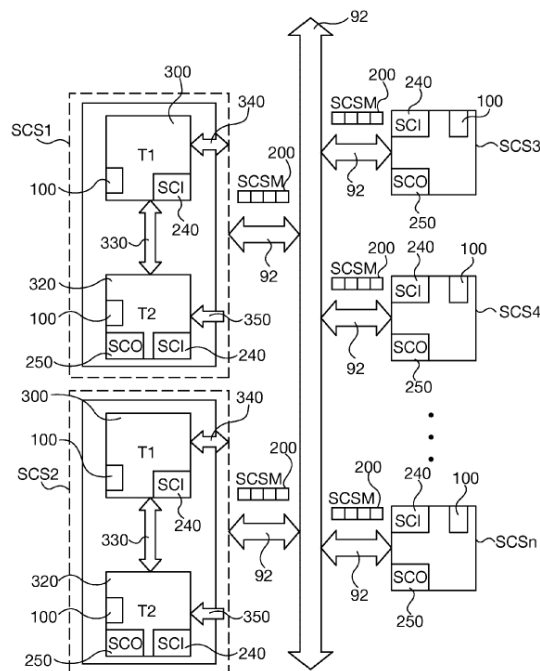


Figure 4 depicts a block diagram of communication interaction among safety critical system control systems. *See* Ex. 1001, 4:22–24. Safety critical systems SCS1 and SCS2 each comprise paired set of tasks T1 300 and T2 320 in bilateral communication with each other via inter-controller data interface or internal data interface 330. *See id.* at 7:19–22, 7:60–61. Tasks 300, 320 run in commercially available devices such as programmable logic controllers, separate or unitized computer/controller motherboards, or COTS computer/motherboards. *See id.* at 7:22–27.

By way of further example if the tasks 300, 320 are executed literally or virtually in personal computers, they may be executed on the same or separate controllers 100, in one or more computers that are housed in separate devices, combined in a common device housing, separate boards in a server rack, etc. . . . In another exemplary embodiment or configuration implementation of the separate tasks T1 and T2, both are executed simultaneously and virtually in real time, in a common computer processor 100, with the respective SCI 240 and SCO 250 sub-tasks also implemented virtually.

Ex. 1001, 7:27–48. Task T1 300 is capable of bilateral communication with critical system data bus 92 through communications pathway 340. *See id.* at 7:49–53. Task T1 300 has incoming security code verification module 240 enabled to verify data integrity of incoming or input safety critical systems message (SCSMI). *See id.* at 7:53–54. SCMSIs include critical input data (DI) and an input security code (SI) “generated by known CHECK–SUM, HASH, protocols.” *See id.* at 6:54–7:1. Task T1 300 does not have the capability to generate an outgoing output safety critical systems message (SCSMO) output security code (SCO). *See id.* at 7:55–56. Task T2 320 has an enabled outgoing security code (SCO) generator 250, but is incapable of transmitting an SCO and critical output data directly to the

critical system data bus 92. *See id.* at 7:57–60. Task T2 320 is only capable of transmitting the SCO to task T1 300 via internal data interface 330. *See id.* at 7:60–61. Task T2 320 is only capable of receiving SCSMI through unilateral incoming communications pathway 350 and can verify data integrity with incoming security code (SCI) verification module 240. *See id.* at 7:60–64.

E. Illustrative Claim

Of the challenged claims, claims 1, 10, and 17 are independent, with claims 2 and 5 dependent from claim 1, claims 11 and 14 dependent from claim 10, and claim 18 dependent from claim 17. Claim 1 is illustrative and reproduced below:

1. A control system for a railway safety critical application system, comprising:
 - at least one controller executing first and second tasks;
 - the first task having an external bilateral communications interface capable of sending and receiving a safety critical systems message within a railway safety critical application system, the message including a security code and safety critical data;
 - the second task having an external communications interface capable of receiving a safety critical systems message, but incapable of sending a safety critical systems message that is generated within the second task, the second task having a security code generator; and
 - an inter-task communications pathway coupling the first and second tasks;
- wherein the first and second tasks respectively receive an input safety critical systems message including input safety critical systems data and an input security code, verify the input message integrity and generate output safety critical systems data, the second task generates an output security code and sends it to the first task, and the first task sends an output safety critical systems message including the output safety

critical systems data and the second task output security code
for use within the railway safety critical application system.

Ex. 1001, 9:5–29.

II. ANALYSIS

A. Brief Overview

Petitioner asserts that the challenged claims are unpatentable over Ruhland (Ex. 1011), which is a U.S. patent application publication filed on September 20, 2013, that claims priority to a provisional application filed on September 20, 2012. *See* Pet. 29–65; Ex. 1011, (22), (60). Petitioner contends Ruhland is prior art under 35 U.S.C. § 102(a)(2), as amended by the Leahy-Smith America Invents Act (AIA),² at least based on its filing date of September 20, 2013. *See id.* at 30–31. Petitioner explains that the ’698 Patent, which was filed on April 16, 2014, is a continuation-in-part of the application that issued as the ’494 Patent. *See id.* at 17. Petitioner argues the ’698 Patent is only entitled to its April 16, 2014, filing date, and is not entitled to the September 10, 2012, filing date of the ’494 Patent, because the ’494 Patent does not provide adequate disclosure under 35 U.S.C. § 112³ for the challenged claims of the ’698 Patent. *See id.* at 17–19 (citing Ex. 1002 ¶¶ 67–78; Manual of Patent Examining Procedure § 211.05). As detailed in the analysis below, the central question before us

² Patent Owner disputes that the America Invents Act applies to the ’698 Patent. *See* PO Resp. 22–23.

³ Section 4(c) of the AIA redesignated pre-AIA 35 U.S.C. § 112 ¶ 1 as 35 U.S.C. § 112(a). 125 Stat. at 296. Because the issues before us hinge on whether the ’494 Patent provides adequate disclosure under 35 U.S.C. § 112, and because the text of pre-AIA 35 U.S.C. § 112 ¶ 1 is identical to 35 U.S.C. § 112(a), we need not address Patent Owner’s assertion that the ’698 Patent is not subject to the AIA.

is whether Ruhland is prior art to the '698 Patent, specifically whether the '698 Patent is entitled to the earlier September 10, 2012, filing date of the '494 Patent, which ultimately turns on whether the '494 Patent provides written description and enablement support for the challenged claims of the '698 Patent. *See id.*

B. Person of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art:

as of April 16, 2014 [(the '698 Patent filing date)] would have had at least a bachelor's of science degree in electrical engineering, mechanical engineering, aeronautics and astronautics, or a related engineering field, and would also have had at least three years of experience with process controls and their use in transportation safety systems. . . . Such a [person of ordinary skill in the art] would have had knowledge of control systems for transportation, and would have understood how to search available literature for relevant publications.

Pet. 28 (citing Ex. 1002 ¶¶ 62–64).

Patent Owner asserts that the issues raised in the Petition do not require an express finding by the Board regarding the level of ordinary skill in the art, and contends the level of ordinary skill in the art may instead be properly deemed to be reflected by the prior art of record. *See* PO Resp. 23–24 (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995)). Patent Owner also contends that, if an express finding is necessary, a person of ordinary skill in the art “would have a bachelor's degree with at least five years of experience in hardware and software controls and safety systems for transportation, or alternatively a master's degree with two years of experience or a Ph.D. degree with like experience.” *Id.* at 24 (citing Ex. 2012 ¶¶ 20–22). Patent

Owner also asserts the analysis of the effective filing date issue should be the same regardless of whether the Board adopts Petitioner's or Patent Owner's definition of a person of ordinary skill in the art. *See id.*

To the extent that an explicit definition of a person of ordinary skill in the art is necessary to resolve the issues before us, we determine that a person of ordinary skill in the art, at the time of the filing date of the '494 Patent⁴, is reflected by Petitioner's definition:

at least a bachelor's of science degree in electrical engineering, mechanical engineering, aeronautics and astronautics, or a related engineering field, and would also have had at least three years of experience with process controls and their use in transportation safety systems. . . . Such a [person of ordinary skill in the art] would have had knowledge of control systems for transportation, and would have understood how to search available literature for relevant publications.

Pet. 28 (citing Ex. 1002 ¶¶ 62–64). We further agree with Patent Owner that our analysis is not altered by choosing Petitioner's definition over Patent Owner's definition.

C. Claim Construction

For petitions filed before November 13, 2018, claims of an unexpired patent are interpreted using the broadest reasonable interpretation in light of

⁴ As discussed below in Section II.D., to be entitled to an earlier effective filing date, the earlier application or patent must comply with the written description requirement of 35 U.S.C. § 112, which is viewed from the perspective of one skilled in the art as of the filing date sought. *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *VasCath v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991). Here, the parties dispute whether the '698 Patent is entitled to the filing date of the '494 Patent.

the specification. *See* 37 C.F.R. § 42.100(b) (2016); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under the broadest reasonable interpretation standard, claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). “‘Where an inventor chooses to be his own lexicographer and to give terms uncommon meanings, he must set out his uncommon definition in some manner within the patent disclosure’ so as to give one of ordinary skill in the art notice of the change.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (quoting *Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1387–88 (Fed. Cir. 1992)). In the absence of such a definition, limitations are not to be read from the specification into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

In the Petition, Petitioner does not provide a claim construction for any claim term or phrase. *See* Pet. 28. Patent Owner provides claim constructions for the terms “controller,” “task,” and “safety critical.” *See* PO Resp. 24–36. Petitioner proposes constructions for those same terms in its Reply. *See* Reply 6–12.

Controller

An explicit definition for the term “controller” is not provided in the ’698 Patent. *See* Ex. 1001; *accord* Ex. 2004 ¶ 64. For the purpose of the Institution Decision, we adopted Patent Owner’s proposed construction for “controller” as “[c]omputer hardware, firmware and/or software that controls the operations of an associated system, subsystem, or function.” *See* Dec. 10–12; *see also* Prelim. Resp. 43–44 (citing Ex. 1001, 5:52–67, 6:3–18;

Ex. 2004 ¶¶ 64–67). Patent Owner maintains its proposed construction for controller. PO Resp. 24–25.

Patent Owner asserts that Petitioner’s witness Dr. Pullen agrees with Patent Owner’s construction for “controller.” See PO Resp. 24–25 (quoting Ex. 2025, 18:13–17, 27:9–28:2, 29:7–14). Patent Owner clarifies that its argument in its Preliminary Response was intended to suggest that the “at least one controller executing first and second tasks,” recited in claim 1 of the ’698 Patent, still requires some hardware, such as a processor to execute the software. See *id.* at 25 (citing Prelim. Resp. 12). Patent Owner also clarifies that its Preliminary Response argument was not intended to suggest that the ’698 Patent claims require the recited controller to be the hardware. See *id.* (citing Prelim. Resp. 12). According to Patent Owner, “[t]he recited ‘at least one controller executing first and second tasks’ could be satisfied by at least one software controller executing first and second tasks.” *Id.*; see *id.* at 26 (citing Ex. 1001, 6:3–12).

In reply, Petitioner asserts that the District Court’s construction of “controller” to mean “computer hardware and software that collectively control the operation of an associated system, subsystem or function” reflects the actual use of the term “controller” in the ’494 Patent and ’698 Patent. See Reply 6–7 (quoting Ex. 1029, 2; Ex. 1030, 16–18; citing Ex. 1012, 7–11). According to Petitioner, the District Court’s construction is correct because Patent Owner requested reconsideration of other claim terms but did not request reconsideration of the construction for “controller.” See *id.* at 7 (citing Ex. 1033); see also Tr. 11:11–13, 12:5–7 (arguing the District Court construction is correct). Petitioner also asserts, “in the discussion of Figure 4 of the ’494 Patent, every embodiment described

requires redundant **hardware** controllers.” Reply 7 (citing Ex. 1012, 7:11–19). Petitioner asserts that Figure 2 of the ’494 Patent and its descriptions were copied from a prior unrelated Siemens patent application and deserves no weight for an effective filing date analysis. *See id.* at 2 (citing Ex. 1025). According to Petitioner, “[t]here is no discussion, outside of the copied text regarding Figure 2, of an embodiment of the ’494 Patent in which a controller is anything but hardware.” *Id.* at 7. Petitioner contends, “[e]ven in the context of Figure 2, (Ex. 1012, 5:62-6:47), the potentially virtualized item is the **controller platform** 100, which only makes up a small part of the individual hardware controllers C1 or C2 of vital system VS1 of Figure 4.” *Id.* at 7–8. In further support of its construction, Petitioner contends “[t]he only communications mechanism for ‘controllers’ to communicate in the ’494 Patent is an inter-controller data bus, which is a hardware pathway connecting two physical devices,” and “[t]here is no discussion . . . about connecting controllers via anything but a hardware construct.” *Id.* at 7 (citing Ex. 1012, 7:11–14; Ex. 1031, 182:1–7).

We have considered the District Court’s claim construction for “controller” and Petitioner’s arguments in support thereof, but are not persuaded that “computer hardware **and** software that collectively control the operation of an associated system, subsystem or function” (emphasis added) is consistent with the broadest reasonable interpretation in light of the ’698 Patent Specification. *See Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326 (Fed. Cir. 2015) (explaining that the Board should assess whether a previous judicial interpretation of a disputed claim term is consistent with the broadest reasonable construction of the term). We also are not persuaded by Petitioner’s arguments alleging that the ’494 Patent

disclosures directed to the physical or virtual controller depicted in Figure 2 should be given no weight because they were copied from an unrelated patent application. Petitioner does not direct us to binding or persuasive authority to support its argument. *See* Reply 2, 7.

We agree with Patent Owner’s construction. The ’698 Patent Specification supports Patent Owner’s construction. The ’698 Patent discloses a physical or virtual controller platform 100 including a processor 110 coupled to one or more internal or external memory devices 130 that include therein operating system 140 and application program 150 software module instruction sets that are accessed and executed by the processor and cause its respective control device to perform control operations. *See* Ex. 1001, 3–12; Fig. 2. In other words, the ’698 Patent discloses that the processor is hardware that accesses the operating system and application program software module instruction sets to perform the control operations. *See id.*; *see also id.* at 6:18–25 (describing preferred aspect of the present invention as hardware including a central processing unit) Moreover, the ’698 Patent discloses, “it is also to be understood that the present invention may be implemented in various forms of *hardware, software, firmware, special purpose processors, or a combination thereof.*” *Id.* at 6:15–18 (emphasis added).

The testimony of Petitioner’s witness Dr. Pullen undercutting Petitioner’s construction for “controller” is also compelling. For example, in response to Patent Owner’s counsel asking what Dr. Pullen meant by a “controller,” Dr. Pullen responded that “[c]ontroller is either hardware **or** software that . . . implements and manages the procedure.” Ex. 2025, 18:13–17 (emphasis added). Dr. Pullen’s testimony is consistent with Patent

Owner’s assertion that the controller recited “in the ’698 Patent [claims] still requires *some* hardware (i.e., a processor) to execute the software but . . . the ’698 Patent claims [do not] *require* the recited controller to be that hardware.” PO Resp. 25; *see also* Tr. 47:11–14 (arguing the same). As another example, in response to Patent Owner’s counsel asking Dr. Pullen whether he agreed with the construction of “controller” in the Institution Decision (*see* Ex. 2025, 27:5–24), Dr. Pullen responded: “So I think this definition of controller is close to the one I used. I would strike the word “computer” in the first -- as unnecessarily limiting, but otherwise, it’s a -- basically a reasonable broad definition.” Ex. 2025, 29:10–14.

For all of the foregoing reasons, we determine that the broadest reasonable interpretation, in light of the ’698 Patent Specification, of “controller” is “[c]omputer hardware, firmware and/or software that controls the operations of an associated system, subsystem, or function.”

Task

An explicit definition for the term “task” is not provided in the ’698 Patent. *See* Ex. 1001; *accord* Ex. 2004 ¶ 63. As mentioned above, Petitioner does not provide a proposed construction for “task” in the Petition. *See* Pet. 28–29. For the purpose of the Institution Decision and based on the record and arguments presented at that time, we construed “task” as: “(1) A sequence of instructions treated as a basic unit of work by the supervisory program of an operating system [];” **and** “(2) . . . a software component that can operate in parallel with other software components.” Dec. 10 (emphasis added); *see id.* at 8–9. Patent Owner argues the construction in the Institution Decision is “legally erroneous because it does not comport with the broadest reasonable interpretation of ‘task’ in light of

the specification,” and “is factually erroneous because the Board appears to have misapplied the multiple definitions of the term ‘task’” in the IEEE STANDARD COMPUTER DICTIONARY A COMPILATION OF IEEE STANDARD COMPUTER GLOSSARIES (1990) (Ex. 2011, “IEEE Dictionary”). PO Resp. 30.

First, Patent Owner asserts that the construction in the Institution Decision does not comport with the broadest reasonable interpretation because it “improperly elevates a dictionary definition over an interpretation that arises from the ’698 Patent disclosure itself.” PO Resp. 30. According to Patent Owner, the IEEE Dictionary states that it is a useful reference for those in the computer field, but does not purport to be a definitive guide to the meaning of the words defined therein. *See id.* at 31 (citing Ex. 2013, 3). Patent Owner contends there are numerous other dictionaries that define “task” in a different way, and which demonstrate that a person of ordinary skill in the art’s understanding of “task” is broader than the IEEE Dictionary definition. *See id.* at 31–32 (citing Ex. 2012 ¶¶ 34–35; Ex. 2014; Ex. 2015, Ex. 2016). Patent Owner also asserts that Petitioner’s witness Dr. Pullen agrees that the construction in the Institution Decision is too narrow to be the broadest reasonable interpretation. *See id.* at 32–33 (quoting Ex. 2025, 17:11–19, 19:20–20:1, 23:13–21; citing Ex. 2025, 22:1–6).

Patent Owner also contends the construction in the Institution Decision is erroneous because it misapplies the IEEE Dictionary’s multiple definitions of the term “task.” *See* PO Resp. 30, 33–34. In particular, the IEEE Dictionary defines task as: “(1) A sequence of instructions treated as a basic unit of work by the supervisory program of an operation system. . . . (2) In software design, a software component that can operate in parallel

with other software components.” Ex. 2011, 13. According to Patent Owner, “[t]he IEEE Dictionary defines ‘task’ in two distinct and context-specific ways,” and “separates the two definitions with numbers ‘(1)’ and ‘(2).’” PO Resp. 34 (quoting Ex. 2011, 13; citing Ex. 2013, 17⁵). Patent Owner asserts that the IEEE Dictionary uses numbering when a term has more than one definition, and recognizes that terms may have different definitions depending on context. *See id.* at 34–35 (quoting Ex. 2013, 13; citing Ex. 2012 ¶¶ 40–42). Patent Owner contends “[t]he IEEE Dictionary treats the two definitions of ‘task’ separately in their usage; the second definition applies only ‘[i]n software design,’ which is omitted from the [] construction” in the Institution Decision, and “the first definition may apply to all areas of electronics systems.” *Id.* at 35 (citing Ex. 2011, 13; Ex. 2012 ¶ 42). Patent Owner asserts there is nothing in the IEEE Dictionary to suggest the two definitions for “task” should be combined. *See id.* at 34 (citing Ex. 2012 ¶¶ 36, 40–42). Patent Owner contends that the Board improperly took two alternative dictionary definitions and required both alternatives to be met by using the restrictive “and” instead of a permissive “or,” which conflicts with the IEEE Dictionary’s context-specific enumerated definitions. *See id.* at 34 (quoting Dec. 10; citing Dec. 18); *id.* at 36 (citing Ex. 2012 ¶ 40).

Patent Owner maintains that “task” should be construed as: “A set of instructions that may be executed by a processor to perform an operation.” PO Resp. 26; *see* Prelim. Resp. 43. Patent Owner contends the intrinsic

⁵ Patent Owner refers to page number 198, as enumerated in the original document.

evidence and extrinsic evidence supports its construction. *See* PO Resp. 26–27 (citing Ex. 2012 ¶¶ 27–32). Patent Owner directs attention to the ’698 Patent disclosure of the embodiment of Figure 2, which includes an operating system and application program software module instruction set that are accessed and executed by the processor and cause its respective control device to perform control operations over their respective safety critical subsystems. *See id.* (citing Ex. 1001, 6:5–12). According to Patent Owner, “[t]aking the implementation-specific details out of this description in the [’698 Patent S]pecification results in the following definition, which fairly reflects the broadest reasonable interpretation in light of the . . .

[S]pecification: software module instruction sets that are accessed and executed by the processor to cause a device to perform operations.” *Id.* at 27 (citing Ex. 2012 ¶ 29). Patent Owner also directs attention to several dictionary definitions of “task” to support its construction. *See id.* at 27–28 (citing Ex. 2013; Ex. 2014, 274; Ex. 2015, 2106; Ex. 2016, 512). Patent Owner also contends that Petitioner’s witness Dr. Pullen agreed that Patent Owner’s construction is an appropriate way to define “task,” and asserts that Dr. Pullen’s own construction is even broader than Patent Owner’s proposed construction. *See id.* at 28–29 (citing Ex. 2025, 17:21–24, 22:1–6, 24:1–15, 25:9–14, 122:3–14).

In reply, Petitioner contends the construction of “task” adopted in the Institution Decision properly reflects characteristics of a “task.” *See* Reply 6 (citing Dec. 10; Paper 15, 7–8). Petitioner notes that the District Court construed “task,” under a different standard, as “a stand-alone application or a subprogram that is run as an independent entity.” *See id.* (citing Ex. 1029, 3; Ex. 1030, 20–22). Petitioner “does not disagree with either the Board’s or

the District of Delaware’s construction.” *Id.* Petitioner, however, does not indicate whether it agrees with Patent Owner’s proposed construction for “task.” *See id.* Nonetheless, Petitioner asserts that it “does not believe the term needs to be construed to resolve the parties’ disputes.” *Id.* (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

We agree with Patent Owner that the construction of “task” adopted in the Institution Decision is erroneous because it misapplies the IEEE Dictionary’s two definitions of the term “task” by using the conjunction “and” instead of the disjunction “or” for the two enumerated definitions. We also agree that the construction in the Institution Decision is not the broadest reasonable interpretation in light of the ’698 Patent Specification, particularly because Petitioner’s witness Dr. Pullen agrees the construction in the Institution Decision is not the broadest reasonable interpretation (*see* Ex. 2025, 17:11–19, 19:20–20:1, 22:1–6, 23:13–21), and because the District Court’s claim construction, under the *Phillips* standard, is broader than the construction in the Institution Decision (*compare* Ex. 1029, 3, *and* Ex. 1030, 20–22, *with* Dec. 12). Nonetheless, an explicit construction of “task” is not necessary to resolve any dispute between the parties.

Safety Critical

The ’698 Patent does not provide an explicit definition for “safety critical.” *See generally* Ex. 1001. Petitioner does not propose an explicit claim construction for “safety critical” (*see* Pet. 28–29), however, Petitioner states:

The ’698 Patent uses the term “safety critical,” which does not have a specific definition in the industry. . . . However, a person of skill in the art would understand that when something is referred to as being a “railway safety critical system,” it is part

of a broad category of systems that are used to ensure the safety of train operations.

Pet. 3, n.1 (citing Ex. 1002 ¶¶ 17, 23).

In its Preliminary Response, Patent Owner argued that the broadest reasonable interpretation for “safety critical” is “important to safety.” See Prelim. Resp. 44 (citing Ex. 1001, 1:9–40; Ex. 2004 ¶ 29). For the purpose of the Institution Decision, we agreed with and adopted Patent Owner’s proposed construction for “safety critical.” See Dec. 12; PO Resp. 26. In its Response, Patent Owner does not provide additional arguments advocating a specific construction for “safety critical.” See PO Resp. 26.

Petitioner, in its Reply, contends that “[f]or purposes of this proceeding’s broadest reasonable interpretation standard, [Petitioner] does not dispute the construction in the Institution Decision of ‘safety critical.’” Reply 9 (citing PO Resp. 46 n.12; *Vivid Techs., Inc.*, 200 F.3d at 803). Yet, Petitioner asserts, “to resolve the disputes here, the Board need only conclude that ‘safety critical’ and ‘vital’ cannot have the same meaning since [Patent Owner] agrees that ‘vital functions are a subset of safety-critical functions.’” *Id.* (citing PO Resp. 46 n.12; *Vivid Techs., Inc.*, 200 F.3d at 803).

An explicit claim construction for “safety critical is not necessary to resolve any dispute between the parties. We address Petitioner’s arguments alleging differences in meaning between “vital” and “safety critical” in Section II.E.1. below, when addressing whether the ’494 Patent provides written description and enablement support for the challenged claims of the ’698 Patent.

D. Principles of Law

In an *inter partes* review, the burden of persuasion is on the petitioner to prove unpatentability by a preponderance of the evidence, and this burden does not shift to the patent owner. See *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015); 35 U.S.C. § 316(e). The distinct burden of production,⁶ however, is a shifting burden, and the allocation of this burden depends upon where in the process of trial the issue arises. See *Dynamic Drinkware*, 800 F.3d at 1379 (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)).

On the issue of entitlement of a patent claim to an earlier effective filing date, the U.S. Court of Appeals for the Federal Circuit's decision in *Dynamic Drinkware* is instructive regarding the parties' respective burdens of persuasion and production. In *Dynamic Drinkware*, the Federal Circuit explained that the petitioner, challenging patentability on the basis of the Raymond reference, had the initial burden of production, and satisfied that burden by arguing that the prior art Raymond reference anticipated the challenged claims of the patent. See *Dynamic Drinkware*, 800 F.3d at 1379. The burden of production then shifted to the patent owner to argue or produce evidence that either the Raymond reference did not actually anticipate or the Raymond reference was not prior art because the challenged claims are entitled to the benefit of an effective filing date prior to the date of the Raymond reference. See *id.* at 1380. In *Dynamic Drinkware*, the

⁶ The burden of production is also referred to as the burden of going forward with evidence, which means both producing evidence and presenting persuasive argument based on the evidence. *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008).

patent owner produced evidence concerning the date of reduction to practice and argued that the challenged patent claims were entitled to an earlier date, thereby shifting the burden of production back to the petitioner to show either that the invention was not reduced to practice as argued or that Raymond was entitled to an effective filing date prior to the challenged patent's earliest effective filing date. *See id.* The underlying principle from *Dynamic Drinkware* is: although the burden of persuasion to prove unpatentability always rests with petitioner, the burden of production for showing that a challenged claim in the patent at issue is entitled to an effective filing date earlier than a prior art reference shifts between the party asserting the entitlement and the party asserting lack of entitlement. *See Tech. Licensing*, 545 F.3d at 1327–29 (explaining the accused infringer/defendant, having the ultimate burden of proving its defense of invalidity, had the burden of going forward with evidence that there is anticipating prior art, and once the accused infringer met that burden, the burden shifted to the patent owner to go forward with evidence that the asserted claim is entitled to an earlier filing date); *id.* at 1327 (explaining the shifting burden of production requires patent owner “to show not only the existence of the earlier application, but why the written description in the earlier application supports the claim,” including by producing evidence and argument sufficient to show that the earlier application contains a written description that supports the limitations of the challenged claim).

Entitlement to the benefit of the filing date of an earlier application under both pre-AIA and post-AIA 35 U.S.C. § 120 is premised on disclosure of the claimed invention in the manner provided by pre-AIA 35 U.S.C. § 112, first paragraph and post-AIA 35 U.S.C. § 112(a) (other than the

requirement to disclose best mode) in an application previously filed in the United States. 35 U.S.C. § 120. The relevant portion of pre-AIA § 112, first paragraph and post-AIA § 112(a) provides:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same

As a result, in order to be entitled to the benefit of an earlier filing date, the claimed invention must be disclosed in the earlier application in the manner provided by the written description and enablement requirements of 35 U.S.C. § 112(a). *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1344–48 (Fed. Cir. 2010) (en banc) (holding that 35 U.S.C. § 112 ¶ 1 contains a written description requirement separate from the enablement requirement).

To comply with the written description requirement of § 112, “a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *see VasCath v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991) (“[T]he applicant must . . . convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession *of the invention*[, which] is, for purposes of the ‘written description’ inquiry, *whatever is now claimed*.”). The applicant conveys possession of the invention “by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention[, [a]]though the exact terms need not be used *in haec verba*.”

Lockwood, 107 F.3d at 1572 (citing *Eiselstein v. Frank*, 52 F.3d 1035, 1038 (Fed. Cir. 1995)). “[W]hatever the specific articulation, the test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Ariad*, 598 F.3d at 1351. As the Federal Circuit has explained,

the patent specification is written for a person of skill in the art, and such a person comes to the patent with the knowledge of what has come before. . . . Placed in that context, it is unnecessary to spell out every detail of the invention in the specification; only enough must be included to convince a person of skill in the art that the inventor possessed the invention and to enable such a person to make and use the invention without undue experimentation.

LizardTech, Inc. v. Earth Res. Mapping, Inc., 424 F.3d 1336, 1345 (Fed. Cir. 2005). “Because the specification is viewed from the perspective of one of skill, in some circumstances, a patentee may rely on information that is ‘well known in the art’ for purposes of meeting the written description requirement.” *Boston Sci. Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1366 (Fed. Cir. 2011). “A description which renders obvious the invention for which an earlier filing date is sought is not sufficient.” *Lockwood*, 107 F.3d at 1572.

Turning to the enablement requirement of § 112, an earlier application will satisfy this requirement “only if one skilled in the art, after reading their disclosures, could practice the invention claimed . . . without undue experimentation.” *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1253 (Fed. Cir. 2004). “A patent specification need not disclose or teach what is known in the art.” *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1373 (Fed. Cir. 2014) (citing *Streck, Inc. v. Research Diagnostic Sys. Inc.*,

665 F.3d 1269, 1288 (Fed. Cir. 2012); *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986)). “Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations.” *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). Relevant factors may “include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.” *Id.*

E. Entitlement of Challenged Claims to Earlier Effective Filing Date

Petitioner asserts the '698 Patent is not entitled to the benefit of the September 10, 2012, filing date of the parent '494 Patent because the '494 Patent does not provide adequate support for the '698 Patent claims in accordance with 35 U.S.C. § 112. *See* Pet. 17–24. Specifically, Petitioner contends there is not adequate support for: (1) “a railway safety critical application system,” “railway safety critical systems,” and “a railway safety critical application control system,” as recited in independent claims 1, 10, and 17, respectively (collectively “railway safety critical systems” limitations); (2) “at least one controller executing first and second tasks” or “first and second tasks that are executed on at least one controller,” as recited in claims 1, 10 and 17 (collectively “at least one controller executing first and second tasks” limitations); and (3) “an inter-task communications pathway coupling the first and second tasks” or “sending the generated security code to the first task,” as recited in claims 1, 10, and 17 (collectively “inter-task communications pathway” limitations). *See id.* at 18–19.

Following Petitioner’s showing regarding the alleged obviousness of the subject matter of the challenged claims in view of Ruhland (*see* Dec. 23–27), the burden of production shifted to Patent Owner to produce evidence and present persuasive argument based on the evidence to show that Ruhland is not prior art because the challenged claims are entitled to the benefit of the September 10, 2012, filing date of the ’494 Patent—which is earlier than the September 20, 2013, filing date of Ruhland and the September 20, 2012, filing date of the provisional application to which Ruhland claims priority. *See Dynamic Drinkware*, 800 F.3d at 1380; Ex. 1011, (22), (60).

Patent Owner asserts the challenged claims of the ’698 Patent are entitled to the benefit of the earlier effective filing date of the ’494 Patent because the ’494 Patent Specification provides written description support and enablement for the challenged claims. *See* PO Resp. 36–72. We address, in turn, each of the parties’ arguments addressing whether the ’494 Patent provides written description support and enablement for: (1) the “railway safety critical systems” limitations; (2) the “at least one controller executing first and second tasks” limitations; and (3) the “an inter-task communications pathway” limitations.

1. Railway Safety Critical Systems

Petitioner argues that “newly-introduced **safety critical** systems components and **safety critical** systems functions [of the challenged claims] are not supported by the disclosure of the ’494 Patent, which is limited to **vital** systems components and **vital** systems functions that have a specific (and very demanding) hazard rate requirement.” Pet. 22 (citing Ex. 1002 ¶ 76); *see id.* at 19–22. Specifically, Petitioner asserts that the ’494 Patent

discloses and claims a number of vital systems components that perform vital system functions, and contends, “[v]ital systems require a very stringent level of hazard rate because their failure could lead to a ‘physical situation with a potential for human injury and/or damage to environment.’”

Id. at 20 (quoting Ex. 1012, 1:28–30; citing Ex. 1002 ¶ 70) (emphasis omitted); *see id.* at 19 (citing Ex. 1012, 6:48–8:18 (claims 1–20)).

According to Petitioner, the ’494 Patent describes the use of redundant hardware as a means to ensure the stringent hazard rate is met. *See id.* (citing Ex. 1012, 2:53–55; Ex. 1002 ¶ 71). Petitioner asserts the ’698 Patent discloses and claims a number of safety critical systems components that perform safety critical systems functions, but omits all the vital systems components and functions disclosed and claimed in the ’494 Patent, and omits the specifically defined hazard rate of no more than 10^{-9} per operational hour. *See* Pet. 21 (citing Ex. 1001, 1:54–60, 6:54–8:35 (claims 1–20)).

Petitioner also contends that a person of ordinary skill in the art “would understand that the general category of ‘safety critical systems’ described in the ’698 Patent are different from the ‘vital systems’ described in the ’494 Patent.” Pet. 21 (citing Ex. 1002 ¶ 73). According to Petitioner, although “all ‘safety critical functions’ affect the safety of users and property, they may have different levels of severity if a failure or hazard occurs.” *Id.* (citing Ex. 1002 ¶ 74). Petitioner asserts, “‘catastrophic’ consequences apply to ‘vital’ functions as defined in the ’494 Patent, where ‘catastrophic’ is generally the most severe consequence that is defined in safety standards.” *Id.* Petitioner contends that, in contrast, a variety of consequences ranging “from ‘catastrophic’ down to ‘hazardous,’ ‘critical,’

‘serious injury,’ ‘major,’ etc. (as defined by railway and aviation safety standards (*see* Ex. 1017, p. 5; Ex. 1018, pp. 23–26)) apply to the more general category of ‘safety critical’ functions.” *Id.* at 21–22 (citing Ex. 1002 ¶ 74). According to Petitioner, “[s]afety critical’ functions with consequences less severe than ‘catastrophic’ receive less-demanding hazard rate requirements than the ‘vital’ functions defined in the ‘494 Patent.” *Id.* at 22 (citing Ex. 1002 ¶ 74).

Petitioner also contends that “vital” functions defined in the ‘494 Patent are a subset of the larger set of “safety critical” functions. *See* Pet. 22 (citing Ex. 1002 ¶ 74). Specifically, Petitioner asserts:

The ‘698 Patent uses the term “safety critical,” which does not have a specific definition in the industry. (Ex. 1002, ¶¶17, 23). However, a person of skill in the art would understand that when something is referred to as being a “railway safety critical system,” it is part of a broad category of systems that are used to ensure the safety of train operations. (Ex. 1002, ¶17). Such a person of skill would understand that if something meets the stringent standard for “vital systems” in railway applications, then it would also fall under the broader category of “safety critical systems.” (Ex. 1002, ¶23).

Pet. 3 n.1.

a. Written Description

In its Response, Patent Owner asserts the ‘494 Patent provides written description support for “safety critical” systems. *See* PO Resp. 40–47. Patent Owner contends the ‘494 Patent disclosure is not limited to vital systems because “the ‘494 Patent effectively uses the terms vital and critical synonymously, or at the very least conveys that the disclosed invention encompasses control systems capable of being used with both types of systems, by its numerous references to ‘critical or vital systems.’” PO Resp.

41–42 (citing Ex. 1012, Abstract, 1:9–11, 1:26, 1:33, 2:21–22, 4:11, 4:36–37, 4:57, 4:61, 5:5, 5:14, 5:62, 6:6, 6:49–50, 6:53–54, 6:58, 6:64, 8:4, 8:22, 8:29, 8:34–35, 8:45–46; Ex. 2012 ¶¶ 56–58, 67–68). In further support of its position, Patent Owner points out that the '494 Patent title includes “Railway Train Critical Systems.” *See id.* at 42 (citing Ex. 1012, [54]). Patent Owner also asserts the '494 Patent and '698 Patent each include “virtually identical list[s] of exemplary ‘vital systems’ and ‘safety critical systems’ in the respective ‘Field of the Invention’ sections of the patents.” *Id.* at 45–46 (*comparing* Ex. 1012, 1:13–21, *with* Ex. 1001, 1:13–22; citing Ex. 2012 ¶ 61). Patent Owner contends the Petition “fails to point to any disclosure in the '698 Patent relating to the meaning of ‘safety critical’ that does not also appear in the '494 Patent with reference to the term ‘vital.’” *Id.* at 45.

Patent Owner also argues that Petitioner’s exhibits and Petitioner’s witness Dr. Pullen confirm that “vital” and “safety critical” are used in the same way. *See* PO Resp. 42 (citing Ex. 1015, 10; Ex. 2025, 59:11–60:13, 61:12–23, 63:23–64:4). According to Patent Owner, Dr. Pullen conceded that the Shaik thesis (Ex. 1015), which Dr. Pullen cited in his Declaration as describing the state of the art in the mid-1990s for railway control systems, uses the words “vital” and “safety critical” synonymously. *See id.* at 46–47 (citing Ex. 2012 ¶¶ 76–82; Ex. 2025, 60:15–61:23). Patent Owner contends that Petitioner’s exhibits and Dr. Pullen’s testimony confirm that “vital” does not have a specialized meaning apart from “safety critical,” or at least that “vital” is not limited to a 10^{-9} hazard rate. *See id.* at 46 (citing Ex. 1015, 13; Ex. 2012 ¶¶ 77–79; Ex. 2025, 62:19–63:4, 64:11–66:10).

Patent Owner further contends a person of ordinary skill in the art would understand the numerous references to “critical systems” in the ’494 Patent, in context, as referring to “safety critical systems.” See PO Resp. 41 (citing Ex. 1012, 6:61, 6:63, 7:35, 7:44–45, 7:59, 8:3; Ex. 2012 ¶¶ 56–58, 67–68). According to Patent Owner, “[t]he addition of the adjective ‘safety’ before ‘critical’ merely clarified the nature of the system to which the present invention is applicable, i.e., systems that are important for safety reasons. It did not change the meaning of the term ‘critical,’ which appears throughout the ’494 Patent [S]pecification.” *Id.* at 43 (footnote omitted). Patent Owner contends that the testimony of Petitioner’s witness Dr. Pullen confirms a person of ordinary skill in the art would have understood the ’494 Patent to also disclose control systems for safety critical application systems. See *id.* at 43–44 (quoting Ex. 2025, 85:8–13; citing Ex. 2025, 89:20–90:1, 90:14–17, 90:21–91:5). Patent Owner asserts “[t]he control system described and claimed in the ’494 Patent was already a control system for ‘safety critical’ applications because a ‘vital’ application is a ‘safety critical’ application.” *Id.* at 44.

Petitioner does not dispute that the ’494 Patent provides sufficient written description support for “safety critical” systems, recited in the ’698 Patent claims. See Reply 16–25; see also Tr. 12:15–17 (Petitioner’s counsel stating, at oral argument: “[i]n our view a vital system is enough to provide written description for a safety critical system.”).

Patent Owner has come forward with sufficient evidence and persuasive argument based on that evidence to support finding the ’494 Patent conveys with reasonably clarity to those skilled in the art, at the time of filing of the ’494 Patent, that the applicant was in possession of

“railway safety critical systems” recited in the challenged claims of the ’698 Patent. In particular, we agree that the ’494 Patent utilizes the terms “vital” and “critical” synonymously, and that a person of ordinary skill in the art would understand that “critical systems” in the ’494 Patent refer to “safety critical systems.” See PO Resp. 40–42. Related to safety, we note that the ’494 Patent discloses “critical or vital applications systems” synonymously in the context of hazards, where a hazard is defined as a physical situation with the potential for human injury and/or damage to environment. See Ex. 1012, 1:9–12, 1:26–33; Ex. 2012 ¶ 56. Also related to the safety, we note that the ’494 Patent discloses that “critical or vital systems” include an onboard unit (OBU) that intervenes in train speed control and braking if the train operator fails to follow track mandates. See Ex. 1012, 4:57–5:9.

For at least the foregoing reasons, we find the numerous disclosures of “railway critical or vital application systems” in the context of safety in the ’494 Patent convey with reasonable clarity to those skilled in the art at the time of the filing date of the ’494 Patent that the applicant was in possession of “railway safety critical systems,” recited in the challenged claims of the ’698 Patent.

b. Enablement

Patent Owner contends the ’494 Patent provides enablement for the “railway safety critical systems” limitations recited in the claims of the ’698 Patent. See PO Resp. 47–48. Specifically, Patent Owner asserts that the terms “vital” and “safety critical” should be understood the same way in the ’494 Patent and ’698 Patent, and because the ’494 Patent enables “vital” applications systems, the ’494 Patent also enables “safety critical” applications systems. See *id.* at 47 (citing Ex. 2012 ¶¶ 56–58, 85).

Patent Owner also asserts that, even under Petitioner’s understanding of vital application systems as a subset of critical applications systems that must meet the most stringent safety standards, the control system described in the ’494 Patent is likely to be safer than necessary when applied to safety critical systems. *See* PO Resp. 47–48 (citing Ex. 2012 ¶ 85). According to Patent Owner, “[c]reating a ‘control system for a railway safety critical application system’ thus requires *at most* the same skill in the art as does creating a ‘control system for a railway vital application system.’” *Id.* at 48 (citing Ex. 2012 ¶ 85). Patent Owner contends that, because the ’494 Patent enables a person of ordinary skill in the art to make the “control system for a railway vital application system,” the ’494 Patent enables a person of ordinary skill in the art to make the “control system for a railway safety critical application system” recited in the claims of the ’698 Patent. *See id.* at 47–48 (citing Ex. 2012 ¶ 85).

In reply to Patent Owner’s arguments, Petitioner asserts that the District Court construed “vital” to mean “an application system that has a hazard rate of no more than 10^{-9} per operational hour,” and “safety critical” to mean “an application system that contributes to safety and, in so doing, has a data failure rate less than 10^{-4} per operational hour.” *See* Reply 9 (quoting Ex. 1030, 18–20); *see also* Pet. Suppl. Info. 1 (citing Ex. 1033, 18–20; Ex. 1049) (Petitioner submits as supplemental information a District Court Order in a related proceeding, and asserts the District Court reaffirmed its interpretation that “vital” and “safety critical” have specific different failure rates); Suppl. Tr. 95:11–97:25 (addressing District Court claim construction and enablement). Petitioner contends that Patent Owner fails to explain why a person of ordinary skill in the art would know how to make

and use a non-vital, safety critical system, and, therefore, “the ‘494 Patent does not enable the **full scope** of the claims.” Reply 23 (citing *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008)); *see also* Tr. 71:12–72:2 (arguing same). According to Petitioner, in the ‘494 Patent, “[t]here is no discussion of how a ‘critical’ or ‘safety critical’ system would be set up, nor is there discussion of what architectural differences would or could be made to create a safety critical system that is not also vital.” Reply 24 (citing Ex. 1012, 7:11–14, Fig. 4); *see id.* at 23–24.

Patent Owner has come forward with sufficient evidence and persuasive argument based on that evidence to support a determination that the ‘494 Patent enables the “railway safety critical systems” limitations recited in the challenged claims of the ‘698 Patent. We are not persuaded by Petitioner’s arguments premised on the District Court’s claim construction for “vital,” which is different from the District Court’s claim construction for “safety critical.” *See* Suppl. Tr. 96:17–26 (explaining the connection between the District Court claim construction and Petitioner’s scope of enablement arguments). We have considered the District Court’s claim constructions for “vital” and “safety critical.” *See Power Integrations*, 797 F.3d at 1326. Yet because we agree with Patent Owner that the ‘494 Patent utilizes the terms “vital” and “critical” synonymously, and that a person of ordinary skill in the art would understand that “critical systems” in the ‘494 Patent refer to “safety critical systems,” as discussed above in Section II.E.1.a., we do not attribute different meanings to “vital” and “safety critical,” and also do not attribute different specific hazard rates to these terms. Thus, we determine that the ‘494 Patent would have enabled one with ordinary skill in the art, at the time of the filing date of the ‘494 Patent,

to make and use, without undue experimentation, “railway safety critical systems” recited in the challenged claims of the ’698 Patent.

Even if a less stringent hazard rate is required for “safety critical” systems as compared to “vital” systems, as argued by Petitioner, we also agree with Patent Owner that the ’494 Patent still would have enabled a person of ordinary skill in the art to make and use, without undue experimentation, “railway safety critical systems.” We note that Petitioner does not address Patent Owner’s persuasive arguments that making a control system for a railway safety critical application system would require at most the same skill in the art as making a control system for a railway vital system because a vital system is even safer than a safety critical system. *See* Reply 23–25. Petitioner’s arguments criticizing the ’494 Patent for failing to disclose how to set up a ‘critical’ or ‘safety critical’ system are not persuasive because Petitioner does not address whether undue experimentation would be required. *See Chiron*, 363 F.3d at 1253. For example, Petitioner does not assert that modifying “vital” applications systems requiring a stringent hazard rate to “safety critical” applications systems, requiring a less stringent hazard rate, would require undue experimentation. For this additional reason, we determine the ’494 Patent would have enabled one with ordinary skill in the art, at the time of the filing date of the ’494 Patent, to make and use, without undue experimentation, “railway safety critical systems” recited in the challenged claims of the ’698 Patent.

2. At Least One Controller Executing First and Second Tasks

Petitioner argues that the ’494 Patent focuses on hardware redundancy as part of its solution. *See* Pet. 19 (citing Ex. 1002 ¶ 69; Ex. 1012, 7:11–16).

Petitioner contends that even though the controllers disclosed in the '494 Patent may be combined in a common device housing, a person of ordinary skill in the art would have understood the '494 Patent to be limited to describing only a system that uses separate controller devices to provide hardware redundancy. *See id.* at 19–20 (citing Ex. 1012, 7:19–22; Ex. 1002 ¶ 69). According to Petitioner, “the challenged claims require that the first and second **tasks** can be executed on **one single** controller.” *Id.* at 20–21. Petitioner contends that Patent Owner recognized the '494 Patent did not support this requirement and modified the '698 Patent disclosure accordingly. *See id.* at 22–23 (citing Ex. 1001, 2:54–58, 4:43–46, 7:27–29, 7:45–47; Ex. 1002 ¶ 77). Petitioner asserts, “[t]he '494 Patent does not specifically describe how its system would work if the first and second tasks are executed by **the same processor**, and a [person of ordinary skill in the art] would understand that by taking away the redundant hardware, the hazard rate would almost certainly be increased.” *Id.* at 21 (citing Ex. 1002 ¶ 72); *see id.* at 23 (arguing same).

a. Written Description

Patent Owner argues the '494 Patent includes specific disclosure of a physical controller platform 100 that includes a processor 110 coupled to one or more external memory devices, wherein the processor 110 includes operating system 140 and application program 150 software module instruction sets. *See* PO Resp. 53 (quoting Ex. 1012, 5:64–67, 6:1–2; citing Ex. 1012, 6:7–9; Ex. 2012 ¶ 95). Patent Owner contends that the plural software module instruction sets are accessed and executed by the processor, and cause its respective control device to perform control operation over their respective associated critical or vital systems. *See id.* (quoting Ex.

1012, 6:2–6). According to Patent Owner, the aforementioned “embodiment is the same as the recited ‘at least one controller executing first and second tasks’ in the challenged claims of the ‘698 Patent.” *Id.* at 53–54. Patent Owner contends that Petitioner’s witness Dr. Pullen admitted this disclosure is: (1) a broad disclosure of an example of tasks implemented in a software environment (citing Ex. 2025, 26:5–27:3); and (2) a disclosure of two tasks being run on one controller, or hardware (citing Ex. 2025, 91:23–95:5). *See id.* at 54.

Patent Owner also asserts the ’494 Patent discloses this same controller platform may be virtual instead of physical. PO Resp. 54 (citing Ex. 1012, 5:64-65; Ex. 2012 ¶¶ 90, 92, 97, 98). Patent Owner contends that a person of ordinary skill in the art, reading this disclosure in the ’494 Patent would have known that a virtual controller is simply a software implementation of a controller. *See id.* (citing Ex. 2012 ¶¶ 53, 54, 92, 97, 98). According to Patent Owner, “[t]he ‘virtual controller platform’ in this embodiment would still be run on some processor, such as processor 110 (a controller), or a processor external to the platform, but a [person of ordinary skill in the art] would understand the processor to execute ‘virtual’ controllers as the disclosed ‘software module instruction sets.’” *Id.* at 55 (citing Ex. 2012 ¶¶ 53–54, 97–98). Patent Owner also contends that a person of ordinary skill in the art “would know that ‘virtualization allows for multiple virtual machines to run on one hardware platform.’” *Id.* at 54 (quoting Ex. 2012 ¶ 53; citing Ex. 2012 ¶¶ 53, 54, 92, 97, 98). According to Patent Owner, Dr. Pullen “confirmed this understanding that a ‘virtual controller’ of the ’494 Patent would be an emulation of the hardware

functions of the hardware controller in Figure 2 as a piece of software within another processor.” *Id.* at 54–55 (citing Ex. 2025, 98:18–100:7).

Patent Owner also directs attention to claim 7 of the ’494 Patent, which recites: “the functions of at least one of the controllers is virtually simulated.” *See* PO Resp. 55 (citing Ex. 1012, 9:29–30). According to Patent Owner, “[c]laim 7 inherently discloses that *both* controllers can be ‘virtually simulated’ because of the ‘at least one’ language” of claim 7. *See id.* (citing Ex. 2012 ¶ 101). Patent Owner contends that each of the virtual controllers would operate to perform control operations over their associated critical or vital subsystems. *See id.* (citing Ex. 2012 ¶¶ 101–102).

According to Patent Owner, “[b]ased on the knowledge in the art, a [person of ordinary skill in the art] would know that the ’494 Patent’s disclosure of a ‘virtual controller platform’ necessarily includes an architecture where a single processor would be capable of running multiple operating systems, tasks, or other types of software.” *Id.* (citing Ex. 2012 ¶¶ 53–54, 101–102).

Patent Owner also asserts that Dr. Pullen

agreed with [Patent Owner] on this point, that a [person of ordinary skill in the art] would understand the ‘virtual controller’ embodiment to also apply to Figure 4 of the ’494 Patent. In that case, each of C1 and C2 would be a virtual controller, and each of C1 and C2 would each be run by a common processor.

PO Resp. 55–56 (citing Ex. 2025, 100:8–102:19, 138:19–139:2).

Also in support of its arguments, Patent Owner contends that the ’494 Patent discloses software redundancy because: (1) the ’494 Patent contemplates a control system that may have hardware or software redundancy (citing Ex. 1012, Abstract, 8:19–25); (2) the ’494 Patent contemplates that its control system can be generally implemented in

“hardware and/or software” (citing Ex. 1012, Abstract; Ex. 2012 ¶ 96); and (3) the ’494 Patent discloses “the present invention may be implemented in various forms of hardware, software, firmware, special purpose processors, or a combination thereof” (quoting Ex. 1012, 6:9–12). See PO Resp. 53. According to Patent Owner, “[t]hese disclosures indicate to a person of ordinary skill in the art the idea of two tasks being executed by at least one controller.” *Id.* (citing Ex. 2012 ¶¶ 46–52, 91–93, 95–96).

In reply, Petitioner argues that Patent Owner’s “erroneous analysis of what constitutes a [person of ordinary skill in the art] undoes its argument. Mr. Weber, the sole named inventor of the ’494 Patent and a named inventor of the ’698 patent, “had no virtualization experience and minimal software experience, and a [person of ordinary skill in the art] with respect to the ’494 Patent similarly lacked such experience.” See Reply 17 (footnote omitted) (citing Ex. 1026, 80:1–6; Reply 12–15). Petitioner asserts that the definition of one with ordinary skill in the art needs to be addressed because Patent Owner relies repeatedly on Dr. Sourì’s erroneous opinion regarding what a person of ordinary skill in the art would understand from reading the ’494 Patent. See Reply 12 (citing PO Resp. 55, 58; Ex. 2012 ¶¶ 46–54, 101–102, 106–107). Petitioner contends that Dr. Sourì’s opinions should be accorded little weight because, in formulating his definition for a person of ordinary skill in the art, Dr. Sourì applied only five of the six factors enumerated in *Environmental Designs, Ltd. v. Union Oil Co. of California*, 713 F.2d 693, 696 (Fed. Cir. 1983), omitting the educational level of one of the named inventors of the ’698 patent, Mr. Weber. See *id.* at 12–13 (citing Ex. 2012 ¶ 17; Ex. 1031, 58:17–21; *Envtl. Designs*, 713 F.2d at 696; *Daiichi*

Sankyo Co. v. Apotex, Inc., 501 F.3d 1254, 1256 (Fed. Cir. 2007); *see also* Tr. 25:1–26:8, 66:15–67:5 (arguing same).

We are not persuaded that, in formulating a definition for a person of ordinary skill in the art, Dr. Sourì erred by omitting the educational level of the inventor, and therefore, we are not persuaded that Dr. Sourì’s opinions should be accorded little weight. As an initial matter, consideration of the educational level of the inventor is not required. In *Environmental Designs*, the Federal Circuit explained:

Factors that *may* be considered in determining level of ordinary skill in the art include: (1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field. Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case.

Envtl. Designs, 713 F.2d at 696–97 (emphasis added) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)); *see also Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 666–67 (Fed. Cir. 2000) (omitting educational level of inventor factor); Tr. 41:16–42:6 (Patent Owner’s counsel arguing that consideration of all factors is not required). “Although the educational level of the inventor may be a factor to consider in determining the level of ordinary skill in the art, it is by no means conclusive.” *Orthopedic Equip.*, 707 F.2d at 1382.

In any event, Petitioner’s arguments focus on Mr. Weber’s particular background and experience. *See* Reply 13 (citing Ex. 1026 (excerpts of a deposition of Mr. Weber in a related proceeding)), 80:1–6); *id.* at 14 (citing Ex. 1026, 45:8–13, 80:1–6). Petitioner argues that if Dr. Sourì had looked at

Mr. Weber, the sole inventor of the '494 Patent, he would have found that Mr. Weber had no background in computer programming, and no experience with software design and virtualization. *See id.* at 13 (citing Ex. 1026, 80:1–6). Petitioner argues that Dr. Souri “use[s] a definition of a level of skill in the art that, by virtue of requiring five years software experience, **excludes** Mr. Weber.” *See id.* at 14 (citing Ex. 1026, 45:8–13, 80:1–6). Petitioner asserts that Dr. Souri’s definition for a person of ordinary skill in the art may be acceptable for the '698 Patent with its added inventor Mr. Egel, who had the software background and joined Siemens after the filing of the '494 Patent, but the definition is incorrect for the '494 Patent. *See id.* at 14–15; *see also id.* at 13 (addressing Mr. Egel’s software background and employment at Siemens; citing Ex. 1031, 234:11–13; Ex. 1032 (excerpts of a deposition of Mr. Egel in a related proceeding), 11:11–16, 57:1–3; Ex. 1026, 80:1–6).

Petitioner’s arguments focusing on Mr. Weber’s experience also do not persuade us that Dr. Souri erred in formulating a definition of a person of ordinary skill in the art and, therefore, do not persuade us that Dr. Souri’s testimony should be accorded little weight. In determining the level of ordinary skill in the art, “[t]he actual inventor’s skill is not determinative.” *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986). Moreover, Petitioner’s argument that Mr. Weber is excluded from Dr. Souri’s definition of a person of ordinary skill is misplaced because Petitioner mischaracterizes Patent Owner’s definition of a person of ordinary skill in the art. Contrary to Petitioner’s suggestion, Patent Owner and Dr. Souri’s definition of a person of ordinary skill in the art does not require a background in computer programming, nor experience

with software design and virtualization. The definition set forth by Patent Owner and Dr. Sourì merely requires “5 years of experience in hardware and software controls and safety systems for transportation,” or 2 years of experience with an advanced degree. Ex. 2012 ¶ 20; PO Resp. 24.

Also in support of its argument that Dr. Sourì’s testimony should be accorded little weight, Petitioner argues that Dr. Sourì improperly reads the ’494 Patent through the eyes of a person of ordinary skill in the art at the time of the ’698 Patent. *See* Reply 14. Petitioner alleges Dr. Sourì did not evaluate the knowledge of a person of ordinary skill in the art with respect to the ’494 Patent differently from the knowledge of a person of ordinary skill in the art with respect to the ’698 Patent. *See id.* (quoting Ex. 2012 ¶¶ 47, 53; citing Ex. 1031, 21:8–19; 20:17–21:7); *see also* Tr. 67:6–8 (arguing same).

Petitioner’s additional arguments do not persuade us that Dr. Sourì’s testimony should be accorded little weight. Contrary to Petitioner’s argument, the testimony at issue in Dr. Sourì’s second declaration (Ex. 2012), as stated by Dr. Sourì, is based on “the background and experience of a [person of ordinary skill in the art] relating to the subject matter of the ’698 and ’494 patent at the time of the invention, which I understand to be around September of 2012 (the filing date of the ’494 Patent).” Ex. 2012 ¶ 20.

Returning to the issue of whether the ’494 Patent provides written description support for “at least one controller executing first and second tasks,” Petitioner asserts that Patent Owner’s arguments rely “on the bald disclosure of ‘a physical or virtual controller platform 100’ and the description of Figure 2 as written description support for one controller

executing two tasks.” Reply 17 (citing PO Resp. 53–54; Ex. 1012, 5:64–6:37). Petitioner argues that weight should not be given to this disclosure in the ‘494 Patent. *See id.* (referencing Reply. 1–5). Specifically, Petitioner contends that Figure 2 of the ‘494 Patent and its description were copied from a prior, unrelated Siemens patent application directed to “Manufacturing Laying Head Pipe Path Below Transformation Temperature” (Ex. 1025). *See id.* at 2–3 (reproducing Ex. 1012, Fig. 2; Ex. 1025, Fig. 7; citing Ex. 1012, 5:64–6:47, Ex. 1025 ¶¶ 35–38). Petitioner uses an argument in Patent Owner’s Motion to Amend as the foundation for asserting “that subject matter copied from an unrelated patent application deserves no weight for priority analyses.” *See id.* at 2 (citing Mot. to Amend 20).

Petitioner also argues, “[e]ven if weight is given to this disclosure . . . , it does not inherently evidence that the sole inventor of the ‘494 Patent was in possession of a control system that utilized a single controller (whether hardware, software, virtual or otherwise) to execute multiple tasks.” Reply 17 (citing Ex. 1027 ¶¶ 33–46). Petitioner contends that, when looking at Figure 4 of the ‘494 Patent in view of Figure 2, a software engineer would have understood that even if a subcomponent of the hardware controllers C1 and C2 were virtualized, the controllers themselves are still separate. *See id.* (citing Ex. 1027 ¶¶ 36–44). Petitioner asserts that Patent Owner’s argument is undermined by the lack of any explanation of how the virtual embodiment of Figure 2 would, in the context of Figure 4, disclose a single controller executing multiple tasks. *See id.* at 18–19. According to Petitioner, “a software engineer would not understand that this concept was inherently disclosed from the incidental copying of ‘virtual’

from a pipe-bending source application.” *Id.* at 18 (citing Ex. 1027 ¶¶ 38–40).

Petitioner also characterizes Patent Owner’s Response as “argu[ing] that the idea of software redundancy *per se* supports the idea of software redundancy **without** hardware redundancy.” Reply 20. According to Petitioner, “[d]espite the loose use of ‘and,’ ‘or,’ and ‘and/or’ in the ‘494 Patent (particularly with regard to the materials copied and pasted from the pipe-bending Siemens application), there is simply no disclosure of software redundancy existing for tasks on a single controller. In discussing Figure 4, the ‘494 Patent **always** discloses hardware redundancy.” *Id.* (citing Ex. 1012, 7:10-60). Petitioner also asserts, “[i]t is telling that ‘redundant’ or a variant is used only five times in the ‘494 Patent.” *Id.* (quoting Ex. 1012, title, 2:65–3:4, 7:10, 8:19–33). According to Petitioner, the same paragraph of the ‘494 Patent discloses that the invention uses two independent parallel computers to solve the problem that a single computer is susceptible to multiple forms of failure. *See id.* at 20–21 (quoting Ex. 1012, 8:25–33); *see also* Tr. 20:18–21:11 (arguing same). Petitioner contends, “there is simply no disclosure of a single controller running redundant software components.” Reply 21 (citing Ex. 1027 ¶¶ 51–52).

Patent Owner has come forward with sufficient evidence and persuasive argument based on that evidence to support finding the ‘494 Patent conveys with reasonably clarity to those skilled in the art, at the time of filing of the ‘494 Patent, that the applicant was in possession of “at least one controller executing first and second tasks” recited in the challenged claims of the ‘698 Patent. We are not persuaded by Petitioner’s argument that Patent Owner’s argument is undermined by an erroneous

analysis of what constitutes a person of ordinary skill in the art. As explained above, we are not persuaded the testimony Dr. Souri (Ex. 2012), should be accorded little weight on the basis that Dr. Souri did not consider Mr. Weber's particular experience in defining a person of ordinary skill in the art. We find Dr. Souri's testimony credible (*see* PO Resp. 53–55 (citing Ex. 2012 ¶¶ 46–54, 91–93, 95–98, 101–102)) because Dr. Souri's opinion is based on the perspective of one with ordinary skill in the art at the time of the filing date of the '494 Patent, and is supported by underlying factual evidence including the '494 Patent disclosure and several references explaining the state of the art. *See, e.g.*, Ex. 2012 ¶¶ 48–49 (citing Ex. 2006, 1, 4); Ex. 2012 ¶ 50 (citing Ex. 2017, 927, Ex. 2018, 224); Ex. 2012 ¶ 52 (citing Ex. 2019, 300); Ex. 2012 ¶ 53 (citing Ex. 2020, 5–7). In contrast, we do not give substantial weight to the testimony of Petitioner's witness Mr. Goodin regarding the understanding of a software engineer, because, as Patent Owner observes, Mr. Goodin's opinions are not based on the perspective of a person of ordinary skill in the art, as defined by either party. *See* PO Mot. Obs. 1–2 (Observation No. 2) (citing Ex. 2031, 17:23–18:2, 64:17–65:10, 67:9–23, 68:21–24, 83:14–19; Ex. 1027 ¶ 25); *see also* Paper 45, 3–4 (Petitioner's Response to Observation No. 2).

We also are not persuaded by Petitioner's argument that certain '494 Patent disclosures should not be given weight because they are allegedly copied from an unrelated patent application. As explained above, Petitioner does not direct us to binding or persuasive authority to support its argument that certain disclosures in a patent copied from elsewhere should be given no weight.

Also not persuasive are Petitioner’s arguments focusing on Figures 2 and 4, and column 5, line 64 through column 6, line 37 of the ’494 Patent (see Reply 17–18), and focusing on the ’494 Patent disclosures of software redundancy (see *id.* at 20–21). Petitioner’s arguments address these disclosures in isolation and do not meaningfully address these disclosures in the context of other ’494 Patent disclosures asserted and cited by Patent Owner. For example, Petitioner does not address the ’494 Patent disclosures of software redundancy together with the disclosures of the physical and virtual controller, and/or the limitations of dependent claim 7. See Reply 1–5, 16–22, 25–26. Petitioner also does not address Patent Owner’s contentions about the following ’494 Patent disclosures: (1) “the functions of at least one of the controllers being virtually simulated,” as recited in dependent claim 7 (see PO Resp. 55); (2) the use of software to verify integrity of input vital systems message (see *id.* at 56); (3) preference that aspects of the invention are implemented in software, executed by a machine comprising any suitable architecture, with the understanding that the actual connections between system components may differ (see *id.* at 56–57); and (4) various processes and functions may be either part of microinstruction code or part of the program (or combination thereof) which is executed via the operating system (see *id.* at 57). See Reply 1–5, 16–22, 25–26.

Petitioner also counters that Patent Owner’s witness, Dr. Souri, “bases his opinion on a misleading portrayal of Dr. Pullen’s [deposition] testimony,” “where [Patent Owner]’s attorney mistakenly said ‘virtual system’ instead of ‘vital system’ with regards to the ‘VS-1’ label in Figure 4,” and Dr. Pullen corrected the question in a passage not cited by Dr. Souri. Reply 18 (citing Ex. 2012 ¶ 99; Ex. 2025, 100:8–19, PO Resp. 56).

According to Petitioner, Dr. Souri “short-cit[ed] Dr. Pullen’s testimony about whether *in general* one processor can execute two virtual machines.” *Id.* (citing Ex. 2012 ¶ 99; Ex. 2025, 102:13–15). Petitioner also contends, “Dr. Souri’s stopped short of the follow-on testimony, where Dr. Pullen testified that ‘one processor execut[ing] two virtual controllers’ is ‘not though, what’s suggested in Figure 4.’” *Id.* (citing Ex. 2025, 102:16–19). Although we agree with Petitioner that Dr. Souri’s testimony and Patent Owner’s arguments (see Ex. 2012 ¶ 99 (citing Ex. 2025, 100:8–12⁷, 102:5–9, 102:13–15); PO Resp. 55–56 (citing Ex. 2025, 100:8–102:19, 138:19–139:2)) regarding Dr. Pullen’s deposition testimony are misleading, Dr. Pullen’s deposition testimony, in its full context, merely shows that Dr. Pullen does not necessarily agree with Patent Owner’s position.

Related to its previous arguments addressing Dr. Pullen’s deposition testimony, Petitioner contends that Dr. Pullen explained why the ’494 Patent does not support the idea of one controller executing two tasks based on the safety considerations of the ’494 Patent. See Reply 18–19 (citing Ex. 2025, 102:20–103:7); see also Tr. 33:8–16 (arguing same). According to Petitioner, “Dr. Pullen [] explained earlier in his deposition that even though the description of Figure 2 may say ‘a physical or virtual controller platform 100,’ substantially more detail would be needed to develop such an implementation.” Reply 19; see *id.* at 19–20 (reproducing Ex. 2025, 98:24–99:10, 99:18–100:2). Petitioner argues that Dr. Pullen’s testimony supports the conclusion that the ’494 Patent does not convey that Mr. Weber

⁷ Ex. 1012 ¶ 99 cited Ex. 2025 at page 101, lines 8–12, however the quoted Deposition transcript text appears at page 100, lines 8–12.

possessed the idea of a single controller executing multiple tasks.” *Id.* at 19–20 (reproducing Ex. 2025, 98:24–99:10, 99:18–100:2).

Petitioner’s arguments relying on Dr. Pullen’s explanation based on safety considerations or safety requirements are not persuasive. Dr. Pullen testified in several instances throughout his deposition testimony that he considered the safety requirements of the ’494 Patent to be a hazard rate of no more than 10^{-9} per operational hour. *See* Ex. 2025, 39:21–40:22, 53:15–54:9, 74:19–75:16, 76:16–77:25; *see also* PO Resp. 60–61 (asserting Dr. Pullen’s testimony is based on a safety requirement of a 10^{-9} hazard rate). As explained above in Section II.E.1.a., the ’494 Patent disclosure is not limited to “vital” systems having a safety requirement of a hazard rate of no more than 10^{-9} per operational hour. Accordingly, because Dr. Pullen’s testimony is premised on this narrow and unsupported safety requirement, we give little weight to Dr. Pullen’s testimony on this matter (Ex. 2025, 102:20–103:7). Petitioner’s argument based on Dr. Pullen’s testimony also is not persuasive because it is misplaced. Essentially, Petitioner argues that because the ’494 Patent does not disclose the specifics of how to make and use (i.e., develop such an implementation), the ’494 Patent does not provide adequate written description. Petitioner’s argument confuses the distinct written description and enablement requirements of § 112(a). *See Ariad* at 1351 (“Since its inception, this court has consistently held that § 112, first paragraph [now § 112(a)], contains a written description requirement separate from enablement, and we have articulated a ‘fairly uniform standard,’ which we now affirm.”) (citing *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562–63 (Fed. Cir. 1991)).

For the foregoing reasons, upon consideration of each party's arguments and supporting evidence, and after according appropriate weight to the cited supporting testimony of Dr. Souri, Dr. Pullen, and Mr. Goodin, we find that, although the exact terms are not found, the '494 Patent conveys with reasonable clarity to those skilled in the art at the time of the filing date of the '494 Patent that the applicant possessed "at least one controller executing first and second tasks" recited in the challenged claims of the '698 Patent.

We also note that Petitioner does not dispute Patent Owner's argument that the '494 Patent provides written description support for the challenged claims of the '698 Patent when each instance of "controller" is replaced with the construction of the term that we adopted in the Institution Decision and maintain in this Final Written Decision: "computer hardware, firmware, and/or software that controls the operations of an associated system, subsystem, or function." See PO Resp. 49–52; Reply 16–22. Petitioner also does not meaningfully address Patent Owner's assertions regarding Dr. Pullen's testimony, including that: (1) Dr. Pullen's testimony confirms replacing "controller" with "software" is proper because controllers were well understood by a person of ordinary skill in the art to have software implementations, and were not limited to hardware implementations alone (see PO Resp. 51–52 (citing Ex. 2025, 3:21–33:4); (2) Dr. Pullen admits that the physical controller embodiment of Figure 2 is a broad disclosure of an example of tasks implemented in a software environment, and is a disclosure of two tasks being run on one controller or "hardware" (see PO Resp. 54 (citing Ex. 2025, 26:5–27:3, 91:23–95:5)); (3) Dr. Pullen's testimony confirms that a virtual controller of the

'494 Patent would be an emulation of the hardware functions of the hardware controller in Figure 2 as a piece of software within another processor (*see* PO Resp. 54–55 (citing Ex. 2025, 99:18–100:7)); and (4) Dr. Pullen agrees that the '494 Patent disclosure of “hardware/software redundancy refers to the software implementing the processes controlled by the first and second controllers (*see* PO Resp. 56 (citing Ex. 1012, 8:19–25; Ex. 2025, 115:20–116:5, 117:3–8)). *See* Reply 16–22.

These additional reasons further support our finding that, although the exact terms are not found in the '494 Patent, the '494 Patent conveys with reasonable clarity to those skilled in the art at the time of the filing date of the '494 Patent that the applicant possessed “at least one controller executing first and second tasks,” recited in the challenged claims of the '698 Patent.

b. Enablement

Patent Owner argues the '494 Patent provides enablement for the '698 Patent claims. *See* PO Resp. 58–61 (citing Pet. 21). Specifically, Patent Owner contends:

the '494 Patent discloses that the computer platform—the controller—has “hardware such as one or more central processing units (CPU), a random access memory (RAM), and input/output (I/O) interface(s).” (Ex. 1012 at 6:12-19.) The controller “also includes an operating system and microinstruction code.” (*Id.* at 6:19-21.) Each of the first and second tasks executed by the controller “may either be part of the microinstruction code or part of the program (or combination thereof) which is executed via the operating system.” (*Id.* at 6:21-24; Ex. 2012 at ¶¶ 113-114.) If necessary, the controller can also have “various other peripheral devices” connected to it. (Ex. 1012 at 6:24-26.)

PO Resp. 58. According to Patent Owner, a person of ordinary skill in the art “would [] read the '494 Patent disclosure fully understanding how to

execute two software instruction sets on one processor to perform various control functions such as those required by the ‘698 Patent claims.” *Id.* (citing Ex. 2012 ¶¶ 46–54, 106–107). Patent Owner asserts “[i]t would also be a straight-forward exercise for a person of ordinary skill in the art to make and use *either* the disclosed hardware-and-software-redundant embodiment of the innovative computer control system using two processors respectively executing first and second redundant tasks, *or* the disclosed software-redundant embodiment using a single processor executing first and second redundant tasks.” *Id.* at 58–59 (citing Ex. 2012 ¶¶ 46–54, 107).

Patent Owner also disputes Petitioner’s enablement argument (*see* Pet. 21 (citing Ex. 1027 ¶ 72)) by asserting that Dr. Pullen’s deposition testimony revealed that Dr. Pullen’s opinions are based on a person of ordinary skill in the art being unable to meet a 10^{-9} hazard per operation hour safety requirement based on Petitioner’s definition for “vital.” *See* PO Resp. 60–61 (quoting Ex. 2025, 95:7–96:3); *see also* Tr. 55:9–12 (Patent Owner’s counsel arguing that Petitioner’s real argument is the ’494 Patent does not enable a person of ordinary skill in the art to make a one controller, two task system that satisfies a 10^{-9} safety requirement). According to Patent Owner, Dr. Pullen clarified that hardware redundancy is required to meet the “vital” requirement. *See id.* at 60 (quoting Ex. 103:4–7, 119:3–8). Patent Owner contends that Dr. Pullen’s testimony that a person of ordinary skill in the art would need hardware redundancy hinges on defining “vital” as a 10^{-9} hazard rate, and breaks down without this unnecessary and unsupported limitation on “vital.” *See id.* at 61 (referencing PO Resp. 40–47, 46 n.12).

In reply, Petitioner argues that a person of ordinary skill in the art would not have been familiar with virtualization. Reply 25 (referencing

Reply 1–5, 12–15). According to Petitioner, none of the details of the deposition testimony of Patent Owner’s witness, Dr. Souri, in which Dr. Souri provided details related to hypervisors, shared memory, central processing unit scheduling, input/output access management, and other details of virtualization, are part of the allegedly enabling disclosure of the ’494 Patent. *See id.* Related to this argument, Petitioner contends its witness Dr. Pullen “explained [] in his deposition that even though the description of Figure 2 may say ‘a physical or virtual controller platform 100,’ substantially more detail would be needed to develop such an implementation.” *Id.* at 19–20 (quoting Ex. 2025, 98:24–99:10, 99:18–100:2).

Petitioner does not respond directly to Patent Owner’s arguments that Dr. Pullen’s opinions are based on meeting a 10^{-9} hazard per operation hour safety requirement. *See* Reply 25–26. Instead, Petitioner reiterates:

By virtue of the sparse disclosure of the ’494 Patent, there is certainly no discussion of the impact on safety of using a virtualization-based system, where failure of a single piece of hardware could result in full system failure. This failing is particularly glaring where the focus of the ’494 Patent is the impact of safety systems with “control system redundancy and asymmetric communication capability.”

Reply 25–26 (citing Ex. 1012, Title).

Patent Owner has come forward with sufficient evidence and persuasive argument based on that evidence to support a determination that the ’494 Patent would have enabled “at least one controller executing first and second tasks” recited in the challenged claims of the ’698 Patent. Petitioner’s contention that a person of ordinary skill in the art would not have been familiar with virtualization is unpersuasive because it is premised

on its unpersuasive argument that Dr. Sourì's testimony should be entitled to little weight because he did not consider Mr. Weber's experience. As explained above in Section II.E.2.a., we are not persuaded that Dr. Sourì's testimony should be accorded little weight on this basis. Moreover, Petitioner's argument regarding virtualization is undermined by the deposition testimony of Petitioner's witness Mr. Goodin, who admits that virtualization is fairly well understood. *See* PO Mot. Obs. 3 (Observation No. 5) (citing Ex. 2031, 30:6–14, 33:19–21); *see also* Paper 45, 5 (Petitioner's Response to Observation No. 5).

We also are not persuaded by Petitioner's argument suggesting that certain details addressed in Dr. Sourì's testimony must be part of the '494 Patent disclosure. "A patent specification need not disclose or teach what is known in the art." *Hill-Rom*, 755 F.3d at 1373. We also agree that Petitioner's arguments and Dr. Pullen's testimony are premised incorrectly on an additional limitation to "vital" systems, specifically, a hazard rate of no more than 10^{-9} per operational hour. As explained above in Section II.E.1.a., we do not give substantial weight to Dr. Pullen's testimony on this matter (Ex. 1027 ¶ 72), because the '494 Patent disclosure is not limited to "vital" systems having a safety requirement of a hazard rate of no more than 10^{-9} per operational hour.

For the foregoing reasons, upon consideration of each party's arguments and supporting evidence, and after according appropriate weight to the cited supporting testimony of Dr. Sourì, Dr. Pullen, and Mr. Goodin, we determine that the '494 Patent would have enabled one with ordinary skill in the art, at the time the '494 Patent was filed, to make and use,

without undue experimentation, “at least one controller executing first and second tasks,” recited in the challenged claims of the ‘698 Patent.

3. *Inter-Task Communications Pathway*

Petitioner argues “inter-task communications pathway,” recited in the challenged claims, is not supported by adequate disclosure in the ’494 Patent in accordance with 35 U.S.C. § 112. *See* Pet. 18–19.

a. *Written Description*

Patent Owner asserts the ’494 Patent provides written description support for “inter-task communications pathway” based on the disclosure of “inter-controller data bus 330,” by which two controllers exchange information such as a security code, as illustrated in Figure 4. *See* PO Resp. 71 (citing Ex. 1012, 3:16–18, 7:11–14, Fig. 4; Ex. 2012 ¶ 139); *see also id.* (citing Ex. 1012, 8:11–17, Fig. 6; Ex. 2012 ¶ 139 (addressing the disclosure of the exchange of data in steps 415 and 425 of Fig. 6)). According to Patent Owner, based on the construction of “controller” as “computer hardware, firmware, and/or software that controls the operation of an associated system, subsystem, or function,” the “inter-controller communications pathway” can be read as an “inter-[software that controls the operations] communications pathway.” *See id.* at 71–72 (referencing PO Resp. 50–57). Patent Owner directs attention to the following disclosure in the ’494 Patent:

It is to be understood that, because some of the constituent system components and method steps depicted in the accompanying figures are *preferably implemented in software*, the actual connections between the system components (or the process steps) may differ depending upon *the manner in which the present invention is programmed*.

PO Resp. 57 (quoting Ex. 2012, 6:27–32).

In reply, Petitioner asserts the '494 Patent only describes a hardware connection, inter-controller data bus 330, between controllers C1 and C2. *See* Reply 22 (citing Ex. 1012, 7:11–14); *see also* Tr. 17:17–20:17 (arguing same). Patent Owner contends that, because there is no discussion in the '494 Patent regarding tasks or controllers being software, there is no disclosure of a pathway to connect two tasks running on a single controller. *See* Reply 22 (citing Ex. 1027 ¶¶ 47–50). According to Petitioner, Dr. Souri speculated about applications programming interface (API) calls and other interaction techniques being usable as an inter-task communications pathway, yet Dr. Souri admitted that the API example is not disclosed in the '494 Patent. *See id.* at 22–23 (citing Ex. 1031, 184:15–185:8); *see also id.* at 23 (citing Ex. 1031, 185:24–186:2 (addressing Dr. Souri's testimony regarding remote procedure calls (RPC) and remote method indications (RMI))). Petitioner argues that the '494 Patent disclosure and Dr. Souri's testimony "do[] not meet the standard for inherently (necessarily) present aspects of the '494 Patent, so inter-task communications pathway utterly lacks written description support in the '494 Patent." *Id.* at 23. According to Petitioner, "[a]s a byproduct of the '494 Patent lacking written description support for the claimed one controller/two task requirement of the '698 Patent claims, it also lacks disclosure of any pathway through which the two tasks on the single controller could communicate with each other." *Id.* (referencing Reply 16–22).

Patent Owner has come forward with sufficient evidence and persuasive argument based on that evidence to support finding the '494 Patent conveys with reasonably clarity to those skilled in the art, at the time of filing of the '494 Patent, that the applicant was in possession of the

“inter-task communications pathway,” recited in the challenged claims of the ’698 Patent. We are not persuaded that the ’494 Patent disclosure of an “inter-controller data bus 330” is limited to hardware, as Petitioner argues. Because the ’494 Patent specification is viewed from the perspective of one with ordinary skill in the art, it is not necessary to spell out every detail of the invention and in some cases, information that is well known in the art may be relied upon for meeting the written description requirement. See *LizardTech*, 424 F.3d at 1345; *Boston Sci.*, 647 F.3d at 1366. As pointed out by Patent Owner, the ’494 Patent discloses: (1) the control system can be implemented by hardware and/or software” (see PO Resp. 53 (quoting Ex. 1012, Abstract)); (2) “the present invention may be implemented in various forms of hardware, software, firmware, special purpose processors, or a combination thereof” (see PO Resp. 53 (quoting Ex. 1012, 6:9–12)); (3) the actual connections between the system components may differ because the system components are preferably implemented in software (see PO Resp. 57 (quoting Ex. 2012 6:27–32)); and (4) claim 7, which depends from claim 1, recites “the functions of at least one of the controllers is virtually simulated” (see PO Resp. 55 (citing Ex. 1012, 9:29–30)). We note that, in the context of addressing communications data bus 92 depicted in Figure 1, the ’494 Patent discloses that “other known communications pathways can be substituted for the data bus when implementing other known control system architectures.” Ex. 2012, 5:39–42; see also Tr. 18:7–8 (Petitioner’s counsel arguing, “there are certainly mechanisms known in the art that would allow two software processes to communicate with each[other]”).

Based on the aforementioned disclosures of the ’494 Patent, we find that, although the exact terms are not found in the ’494 Patent, the

'494 Patent conveys with reasonable clarity to those skilled in the art at the time of the filing date of the '494 Patent that the applicant possessed the "inter-task communications pathway," recited in the challenged claims of the '698 Patent.

b. Enablement

Patent Owner argues that the '494 Patent enables "an inter-task communications pathway" because a person of ordinary skill in the art "would be well aware of numerous programming techniques whereby software tasks could pass information between and among each other." PO Resp. 72 (citing Ex. 2012 ¶ 140). Patent Owner presents, as an example, "a communications interface layer between two pieces of software could moderate the communication between that software, and could be considered a 'pathway.'" *Id.* (citing Ex. 2012 ¶ 140).

In reply, Petitioner argues that the '494 Patent does not enable those of skill in the art to make and use a system where a single controller executing tasks has an inter-task communications pathway for similar reasons as Petitioner's arguments that '494 Patent does not provide written description support for this limitation. *See* Reply 26 (citing Ex. 1027 ¶¶ 43–45; referencing Reply 22–23). According to Petitioner:

Since the one controller/two task embodiment is not enabled, it is unsurprising that all Dr. Souri could do is speculate about undisclosed techniques for creating an "inter-task communications pathway." (Ex. 1031, 184:15-185:8). He admitted, as he must, that the API/RPC/RPI example he speculated about is not disclosed in the '494 Patent.

Reply 26 (citing Ex. 1031, 185:3–8, 185:24–186:2).

Patent Owner has come forward with sufficient evidence and persuasive argument based on that evidence to support a determination that

the '494 Patent would have enabled a person of ordinary skill in the art to make and use, without undue experimentation, the “inter-task communications pathway” recited in the challenged claims of the '698 Patent. In particular, we agree that a person of ordinary skill in the art “would be well aware of numerous programming techniques whereby software tasks could pass information between and among each other.” PO Resp. 72 (citing Ex. 2012 ¶ 140). Petitioner’s arguments premised on a lack of written description support in the '494 Patent are not persuasive because the '494 Patent need not disclose or teach what is known in the art to satisfy the enablement requirement. *See Hill-Rom*, 755 F.3d at 1373. Also unpersuasive are Petitioner’s arguments addressing Dr. Sourì’s alleged speculation about undisclosed techniques for creating an inter-task communications pathway, because Petitioner does not allege that these techniques entail undue experimentation.

For the foregoing reasons, upon consideration of the parties’ arguments and supporting evidence, and after according appropriate weight to the cited supporting testimony of Dr. Sourì and Mr. Goodin, we determine that the '494 Patent would have enabled one with ordinary skill in the art, at the time the '494 Patent was filed, to make and use, without undue experimentation, the “inter-task communications pathway” recited in the challenged claims of the '698 Patent.

4. Other Limitations of the Challenged Claims

Petitioner contends that, because Patent Owner’s Response only addresses the “railway safety critical systems” limitations, the “at least one controller executing first and second tasks” limitations, and the “inter-task communications pathway” limitations, and is silent regarding the remaining

limitations of the independent claims and the limitations of the dependent claims, Patent Owner failed to meet its burden of production regarding the challenged claims. See Reply 15–16 (citing PO Resp. 40–72, Ex. 1031, 47:2–7; *Google, Inc. v. Visual Real Estate, Inc.*, Case IPR2014-01341, slip op. at 13–14 (PTAB Feb. 19, 2016) (Paper 38)). In the circumstances before us, we are not persuaded that Patent Owner failed to meet its burden of production with respect to every limitation of the challenged claims. In its Response, Patent Owner pointed out that there are only three differences between the challenged claims of the '698 Patent and its counterpart claims of the '494 Patent. See PO Resp. 12. Specifically, Patent Owner asserts that “first controller” and “second controller” recited in the '494 Patent claims were replaced by a “first task” and a “second task;” the “first task” and a “second task” are executed by “at least one controller;” was added to the '698 Patent claims, and “vital” recited in the '494 Patent claims was replaced by “safety critical.” See PO Resp. 12; *see also id.* at 13–14 (reproducing claim 1 of the '494 Patent with redline annotations highlighting the three differences).

5. '698 Patent Filed as a Continuation-in-Part Application

Petitioner also argues that Patent Owner’s “attempt to explain **why** it chose to file the '698 Patent as a continuation-in-part dooms its argument that the '494 Patent supports the '698 Patent claims.” Reply 21. Petitioner directs attention to Patent Owner’s assertion that the following is a “Newly Disclosed Embodiment of the '698 Patent”:

In another exemplary embodiment or configuration implementation of the separate tasks T1 and T2, both are executed simultaneously and virtually in real time, in a common

computer processor 100, with the respective SCI 240 and SCO 250 sub-tasks also implemented virtually.

Reply 21 (citing Ex. 1001, 7:43-48; PO Resp. 22-23). According to Petitioner, the '698 Patent claims “actually **do** encompass this very embodiment by virtue of the ‘at least one controller’ language.” *Id.* (citing Ex. 1027 ¶ 53). Petitioner contends that, although the '698 Patent claims, as written, do not use the phrase “simultaneously and virtually in real time,” the fact that the challenged '698 Patent claims cover a single controller executing multiple tasks means that the challenged claims do cover the “newly disclosed embodiment” of the '698 Patent. *See id.* at 21–22.

According to Petitioner, the fact that the challenged '698 Patent claims cover the newly disclosed embodiment “warrants a finding that the '698 Patent is not entitled to the '494 Patent’s filing date.” *Id.* at 22.

Petitioner’s arguments are not persuasive because Petitioner does not direct us to binding or persuasive authority to support its assertion that a claim, whose scope encompasses a newly disclosed embodiment, is *per se* not entitled to an earlier effective filing date. Consistent with our findings explained above regarding the sufficiency of the '494 Patent written description support for the '698 Patent challenged claims, “[a] specification may, within the meaning of 35 U.S.C. § 112 para. 1, contain a written description of a broadly claimed invention without describing all species that [the] claim encompasses.” *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003) (quoting *Utter v. Hiraga*, 845 F.2d 993, 998 (Fed. Cir. 1988)).

6. Conclusion

We find that the '494 Patent provides sufficient written description support for the challenged claims of the '698 Patent, and determine the '494 Patent sufficiently enables the challenged claims of the '698 Patent. Accordingly, the challenged claims of the '698 Patent are entitled to the September 10, 2012, filing date of the '494 Patent.

F. Unpatentability of Challenged Claims over Ruhland (Ex. 1011)

Ruhland has an actual filing date of September 20, 2013, and claims priority to a provisional application with a filing date of September 20, 2012. Ex. 1011, [22], [60]. Under either its actual filing date, or its earliest potential effective filing date, Ruhland does not qualify as prior art to the challenged claims of the '698 Patent. Accordingly, Petitioner has not shown by a preponderance of the evidence that claims 1, 2, 5, 10, 11, 14, 17, and 18 are unpatentable over Ruhland.

G. Patent Owner's Motion to Exclude Ex. 1027

Patent Owner moves to exclude Exhibit 1027, which is the declaration of Mr. Richard M. Goodin, PE. See PO Mot. Excl. Patent Owner urges the exclusion of Mr. Goodin's testimony under Federal Rules of Evidence (FRE) 403 and 702. See *id.* at 1. Petitioner opposes Patent Owner's Motion. See Opp. Mot. Excl.

Patent Owner argues that Mr. Goodin's testimony should be excluded under FRE 702 on the basis that Mr. Goodin has insufficient experience specific to control systems for railway safety application systems. PO Mot. Excl. 3–7; Reply Mot. Excl. 2–3. In response, Petitioner argues that Mr. Goodin “testified that he has ‘experience with software development,

virtual machines, and hypervisor technology.” Opp. Mot. Excl. 6.

According to Petitioner, “Mr. Goodin is more than qualified to opine on ‘scientific, technical, or other specialized knowledge,’ including the kinds of disclosures that would need to be present in the ‘494 Patent to support a finding that the ‘698 Patent claims are supported by the ‘494 Patent specification, to assist a finder of fact in assessing this fact-intensive issue.” *Id.* at 7.

We are not persuaded that Mr. Goodin’s testimony should be excluded from the record under FRE 702. Mr. Goodin’s declaration states that he has “worked for over 35 years in the field of computer engineering and computer technology, and in that time ha[s] focused on both hardware and software aspects of computer engineering and computer technology.” Ex. 1027 ¶ 7; *see also id.* ¶¶ 8–24 (describing professional experience in detail). Complete overlap between a witness’s technical qualifications and the field of the invention is not necessary for the witness’s testimony to be admissible as expert testimony under FRE 702. For example, the Federal Circuit has upheld a district court’s admission under FRE 702 of the testimony of a witness who lacked experience in the design of the patented invention, but had experience with materials selected for use in the invention. *See SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1372–73 (Fed. Cir. 2010); *see also* PTAB Trial Practice Guide August 2018 Update at 3 (“There is . . . no requirement of a perfect match between the expert’s experience and the relevant field.”), available at http://www.uspto.gov/sites/default/files/documents/2018_Revised_Trial_Practice_%20Guide.pdf. Mr. Goodin’s lack of experience specific to control systems for railway safety application systems may detract from the weight

to be given his testimony on certain matters, but it does not render the entirety of his testimony inadmissible under Rule 702.

To support its motion, Patent Owner relies heavily on *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356 (Fed. Cir. 2008). See PO Mot. Excl. 3–4; Paper 4–5. In *Sundance*, the Federal Circuit reviewed the district court’s denial of a motion to exclude a patent lawyer having no relevant technical expertise from testifying in a jury trial. *Sundance*, 550 F.3d at 1361–62. The Federal Circuit held that because the patent attorney “was never offered as a technical expert, and in fact was not qualified as a technical expert, it was an abuse of discretion for the district court to permit him to testify as an expert on the issues of noninfringement or invalidity.” *Id.* at 1362. The Federal Circuit further explained:

The court, in its role as gatekeeper, must exclude expert testimony that is not reliable and specialized, and which invades the province of the jury to find facts and that of the court to make ultimate legal conclusions. Allowing a patent law expert without any technical expertise to testify on the issues of infringement and validity amounts to nothing more than advocacy from the witness stand.

Id. at 1364–65.

Here, Mr. Goodin is offered as a technical expert and he has substantial technical expertise relevant to the field of the ’698 Patent. Moreover, in this proceeding, fact-finding and legal determinations are carried out by the same panel of administrative patent judges, which eliminates any concern of invading a jury’s province. These distinctions make *Sundance* inapposite as a basis for excluding Mr. Goodin’s testimony.

Patent Owner also argues that Mr. Goodin’s testimony regarding issues to be considered from the perspective of an ordinarily skilled artisan

should be excluded under FRE 403 because its limited probative value is substantially outweighed by a danger of confusing issues to be determined in this proceeding. PO Mot. Excl. 7–9. Patent Owner contends that Mr. Goodin admitted during his deposition that he is proposing a definition of a person of ordinary skill in the art that does not conform with either party’s proposals. *See id.* at 7–8 (citing Ex. 2031, 64:17–65:10, 83:14–19). According to Patent Owner, Mr. Goodin’s person of ordinary skill in the art is a person of skill in the art of computer software. *See id.* at 8 (citing Ex. 1027 ¶ 25). Patent Owner asserts that allowing Exhibit 1027 into the record would confuse the issues to be determined in this proceeding, which are written description and enablement from the perspective of a person of ordinary skill in the art, not from the perspective of “a person of skill in the art of computer software.” *See id.* at 8; *see also* Reply Mot. Excl. 3–5 (arguing the importance of the perspective of one with ordinary skill in the art).

In response, Petitioner argues that Mr. Goodin’s testimony meets the standard of relevant evidence under FRE 401 as rebuttal testimony to Dr. Souris’s testimony. *See* Opp. Mot. Excl. 8. According to Petitioner, Patent Owner gives the panel of the Board “too little credit” because “the panel is certainly capable of understanding the issues (and Mr. Goodin’s opinions’ relevance to those issues).” *Id.* at 8–9 (quoting *Mobotix Corp. v. Comcam Int’l, Inc.*, Case IPR2015-00093, slip op. at 3 (PTAB April 28, 2016) (Paper 22)).

We are not persuaded that Exhibit 1027 should be excluded under FRE 403. We agree Mr. Goodin’s testimony meets the standard of relevant evidence under Rule 401. A motion to exclude is not the proper vehicle to

challenge the sufficiency of Mr. Goodin's testimony. It is within the panel's discretion to assign the appropriate weight to be accorded to Mr. Goodin's testimony.

For all of the foregoing reasons, we deny Patent Owner's motion to exclude Exhibit 1027.

H. Patent Owner's Motion for Observations

To the extent Patent Owner's Observations pertain to testimony purportedly impacting Mr. Goodin's credibility and have not been addressed explicitly in this Final Written Decision, we have considered Patent Owner's observations and Petitioner's responses in rendering this Final Written Decision, and accorded Mr. Goodin's testimony appropriate weight in view of Patent Owner's observations and Petitioner's response to those observations.

I. Patent Owner's Contingent Motion to Amend and Supplemental Contingent Motion to Amend

As discussed above, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1, 2, 5, 10, 11, 14, 17, and 18 are unpatentable. Therefore, Patent Owner's Contingent Motion to Amend claims 1, 2, 10, 11, 17, and 18, and Supplemental Contingent Motion to Amend claims 5 and 14 are dismissed as moot.

J. Petitioner's Motion to Exclude Ex. 2029

Petitioner moves to exclude Ex. 2029 under Federal Rules of Evidence 401–403, 802, and 901. See Paper 40. Patent Owner offers Exhibit 2029 in support of its Reply to Petitioner's Opposition to Patent Owner's Contingent Motion to Amend. See Paper 33, 12. Because Patent

IPR2017-00580
Patent 9,233,698 B2

Owner's Contingent Motion to Amend is dismissed as moot, Petitioner's Motion to Exclude 2029 also is dismissed as moot.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 5, 10, 11, 14, 17, and 18 of U.S. Patent No. 9,233,698 B2 have not been shown to be unpatentable under 35 U.S.C. § 103 over Ruhland;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibit 1027 is *denied*;

FURTHER ORDERED that Patent Owner's Contingent Motion to Amend claims 1, 2, 10, 11, 17, and 18, and Supplemental Contingent Motion to Amend claims 5 and 14 are *dismissed* as moot;

FURTHER ORDERED that Petitioner's Motion to Exclude Exhibit 2029 is *dismissed* as moot; and

FURTHER ORDERED that 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.

IPR2017-00580
Patent 9,233,698 B2

PETITIONER:

Jason A. Engel
Alan L. Barry
Roberto Capriotti
Benjamin E. Weed
Katherine L. Hoffee
K&L GATES LLP
Jason.Engel.PTAB@klgates.com
alan.barry@klgates.com
roberto.capriotti@klgates.com
benjamin.weed.PTAB@klgates.com
katy.hoffee.PTAB@klgates.com

PATENT OWNER:

Jeffrey D. Sanok
Mark M. Supko
Vincent J. Galluzzo
CROWELL & MORING LLP
jsanok@crowell.com
msupko@crowell.com
vgalluzzo@crowell.com