

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BUNGIE, INC.,
Petitioner,

v.

WORLDS INC.,
Patent Owner.

Case IPR2015-01321
Patent 8,145,998 B2

Before KARL D. EASTHOM, KERRY BEGLEY, and
JASON J. CHUNG, *Administrative Patent Judges*.

CHUNG, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Petitioner, Bungie, Inc., filed a Petition to institute an *inter partes* review of claims 1–3, 7, 8, and 11–20 (“the challenged claims”) of U.S. Patent No. 8,145,998 B2 (“the ’998 patent”). Paper 3 (“Pet.”). Patent Owner, Worlds Inc., filed a Preliminary Response pursuant to 35 U.S.C. § 313. Paper 12 (“Prelim. Resp.”). Upon consideration of the Petition and Preliminary Response, on November 30, 2015, we instituted an *inter partes* review of claims 1–3, 7, 8, 12–18, and 20 (“instituted claims”), pursuant to 35 U.S.C. § 314. Paper 13 (“Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 20 (“PO Resp.”)) and a Supplement to the Response (Paper 22 (“Supp. Resp.”)). Petitioner filed a Reply to Patent Owner’s Response (Paper 31 (“Reply”)). Patent Owner filed a Motion to Exclude (Paper 33 (“Mot.”) and Petitioner filed an Opposition to the Motion to Exclude (Paper 36 (“Opp.”)), to which Patent Owner filed a Reply (Paper 38 (“Mot. Reply”)). An oral hearing was held on August 17, 2016, and a transcript of the hearing is included in the record (Paper 41 (“Tr.”)).

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, Petitioner has shown by a preponderance of the evidence that the instituted claims of the ’998 patent are unpatentable. *See* 35 U.S.C. § 316(e).

A. *Related Matters*

The ’998 patent is involved in a district court proceeding, *Worlds Inc. v. Activision Blizzard, Inc.*, Case No. 1:12-cv-10576 (D. Mass.) (“District Court Case”). Paper 6. In addition, the ’998 patent is the subject of

IPR2015-01325 and related to the patents at issue in IPR2015-01264, IPR2015-01268, IPR2015-01269, and IPR2015-01319. *Id.*

B. The Asserted Grounds

We instituted *inter partes* review on the following grounds of unpatentability asserted by Petitioner:

Reference(s)	Basis	Instituted Claim(s)
Funkhouser (Ex. 1005) ¹ and Marathon (Ex. 1021) ²	§ 103(a) ³	1, 2, 7, 8, 12, 16, 18, and 20
Funkhouser, Marathon, and Sitrick (Ex. 1013) ⁴	§ 103(a)	3
Funkhouser, Marathon, and Funkhouser '93 (Ex. 1017) ⁵	§ 103(a)	13–15
Funkhouser, Marathon, and Wexelblat (Ex. 1020) ⁶	§ 103(a)	17

¹ Thomas A. Funkhouser, *RING: A Client-Server System for Multi-User Virtual Environments*, in 1995 SYMPOSIUM ON INTERACTIVE 3D GRAPHICS (1995).

² Marathon, Bungie Products Software Corporation (1994).

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, revised 35 U.S.C. § 103 and the relevant sections took effect on March 16, 2013. Because the application from which the ’998 patent issued was filed before that date, our citations to Title 35 are to its pre-AIA version.

⁴ U.S. Patent No. 4,521,014, issued June 4, 1985.

⁵ Thomas A. Funkhouser & Carlo H. Séquin, *Adaptive Display Algorithm for Interactive Frame Rates During Visualization of Complex Virtual Environments*, in COMPUTER GRAPHICS PROCEEDINGS: ANNUAL CONFERENCE SERIES (1993).

⁶ U.S. Patent No. 5,021,976, issued June 4, 1991.

C. The '998 Patent

The '998 patent is directed to a graphical, multi-user, interactive virtual world system that includes highly scalable architecture. Ex. 1001, Abs. The system disclosed in the '998 patent displays avatars representing other users neighboring the user viewing the virtual world. *Id.* Motion information from the remote users' avatars is transmitted to a central server process that provides positions updates to client processes for neighbors of the user at that client process. *Id.* The client process also determines which background objects to render. *Id.*

D. The Instituted Claims

Of the instituted claims 1–3, 7, 8, 12–18, and 20, claims 1, 2, and 18 are independent claims. Claim 1 is illustrative and reproduced below:

1. A method for displaying interactions of a local user avatar of a local user and a plurality of remote user avatars of remote users interacting in a virtual environment, the method comprising:

receiving, at a client processor associated with the local user, positions associated with less than all of the remote user avatars in one or more interaction rooms of the virtual environment, wherein the client processor does not receive position information associated with at least some of the remote user avatars in the one or more rooms of the virtual environment, each avatar of the at least some of the remote user avatars failing to satisfy a condition imposed on displaying remote avatars to the local user;

generating, on a graphic display associated with the client processor, a rendering showing position of at least one remote user avatar; and switching between a rendering on the graphic display that shows at least a portion of the virtual environment to the local user from a perspective of one of the remote user avatars

and a rendering that allows the local user to view the local user avatar in the virtual environment.

II. ANALYSIS

A. Level of Ordinary Skill in the Art

We begin our analysis by addressing the level of ordinary skill in the art. Petitioner argues, and Dr. Zyda opines, that a person of ordinary skill in the art relevant to the '998 patent would have had “through education or practical experience, the equivalent of a bachelor’s degree in computer science or a related field and at least an additional two years of work experience developing or implementing networked virtual environments.” Pet. 11; Ex. 1002 ¶ 58. Mr. Pesce similarly testifies that a person of ordinary skill in the art would have had “at least a bachelor’s degree or equivalent in computer science, with two or more years of experience in coding related to both virtual environments and computer networking.” Ex. 2017 ¶ 33.

The parties’ proposals for the level of ordinary skill in the art have slight differences in wording, yet we do not find them to have meaningful distinctions (e.g., “at least” two years versus “two or more years,” “networked virtual environments” versus “virtual environments and computer networking”). Neither party asserted that there is any such distinction. Based on the testimony of the parties’ experts as well as our review of the '998 patent, the types of problems and solutions described therein, and the prior art involved in this proceeding, we adopt the following as the level of ordinary skill in the art: the equivalent, through education or practical experience, of a bachelor’s degree in computer science or a related field, and at least two years of experience developing, coding, or

implementing networked virtual environments, or virtual environments and computer networking.

B. Mr. Pesce's Qualifications as an Expert

Petitioner argues the testimony of Mr. Pesce, Patent Owner's declarant, should be given no weight because it "often is inconsistent, lacks objective support, and/or was incapable of being substantiated during . . . cross examination," providing examples of these alleged deficiencies in Mr. Pesce's testimony regarding claim construction and the timing of the invention of the '998 patent. Reply 1–3. Petitioner further argues that "[i]t is not clear how Mr. Pesce qualifies as an expert in this field," citing Mr. Pesce's deposition testimony regarding the amount of experience he had in 1995⁷ and his lack of an educational degree beyond high school. Reply 3 (citing Ex. 1046, 18:12–19:2, 21:8–15, 40:10–20; Ex. 2017 ¶ 35). Petitioner also asserts that "Mr. Pesce was unwilling to address his documented . . . use

⁷ The '998 patent claims priority to provisional application no. 60/020,296 ("296 provisional"), filed on November 13, 1995. Ex. 1001, [60]. Petitioner uses the provisional filing date in its analysis in its briefing and Dr. Zyda's declaration (*see, e.g.*, Pet. 4–11; Reply 2–5; Ex. 1002 ¶¶ 56–58), and represented at the hearing that it does not contest, for purposes of this proceeding, priority to the provisional (Tr. 195:1–7). Patent Owner also takes the position that the '998 patent is entitled to priority to the provisional and represented at the hearing that its specification is nearly identical to that of the '998 patent. *See, e.g., id.* at 90:5–91:3, 92:10–15; Ex. 2017 ¶ 34. Based on our review of the '296 provisional, we agree with Patent Owner's representation that its specification is nearly identical to the '998 patent specification, and we accept the parties' agreement that the '998 patent is entitled to priority to the '296 provisional. *See* Ex. 2020. None of our determinations in this Decision would change if the '998 patent were not entitled to this priority date.

of psychedelic drugs during the 1990s (Ex. 1041) and whether that drug use affected his recollection of events during the period relevant to the [’998] patent[]]. *See also*, Ex. 1046 at 46:11–47:21, 50:25–53.” Reply 3.

Here, Petitioner has not moved to exclude Mr. Pesce’s testimony. Nor has Petitioner taken an express and affirmative position that Mr. Pesce is not qualified as an expert. *See id.* (“It is *not clear* how Mr. Pesce qualifies as an expert in this field.”) (emphasis added). To the extent Petitioner is suggesting as much, we disagree.

Federal Rule of Evidence (“Rule”) 702 provides that a “witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion if (a) the expert’s knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based upon sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the witness has applied the principles and methods reliably to the facts of the case.” Fed. R. Evid. 702. Under this standard, testimony on the issue of unpatentability proffered by a witness who is not “qualified in the pertinent art” generally is not admissible. *Sundance Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363–64 (Fed. Cir. 2008). Rule 702, however, does not “require[] a witness to possess something more than ordinary skill in the art to testify as an expert” and a “witness possessing merely ordinary skill will often be qualified to present expert testimony.” *Id.* at 1363. Nor does the Rule require a perfect match or complete overlap between the witness’s technical qualifications and the field of the invention. *See SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1372–73 (Fed. Cir. 2010).

In his declaration and curriculum vitae, Mr. Pesce details his relevant work experience from 1984 to the present as well as his teaching experience and numerous technical publications and presentations. *See* Ex. 2017 ¶¶ 3–19, 35–42, pp. 67–82; *see also* Ex. 1046, 19:8–21:16, 39:11–40:20. Having reviewed this experience and Mr. Pesce’s technical testimony, we find his knowledge, skill, and experience in the relevant field of networked virtual environments, as well as computer networking and virtual reality more generally, sufficient to render him qualified to offer expert testimony in this proceeding under Rule 702.

We do not find the evidence to which Petitioner points persuasive on this issue. First, Petitioner refers to Mr. Pesce’s declaration testimony that “as of 1995, [he] possessed more than 5 years of experience in the computer graphics industry with an emphasis on virtual reality” and his admission during his deposition that he was working in the field “from 1991” so “five years” is accurate, rather than “more than five years” as he stated in his declaration. Ex. 2017 ¶ 33; Ex. 1046, 39:13–40:20; *see* Reply 3. We do not find this admitted minor misstatement of Mr. Pesce’s experience to undermine his qualifications, or credibility, as an expert. Mr. Pesce worked on virtual reality environments beginning in 1991 and continuing through the relevant time of invention of the ’998 patent, and for many years thereafter. *See*, e.g., Ex. 2017 ¶¶ 5–19, 35–42, pp. 67–82; Ex. 1046, 39:13–40:20. Second, as to Mr. Pesce’s lack of an educational degree beyond high school, Petitioner and Dr. Zyda, as well as Mr. Pesce, agree that experience can overcome a lack of a formal technical education in satisfying the standard for a person of ordinary skill in the art, and we have so determined in our finding in § II.A regarding the level of ordinary skill in the art.

Pet. 11 (proffering definition of one of ordinary skill in the art as “someone who had, through education *or practical experience, the equivalent* of a bachelor’s degree in computer science or a related field”) (emphasis added); Ex. 1002 ¶ 58 (same); Ex. 2017 ¶ 33; *see id.* ¶¶ 3, 35; Reply 3; Opp. 7. We note that Mr. Pesce did attend the Massachusetts Institute of Technology (“MIT”) for four semesters. Ex. 2017 ¶ 3; Ex. 1046, 19:8–14; *see id.* at 19:15–21:16. As we explain above, we find Mr. Pesce’s experience, skill, and knowledge in the relevant field sufficient to render him qualified to offer expert testimony in this proceeding.

Third, we turn to Petitioner’s citation and reference to Exhibit 1041,⁸ an excerpt from a 1999 interview of Mr. Pesce at the AllChemical Arts conference in which he discusses how his use of psychedelic drugs, beginning in college, has impacted and facilitated his career and work, and Mr. Pesce’s related deposition testimony in which he states he does not recall the interview and the specific contents thereof. Reply 3 (citing Ex. 1041; Ex. 1046, “46:11–47:21, 50:25–53”); Ex. 1041; Ex. 1046, 46:11–47:21, 50:25–57:10. We have considered Exhibit 1041 in assessing Mr. Pesce’s capacity to perceive and recall developments and details from the relevant art in the 1990s about which he testifies, as well as the reliability of his perception and recollection. *See infra* § II.K; *see, e.g.*, Ex. 2017 ¶¶ 36–44, 49.a.iv, 59; Ex. 1046, 85:4–21, 89:10–90:7, 204:12–205:20, 222:1–223:6. We do not find Exhibit 1041, which lacks detailed information regarding the extent and regularity of any drug use, to

⁸ Exhibit 1041 is a subject of Patent Owner’s motion to exclude, which we address below in § II.K. We consider Exhibit 1041 here only for the limited purpose for which we find it relevant and admissible in § II.K.

undermine Mr. Pesce's capacity to perceive and recall such events or the reliability of his relevant testimony. Nor do we find his inability to remember the specifics of this one particular interview given nearly twenty years ago to undermine his credibility, reliability, or qualifications as a witness. Having carefully reviewed his testimony in this proceeding, we find his technical testimony, and particularly his testimony on issues related to the development of the art in the early to mid-1990s, cogent. We consider Mr. Pesce's testimony throughout our analysis below and where we discount or disagree with his testimony, it is for reasons other than the contents of Exhibit 1041 and his deposition testimony regarding this exhibit.

Petitioner's remaining arguments regarding specific alleged deficiencies in Mr. Pesce's testimony on claim construction go to the weight to be accorded to Mr. Pesce's testimony on these particular substantive issues. *See* Reply 1–3. We have considered these alleged deficiencies and address them, as appropriate, in our analysis below of the issues to which they pertain.

C. Claim Construction

In our Institution Decision, we raised the issue of the impending expiration of the '998 patent and its potential impact on the applicable claim construction standard, given that the Board construes unexpired patents under the broadest reasonable interpretation standard but expired patents under the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). *See* Inst. Dec. 5 n.8; 37 C.F.R. § 42.100(b) (2012)⁹; *Cuozzo*

⁹ The Office amended rule 37 C.F.R. § 42.100(b) after the Institution Decision in this proceeding. The amended rule does not apply to this

Speed Techs., LLC v. Lee, 136 S. Ct. 2131, 2144–46 (2016) (holding that 37 C.F.R. § 42.100(b), under which the Board applies the broadest reasonable interpretation standard to unexpired patents, “represents a reasonable exercise of the rulemaking authority that Congress delegated to the . . . Office”); *Black & Decker, Inc. v. Positec USA, Inc.*, 646 Fed. App’x 1019, 1024 (Fed. Cir. 2016) (holding that in an *inter partes* review, “[c]laims of an expired patent are given their ordinary and customary meaning in accordance with our opinion in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc)”). Because neither party had addressed this issue, we stated that we “expect the parties to address, with particularity, in their future briefing the expiration date of claim 1–3, 7, 8, 12–18, and 20 of the ’998 patent.” Inst. Dec. 5 n.8.

In its Response, Patent Owner represented that the ’998 patent expires on June 8, 2017, with an explanation supporting the calculation of this expiration date. *See* PO Resp. 10–12. In its Supplement to its Response, Patent Owner changed the expiration date of the ’998 patent to November 12, 2016 because it inadvertently did not account for a terminal disclaimer when initially calculating the expiration date. *See* Supp. Resp.; Tr. 89:1–7. At the oral hearing, Patent Owner confirmed this expiration date and Petitioner indicated that it agrees with and does not challenge this date. *See* Tr. 14:1–16, 88:8–89:7. Based on the parties’ agreement and our review of the record, we agree that the ’998 patent expired on November 12, 2016. *See, e.g.*, Ex. 1001, [22], [60], [63]; Ex. 1004, 322, 339.

proceeding, because it applies only to petitions filed on or after May 2, 2016. *See* Amendments to the Rules of Practice for Trials Before the Patent Trial and Appeal Board, 81 Fed. Reg. 18,750, 18,766 (Apr. 1, 2016).

The '998 patent is now expired.¹⁰ In an *inter partes* review, the proper claim construction standard in an expired patent is set forth in *Phillips*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). See *In re Rambus Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012) (“[T]he Board’s review of the claims of an expired patent is similar to that of a district court’s review.”). Under the *Phillips* 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 patent disclosure. *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365-66 (Fed. Cir. 2012).

A claim term will be interpreted more narrowly than its ordinary and customary meaning only under two circumstances: (1) the “patentee sets out a definition and acts as [its] own lexicographer,” or (2) the “patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Aventis Pharma S.A. v. Hospira, Inc.*, 675 F.3d 1324, 1330 (Fed. Cir. 2012). To act as a lexicographer, the patentee “must clearly set forth a definition of the disputed claim term other than its plain and ordinary meaning,” or in other words, “must clearly express an intent to redefine the term.” *Id.* at 1330 (internal citations and quotations omitted). “This clear expression . . . may be inferred from clear limiting descriptions of the invention in the specification or prosecution history.” *Id.*

¹⁰ Although we apply the *Phillips* standard in this Decision, our claim interpretation would not differ under the broadest reasonable interpretation standard, applicable to unexpired patents. Rather, having considered the issue, we would reach the same claim interpretation under the broadest reasonable interpretation standard.

Similarly, to disavow claim scope, “the specification or prosecution history [must] make clear that the invention does not include a particular feature.” *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) (internal citation, quotation, and alterations omitted). To do so, the patentee may “include[] in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Aventis*, 675 F.3d at 1330 (internal quotations omitted). Ambiguous language does not constitute disavowal. *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323–26 (Fed. Cir. 2003). Nor is it sufficient “that the only embodiments, or all of the embodiments, contain a particular limitation.” *Aventis*, 675 F.3d at 1330.

“A patent that discloses only one embodiment is not necessarily limited to that embodiment.” *GE Lighting*, 750 F.3d at 1309. “It is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Id.*

Here, both parties address the construction of the term “avatar.” Pet. 13; PO Resp. 14–16; Reply 4–6. Petitioner also proffers a construction for the recited “rendering” and “third user perspective.” Pet. 13–15. Based on our review of the arguments and evidence of record, we determine that we must address only the interpretation of “avatar,” discussed below. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that only claim terms that “are in controversy” need to be construed and “only to the extent necessary to resolve the controversy”).

The parties' post-institution arguments require that we address the proper scope of the claim term "avatar." Pet. 13; PO Resp. 14–16; Reply 4–6. In the Petition, Petitioner argues that "avatar" should be construed to mean "a graphical representation of a user," citing as support the '998 patent specification's explanation that "[t]he virtual world shows avatars representing the other users who are neighbors of the user viewing the virtual world." Pet. 11 (quoting Ex. 1001, 2:42–44). With supporting testimony from Dr. Zyda as well as a definition from THE MICROSOFT COMPUTER DICTIONARY (3d. ed. 1997), Petitioner contends that its proposed construction is consistent with how one of ordinary skill would have understood the term. *Id.* (citing Ex. 1002 ¶ 62; Ex. 1010).

In its Response, Patent Owner argues that the proper construction of "avatar," under either the broadest reasonable interpretation or the *Phillips* standard, is "a *three-dimensional* graphical representation of a user." PO Resp. 14 (emphasis added). Patent Owner directs our attention to the District Court's construction of "avatar" as "a graphical representation of the user in three-dimensional form." *Id.* at 14 (citing Ex. 2006, 20–24); Tr. 126:17–20. Patent Owner, with supporting testimony from Mr. Pesce, contends that a construction limiting an avatar to a "three-dimensional" form is "consistent with the ['998 patent] specification . . . and the interpretation that would be reached by a person of ordinary skill in the art." PO Resp. 14–15 (citing Ex. 2017 ¶ 49.a). Patent Owner asserts that the '998 patent is "consistent in" its description of an avatar as "three-dimensional." *Id.* at 15 (citing Ex. 1001, 3:25–27, 6:13–16, 7:41–44). Moreover, at the hearing, Patent Owner argued that column 3, lines 25–27 of the '998 patent

specification¹¹ comes “fairly close to” and is “practically lexicography,” given the quotation marks around the term “avatar.” Tr. 127:17–129:6, 130:14–15, 135:16–19, 140:7–12. In addition, Patent Owner argues that the District Court properly recognized that “the ‘crowd control’ issue at the heart of [the ’998] patent is an issue implicated by the more complex three-dimensional system.” PO Resp. 15 (quoting Ex. 2006, 21); *see* Tr. 130:15–21, 140:14–21.

Petitioner responds that its proposed construction of “avatar” is proper under both the broadest reasonable interpretation and the *Phillips* standards. Reply 3–6. Petitioner contends Patent Owner’s attempt to limit the term to “three-dimensional” representations “improperly import[s] a term” from the specification “that could have been recited in the claims, but was not.” *Id.* at 4; Tr. 174:20–175:2, 180:16–18. Petitioner asserts that the ’998 patent does not define an “avatar” to be three-dimensional and the specification is explicit that column 3, lines 22–25, to which Patent Owner cites, is referring to a specific “example” in Figure 1, which is “illustrative and not restrictive”—not a fundamental aspect of the invention. Reply 4 (quoting Ex. 1001, 3:1–8, 3:17–20, 16:16–22); *see* Tr. 39:11–15.

Moreover, Petitioner contends that the specification, even when describing avatars that it refers to as “three-dimensional,” does not describe “true-three dimensional renderings”—which contradicts Patent Owner’s

¹¹ We held a consolidated hearing on this and the other *inter partes* reviews listed in § II.A involving related patents with specifications nearly identical to the ’998 patent. As a result, the hearing arguments sometimes refer to the specification of one of the related patents, rather than to the ’998 patent. Throughout this Decision, we have adjusted relevant citations from the hearing to refer to the specification of the ’998 patent.

attempt to limit the term to precisely three-dimensional figures. Reply 4; Tr. 43:8–45:10, 164:17–25. According to Petitioner, the specification’s explanation that an avatar “comprises N two-dimensional panels, where the i-th panel is the view of the avatar from an angle of $360 \cdot i/N$ degrees” demonstrates that the avatars are “two-dimensional panels” and the panel displayed depends on the user’s viewing angle, a technique similar to that which Mr. Pesce described as “quasi-3D.” Reply 4–5 (quoting Ex. 1001, 7:39–44; Ex. 1046, 204:12–205:20); Tr. 43:8–45:10, 164:17–25.

In addition, Petitioner proffers a claim differentiation argument, asserting that the related ’501 patent includes a claim, for example, that expressly recites a “*three dimensional* avatar” and, thus, construing the term “avatar” alone to require “three-dimensional” would render meaningless the additional claim language in violation of governing precedent. Reply 5–6 (emphasis added); Tr. 37:20–25, 39:5–40:11, 41:3–5, 43:1–7, 178:4–7. According to Petitioner, Patent Owner’s decision to include the term “three dimensional” before “avatar” in some claims reflects that the plain and ordinary meaning of “avatar” is not so limited. *See* Reply 10, 12; Tr. 39:16–40:11.

Petitioner also argues that Mr. Pesce’s testimony in support of Patent Owner’s attempt to limit the term “avatar” to be three-dimensional is “not credible,” “unsubstantiated,” “inconsistent,” and in conflict with the record, including the THE MICROSOFT COMPUTER DICTIONARY’s definition. Reply 5; Tr. 45:13–46:9.

Here, both Petitioner and Patent Owner’s proposed constructions represent that an “avatar” is a “graphical representation of a user.” Pet. 13; PO Resp. 14–15. The parties dispute only whether that representation must

be “three-dimensional,” as Patent Owner urges. *See* Pet. 13; PO Resp. 14–15; Reply 4–6; Tr. 127:6–11. We address each issue in turn.

First, as noted above, there is no dispute in the record that an “avatar” is a “graphical representation of a user,” as the parties, their experts, and the construction adopted by the District Court are in agreement on this point. *See, e.g.*, Pet. 13; PO Resp. 14–15; Ex. 2006, 24; Tr. 127:6–11; *see also* Ex. 1002 ¶ 62; Ex. 2017 ¶ 49.a.ii–iii. Having reviewed the intrinsic record of the ’998 patent, we agree that “avatar” refers to a “graphical representation of a user.” Instituted claim 1 recites “[a] method for displaying interactions,” which involves “a plurality of remote user avatars of remote users interacting in a virtual environment” and “receiving . . . positions associated with less than all of the remote user avatars . . . [and] generating, on a graphic display . . . the local user avatar.” Ex. 1001, 19:12–30. Independent claims 2 and 18, in turn, each provides for a system, which displays at least one remote user avatar. *Id.* at 19:31–56, 20:45–21:5. The written description explains that in the preferred embodiment, “[t]he virtual world shows avatars representing other users who are neighbors of the user viewing the virtual world” and each avatar is a figure “chosen by the user to represent the user in the virtual world.” *Id.* at [57], 2:42–47, 3:25–27, Fig. 1. This claim language and description demonstrate that an avatar represents a particular user in a graphical virtual space. Neither party points us to any relevant prosecution history, nor do we see any. *See generally* Pet.; Resp.; Reply; Ex. 1004. Accordingly, the intrinsic record demonstrably supports the parties’ positions that an avatar is a “graphical representation of a user.”

Considering the submitted extrinsic evidence, we find it to persuasively support that “avatar” refers to a “graphical representation of a

user.” THE MICROSOFT COMPUTER DICTIONARY (3d. ed. 1997),¹² proffered by Petitioner, defines “avatar” as: “In virtual-reality environments such as certain types of Internet chat rooms, *a graphical representation of a user.*” Ex. 1010, 38 (emphasis added); *see* Pet. 13. Moreover, Dr. Zyda and Mr. Pesce testify in agreement on this issue. Ex. 1002 ¶ 63; Ex. 2017 ¶ 49.a.ii–iii.

Second, we consider the contested issue of whether the “graphical representation of a user” must be “three-dimensional” to come within the meaning of “avatar.” We conclude, under the *Phillips* standard, the ordinary and customary meaning of the term, in the context of the ’998 patent specification, is not so limited.

We acknowledge that the District Court, applying the *Phillips* standard, answered this disputed question in the affirmative, determining that the patent limits the meaning of “avatar” to three-dimensional graphical representations. Ex. 2006, 20–24; *see* PO Resp. 14–15. Although the District Court’s interpretation is informative, we are not bound by that construction. *See Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326 (Fed. Cir. 2015) (“There is no dispute that the board is not generally bound by a prior judicial construction of a claim term.”). Moreover, Petitioner is not a named party in the District Court Case and the supporting arguments

¹² THE MICROSOFT COMPUTER DICTIONARY has a copyright date of 1997, which is after the filing of the ’296 provisional, to which the parties agree, for purposes of this proceeding, the ’998 patent is entitled to priority. *See* Ex. 1001, [60]; *supra* n.7. Neither party raised this issue. Nonetheless, we determine that the 1997 dictionary is sufficiently contemporaneous to the filing date of the ’296 provisional, November 13, 1995, to inform the ordinary meaning of the term at the relevant time period.

and evidence in the record before us are not identical to those proffered to the District Court. *See, e.g.*, Ex. 2006, 1, 20–24; Pet. 13; PO Resp. 14–15; Reply 3–6. We have considered carefully the District Court’s claim construction, *see Power Integrations*, 797 F.3d at 1324–27, but for the reasons given below, we determine that “avatar” is not restricted to “three-dimensional.”

We begin our analysis with the language of the claims. We see nothing in the instituted claims, as well as the other claims of the ’998 patent, that would require or even suggest that a representation of a user must be three-dimensional to be an “avatar” within the meaning of the claim language. *See* Ex. 1001, 19:12–30. We note that in arguing that the meaning of “avatar” is so limited, Patent Owner does not cite or refer to any supporting claim language. *See, e.g.*, Resp. 14–15.

In light of Petitioner’s claim differentiation argument, we also consider the claim language of other patents in the same family, including the ’501 patent. *See, e.g.*, Reply 5–6. “[W]e presume, unless otherwise compelled, that the same claim term in the same patent or related patent carries the same construed meaning.” *Omega Eng’g*, 334 F.3d at 1334. More specifically, where “patents all derive from the same parent application and share many common terms, we must interpret the claims consistently across” the patents. *NTP*, 418 F.3d at 1293.

The doctrine of claim differentiation applies across related patents but “is not as strong” as within the same patent. *Clare v. Chrysler Group LLC*, 819 F.3d 1323, 1330 (Fed. Cir. 2016); *see In re Rambus Inc.*, 694 F.3d 42, 48 (Fed. Cir. 2003) (applying claim differentiation across related patents). The doctrine creates a presumption that “two independent claims have

different scope when different words or phrases are used in those claims.” *Seachange Int’l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1368–69 (Fed. Cir. 2005) (citations omitted). The doctrine “takes on relevance in the context of a claim construction that would render additional, or different, language in another independent claim superfluous.” *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011) (internal citation and quotations omitted).

Here, the ’501 and ’998 patents share a common specification and many claim terms, including “avatar,” and each patent claims priority to the ’296 provisional and issued from three common continuation applications. *See* Ex. 1001, [60], [63]; Ex. 2043, [60], [63]; *see generally* Ex. 1001; Ex. 2043. Accordingly, in the absence of evidence compelling otherwise—of which, as explain below, we see none in the record—“avatar” has the same meaning in these patents.

In contrast to claim 1 of the ’998 patent, which recites “avatar” alone, without the “three dimensional” modifier, independent claims 2, 18, and 19 of the ’998 patent and independent claims 1, 12, and 14 of the ’501 patent specifically recite a “*three dimensional* avatar.” *See* Ex. 1001, 19:12–56, 22:45–22:13; Ex. 2043, 19:19–38, 20:14–52 (emphasis added); Reply 5–6.

We agree with Petitioner that adopting Patent Owner’s proposed construction of “avatar”—which requires the graphical representation to be three-dimensional—would render the additional modifying limitation “three dimensional” in claims 2, 18, and 19 of the ’998 patent and claims 1, 12, and 14 of the ’501 patent meaningless or superfluous. *See* Reply 12; Tr. 37:20–25, 39:5–40:11, 41:3–5, 43:1–7, 178:4–7. Patent Owner acknowledged this at the oral hearing. Tr. 129:22–130:12 (Patent Owner responding to

question regarding whether its proposed construction, when “plugged” into the ’501 and other patent claims requiring a “three-dimensional” avatar would render “three-dimensional” superfluous with “I think it has to, Your Honor. I think it has to.”); *see also* Ex. 1046, 100:1–19, 104:13–105:4. Such a result weighs against adopting Patent Owner’s proffered “three dimensional” requirement. *Arlington Indus.*, 632 F.3d at 1254–55 (reasoning that “[r]eading . . . limitation[s],” which are included in some claims but not others, into another claim term “would render these additional modifiers superfluous, which weighs against doing so”); *Cat Tech LLC v. TubeMaster, Inc.*, 528 F.3d 871, 885 (Fed. Cir. 2008) (refusing to adopt a construction that would render a claim limitation meaningless). If “avatar,” alone, required a three-dimensional graphical representation, as Patent Owner argues, there would be no need for the additional “three dimensional” claim language in the ’998 and ’501 patents. *See Rambus*, 694 F.3d at 48 (rejecting argument that claim term “memory device” requires a single chip, where dependent claim of related patent added limitation requiring a single chip, because “if a memory device were always a single chip[,] there would be no need to use the word ‘single’” in the dependent claim); *Phillips*, 415 F.3d at 1314 (explaining that claim language “steel baffles” “strongly implies that the term ‘baffles’ does not inherently mean objects made of steel” and similarly, claim language providing “baffles are placed ‘projecting inwardly from the outer shell at angles tending to deflect projectiles[.]’ . . . would be unnecessary if persons of skill in the art understood that the baffles inherently served such a function”).

Accordingly, we agree with Petitioner that the differentiation in the claim language—“avatar” versus “*three dimensional* avatar”—supports that

the ordinary and customary meaning of the term “avatar” is not limited to “three-dimensional,” and neither is any potential more specific meaning of the term in the context of these patents (which we determine below there is not). *See* Reply 12; Tr. 39:24–40:2; *see also id.* at Tr. 37:20–25, 39:5–40:11, 41:3–5, 43:1–7, 178:4–7. Moreover, if the patentee intended to require that “avatar,” as recited in independent claim 1 of the ’998 patent and its dependent claims, be limited to “three-dimensional,” it could have included such an express limitation as it did in other claims of the same patent, claims 2, 18, and 19, as well as claims 1, 12, and 14 of the related ’501 patent—but notably did not. We are cognizant that claim differentiation creates only a presumption, not a “hard and fast rule” of claim construction, *e.g.*, *Seachange*, 413 F.3d at 1368–69, but as we explain below, nothing in the remainder of the intrinsic record of the ’998 patent dictates to the contrary.

We next consider the written description of the ’998 patent. We agree with Patent Owner that the written description refers to avatars as three-dimensional figures—but we determine these descriptions of the preferred embodiment, and specific examples thereof, are not limiting or restrictive. Patent Owner supports its position that an “avatar” must be three-dimensional with citations to column 3, lines 25–27 and column 6, lines 13–16 of the ’998 patent specification—which state, respectively, that Figure 1 shows “two ‘avatars’ 18. Each avatar 18 is a three-dimensional figure chosen by a user to represent the user in the virtual world” and that “[t]he orientation is needed for rendering because the avatar images are three-dimensional and look different (in most cases) from different angles.” *See* Ex. 1001, 3:22–27, 6:13–18; Resp. 24. Yet as Petitioner points out, the

specification makes clear that these disclosures are describing the “preferred embodiment,” “using the *example* of a client-server architecture for use in a virtual world ‘chat’ system.” Ex. 1001, 3:4–8 (emphasis added); *see* Reply 4–5. In addition, regarding the discussion at column 3, lines 25–27 in particular, the specification further explains that it is discussing Figure 1 as an “*example*” and “*illustration*” of “what such a client might display.” Ex. 1001, 3:13, 3:22–23 (emphases added); *see* Reply 4–5. Even Patent Owner acknowledges that Figure 1 is merely exemplary. *See* Tr. 129:1–21 (“I’m not saying that figure 1 is the invention . . . I think [figure 1] has to be an example, yes.”). Moreover, the specification expressly instructs that the disclosed preferred embodiment and examples are “*illustrative and not restrictive*.” Ex. 1001, 15:64–16:3 (emphasis added); *see* Reply 4.¹³ These references to avatars as three-dimensional in the preferred embodiment, including specific examples thereof, do not suffice to limit the claim term “avatar.” *See Aventis*, 675 F.3d at 1330–31 (“[I]t is . . . not enough that the only embodiments, or all of the embodiments, contain a particular limitation to limit a claim term beyond its ordinary meaning.”) (internal citations and quotations omitted).

With regard to Patent Owner’s argument raised at oral hearing that column 3, lines 25–27 of the specification comes “awfully” and “fairly close

¹³ Neither party cites to the disclosure, but we note that the “Brief Description of the Drawings” refers to Figure 1 as “a client screen view in a virtual world system according to the present invention.” Ex. 1001, 2:58–59. We do not find this statement in the overview of the drawings to overcome the express statements in the detailed description explaining that the figure is an “example” and “illustration” that is “not restrictive.” *Id.* at 3:13–23, 15:64–16:3; *see* Tr. 41:16–42:25, 129:1–21.

to” and is “practically lexicography,” we first note that Patent Owner repeatedly used hedging phrases—“awfully close,” “fairly close,” “fairly clear,” and “practically”—and also offered modifications to the specification’s language that might have clarified that the disclosure was intended to be definitional—suggesting that Patent Owner itself does not view the statement, as written, as sufficiently clear to constitute lexicography. Tr. 127:17–129:6 (“[I]f we didn’t have 18 in the following sentence, if it just said each avatar, instead of each avatar 18, I think there would be very little question of whether it is definitional.”); *id.* at 130:14–15, 135:16–19, 140:7–12. To the extent Patent Owner intended to argue that this statement constitutes lexicography, we disagree and determine to the contrary. The quotation marks around avatar, on which Patent Owner focuses, are insufficient to demonstrate clearly an intent to limit or redefine the term “avatar,” particularly given the express statements in the specification that this disclosure regarding Figure 1 is exemplary and illustrative, outlined above. *See* Ex. 1001, 3:4–8, 3:13, 3:22–27; Tr. 127:17–19, 128:8–11, 129:4–6. We also agree with Petitioner that the explanation that “[e]ach avatar 18 is a three-dimensional figure” relates to the two figures depicted in Figure 1. Ex. 1001, 3:25–26, Fig. 1; *see* Reply 4–5.

Moreover, turning to column 7, lines 39–44 of the specification, to which both parties cite in support of their positions, we agree with Petitioner that this disclosure undermines Patent Owner’s position that “avatar” should be limited to three-dimensional representations. *See* PO Resp. 14; Reply 4–5. This portion of the specification explains that an avatar, stored in the relevant database, “comprises N *two-dimensional panels*, where the i-th panel is the view of the avatar from an angle of $360 \cdot i / N$ degrees.” Ex. 1001,

7:39–44 (emphasis added); *see id.* at 6:18–22. The arguments and evidence before us support Petitioner’s assertion that this passage, describing avatars in the preferred embodiment that the specification refers to as three-dimensional, are not true three-dimensional renderings and instead can be created using shortcuts designed to create the illusion of three-dimensional renderings, which were known in the art. *See* Reply 4–5 (citing Ex. 1046, 204:12–205:20); Tr. 43:8–45:10, 50:9–13, 164:17–25 (Petitioner); *id.* at 132:25–133:23, 143:23–144:5 (Patent Owner); *see also* Ex. 2017 ¶ 40 (Mr. Pesce testifying that the 1992 game Wolfenstein 3D “used a variety of mathematical cheats to produce the illusion of a full 3D environment”); Ex. 1046, 204:12–205:20 (Mr. Pesce testifying that Wolfenstein 3D used “cheats in the art[] to produce the effect of 3-D” and the “appear[ance of] three-dimensional” figures but he believes the figures were “actually draw[n]” or “handled . . . mathematically as two-dimensional” in a “quasi-3D” technique).¹⁴ At the hearing, Patent

¹⁴ Neither party cites to the specification’s references to a “three-dimensional . . . system” and “space” (Ex. 1001, [57], 2:37–42) on the issue of whether an “avatar” must be three-dimensional, but we note that the evidence before us shows that these references do not operate to limit “avatar” to three-dimensional. As we explain, the record arguments and evidence demonstrate that there were known techniques to create the illusion of a three-dimensional graphical rendering in a three-dimensional environment, without the rendering being truly three-dimensional. Similarly, the evidence before us shows, and Patent Owner acknowledges, that there can be virtual beings in less than three-dimensions within a three-dimensional environment. *See, e.g.*, Tr. 134:8–135:6 (arguing that despite Durward’s disclosure of a “three-dimensional virtual space,” its virtual entities would have been understood to be two-dimensional); *see also, e.g.*, Ex. 2017 ¶¶ 40, 59 (opining the same); Ex. 1046, 85:8–86:11 (explaining that it is possible to have entities that are “2-D representations in a 3-D world”); *id.* at 204:12–

Owner similarly explained that this passage involves a “shortcut” aimed to “try[] to achieve” that the “appearance of the[] panels to a user is a 3-D avatar.” Tr. 132:2–133:23; *see id.* at 143:23–144:5; PO Resp. 15. In sum, this passage further supports concluding that “avatar,” in light of the specification, cannot be limited exclusively to three-dimensional representations, as Patent Owner urges.

Finally, Patent Owner’s assertion that “[t]he District Court . . . correctly stated that ‘the “crowd control” issue at the heart of this patent is an issue implicated by the more complex-three dimensional system, as opposed to the two-dimensional systems that did not require as much strain on computing resources” does not support limiting the meaning of “avatar” to three-dimensional. PO Resp. 14–15 (quoting Ex. 2006, 21); Tr. 130:15–21, 140:14–21; *see* Ex. 2017 ¶ 49.a.v; Ex. 2006, 21. That the crowd control functionality discussed in the specification may be better suited to, or useful for, three-dimensional systems with three-dimensional virtual beings does not operate to limit the invention to virtual beings, or avatars, in three-dimensional form. *See, e.g., Rambus*, 694 F.3d at 47 (determining that “preferred embodiments and goals of the invention that [patentee] argues are better met by single chip devices” did not “restrict the invention to single chip memory devices”).

In conclusion, we agree with Petitioner that Patent Owner’s attempt to limit “avatar” to three-dimensional representations improperly seeks to import a limitation—“three-dimensional”—from the specification, including the preferred embodiment and specific examples thereof, into the claims.

205:20.

See Reply 4–5; Tr. 174:20–175:2, 180:16–18; *GE Lighting*, 750 F.3d at 1309. We determine that the specification’s references to avatars as three-dimensional in its preferred embodiment, and examples thereof, do not rise to the level of either lexicography or disavowal—whether express or implicit. There is not a clear indication of an intent to define “avatar” or to restrict the term to three-dimensional representations. Nor is there any language of manifest exclusion or restriction. Nothing in the specification indicates that an avatar being three-dimensional is an essential feature of, or a required limitation of, the claimed method or an advantage of the recited method over the prior art. *See, e.g., GE Lighting*, 750 F.3d at 1309; *Aventis*, 675 F.3d at 1331; *Seachange*, 413 F.3d at 1370.

The prosecution history of the ’998 patent likewise does not evidence a disavowal of claim scope or redefinition of “avatar.” Neither party refers to prosecution history for the construction of “avatar,” yet based on our review, we see no amendments or arguments that would show an intent to define or narrow the term. *See* Ex. 1004.

In sum, based on the intrinsic record of the ’998 patent, as well as closely related patents sharing the same specification and common ancestors, we conclude that the ordinary and customary meaning of the term “avatar,” as used in the specification, is not limited to three-dimensional graphical representations, and the patentee did not narrow this ordinary meaning by acting as a lexicographer or disavowing claim scope.

This conclusion is supported by the extrinsic evidence of record, which is “less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (internal citations and quotations omitted). As we explain above, THE MICROSOFT

COMPUTER DICTIONARY (3d. ed. 1997) defines “avatar” as “a graphical representation of a user.” Ex. 1010, 38; *see* Pet. 13; Reply 4–5. Notably, this definition does not restrict the graphical representation to three-dimensional—which supports Petitioner’s position that the ordinary meaning of the term in November 1995, the effective filing date of the patent, was not so limited. *See* Tr. 46:10–17; Reply 5.

As to Mr. Pesce’s testimony on the issue, Mr. Pesce provides, in his declaration, a general overview of the development of virtual environments from early 1991 through 1996, including challenges and advancements during an alleged transition from two-dimensional to three-dimensional techniques. *See* Ex. 2017 ¶¶ 36–44, 49.a.iv, 59. Mr. Pesce testifies that in September 1993, virtual entities, including those in a “three-dimensional virtual space[,],” “would have been understood by a [person of ordinary skill in the art] to be two-dimensional given the limitations of available software to render a three-dimensional entity,” even in “very high end computers and implementations.” Ex. 2017 ¶ 59; *see* Ex. 1008 [22]; Ex. 1046, 85:4–86:11. He also testifies that 1994–1996 “represent a fulcrum,” as “real-time computer graphics switched from 2D to 3D techniques” and that reading the ’998 patent in this context makes clear that the term “avatar,” as used in the patent, is “a three-dimensional graphical representation of a user.” Ex. 2017 ¶¶ 44, 49.a.iv. At his deposition, Mr. Pesce further testified that, although he did not “know that [he] could be definitive,” he is “fairly positive that by ’95, late ’95, sort of around the frame of these patents, that ‘avatar’ would have necessarily implied 3-D.” Ex. 1046, 89:10–90:1.

We find Mr. Pesce’s testimony, outlined above, that from late 1993—when an “avatar” referred to a two-dimensional virtual entity and such a

representation was used even in high end technology—to 1995, the effective filing date of the '998 patent, virtual reality changed so rapidly that the ordinary meaning of “avatar” no longer encompassed two-dimensional entities and instead required three-dimensionality to be unsupported and internally inconsistent. This testimony is contradicted by Mr. Pesce’s own testimony that “[t]hree-dimensional user representations” were only “*starting to become known in the art by 1995.*” *Id.* at 222:1–4 (emphasis added). Mr. Pesce also testified that the “first time” he saw an avatar in Virtual Reality Modeling Language (“VRML”)—which he worked on beginning in December 1993 and describes as a “standard for the presentation of three-dimensional worlds”—was “[s]omewhere between late 1995 and early 1996.” *Id.* at 41:18–42:15, 222:9–223:6; Ex. 2017 ¶¶ 41–42.

Moreover, as Petitioner points out and Patent Owner explicitly acknowledged at the hearing, Mr. Pesce’s testimony on this issue wholly lacks supporting or corroborating evidence. *See* Reply 5–6; Ex. 2017 ¶¶ 36–44, 49.a.iv, 59; Tr. 45:13–46:9, 138:9–11, 138:19–139:7. In addition, it conflicts with the definition from the MICROSOFT COMPUTER DICTIONARY, which, despite being published in 1997—well after the alleged shift in the art that restricted an “avatar” to three-dimensional form—does not require three-dimensionality. *See* Ex. 1010, 38; Tr. 46:12–17.

We find Mr. Pesce’s inconsistent and unsupported testimony, which contradicts other record evidence, unpersuasive. Accordingly, we accord minimal probative weight to his opinion that in late 1995, the effective filing date of the '998 patent, the ordinary meaning of the term “avatar” to one of ordinary skill was restricted to three-dimensional representations. *See*

37 C.F.R. § 42.65(a); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (explaining that “the Board has broad discretion” to weigh declarations and “to conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations”); *Rohm & Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (“Nothing in the [federal] rules [of evidence] or in our jurisprudence requires the fact finder to credit the unsupported assertions of an expert witness.”). Accordingly, based on the record before us, we agree with both parties that “avatar,” as recited in the instituted claims of the ’998 patent, refers to “a graphical representation of a user,” and further determine that its ordinary and customary meaning, in the context of the specification, is not limited to three-dimensional graphical representations.

E. Obviousness of Claims 1, 2, 7, 8, 12, 16, 18, and 20 in View of Funkhouser and Marathon

1. Funkhouser (Ex. 1005)

Petitioner argues Funkhouser constitutes a “printed publication” under § 102(a) and was published “no later than April 12, 1995.” Pet. 6–7, 15. Patent Owner does not contest, and appears to accept, Petitioner’s position. *See* IPR2015-01264, Paper 20, 44–47 (referring to April 12, 1995 as “the effective publication date of Funkhouser”); *see generally id.*

In determining whether a reference is a “printed publication,” “the key inquiry is whether or not [the] reference has been made ‘publicly accessible.’” *In re Klopfenstein*, 380 F.3d 1345, 1348 (Fed. Cir. 2004). A reference is “publicly accessible” if the reference “has been disseminated or otherwise made available to the extent that persons interested and ordinarily

skilled in the subject matter . . . exercising reasonable diligence, can locate it and recognize and comprehend therefrom the essentials of the claimed invention without need of further research or experimentation.”

Bruckelmyer v. Ground Heaters, Inc., 445 F.3d 1374, 1378 (Fed. Cir. 2006) (internal citations omitted).

Funkhouser (Ex. 1005) is an article that appears in a collection of articles, titled 1995 SYMPOSIUM ON INTERACTIVE 3D GRAPHICS (Ex. 1006) (“1995 Symposium Book”). Ex. 1005; Ex. 1006, cover, 1–3, 85; Ex. 1002 ¶ 40. The 1995 Symposium Book was compiled for a symposium sponsored by the Association for Computing Machinery (“ACM”), held on April 9–12, 1995 (“1995 Symposium”). Ex. 1006, cover, 1–3, 85; Ex. 1002 ¶¶ 40–41. The 1995 Symposium Book indicates that Funkhouser was scheduled to be presented on April 11, 1995. Ex. 1006, 2. Dr. Zyda—who was the chairperson of the 1995 Symposium—testifies that Funkhouser’s author, Thomas Funkhouser, “was a well-known researcher” at the time and that the symposium gathered “many of the top researchers in the fields of virtual reality systems, computer graphics, and real-time interactive 3D.” Ex. 1002 ¶¶ 44–45; Ex. 1006, cover. According to Dr. Zyda, “[o]ver 250 participants attended the 1995 [S]ymposium and each was provided with a copy of the 1995 [Symposium Book].” Ex. 1002 ¶ 45. In addition, Dr. Zyda testifies that copies of the book were available from the ACM. *Id.*; *see* Ex. 1006, copyright page (“A limited number of copies are available at the ACM member discount.”); *see also id.* at 4. The 1995 Symposium Book and Funkhouser feature a 1995 copyright date and permit copying, generally without a fee and with “a fee and/or specific permission” if for “direct commercial advantage.” Ex. 1006, copyright page, 85; Ex. 1005, 85.

In light of this evidence of Funkhouser’s distribution and accessibility, Petitioner has demonstrated that an interested ordinarily skilled artisan, “exercising reasonable diligence,” could have obtained Funkhouser “no later than April 12, 1995”—the last day of the 1995 Symposium. *See, e.g., Mass. Inst. of Tech. v. Ab Fortia*, 774 F.2d 1104, 1109 (Fed. Cir. 1985) (holding a paper to be a prior art printed publication where the paper was “disseminated without restriction to at least six persons” and “between 50 and 500” ordinary artisans were “informed of its contents by [an] oral presentation” before the critical date). Accordingly, Petitioner has submitted evidence sufficient to show that Funkhouser was a printed publication no later than April 12, 1995. Patent Owner does not dispute the publication date of Funkhouser. *See generally* PO Resp.; Tr. Based on the record before us, Petitioner has shown by a preponderance of the evidence that Funkhouser qualifies as prior art under 35 U.S.C. § 102(a).

Funkhouser describes providing a three-dimensional virtual environment between entities representing users. Ex. 1005, 85. In addition, Funkhouser discusses when an entity changes state, sending update messages to workstations with entities that can “potentially perceive” the change. *Id.* Figure 12 is reproduced below.

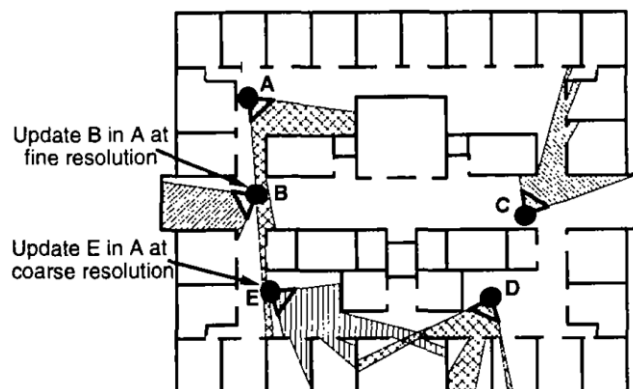


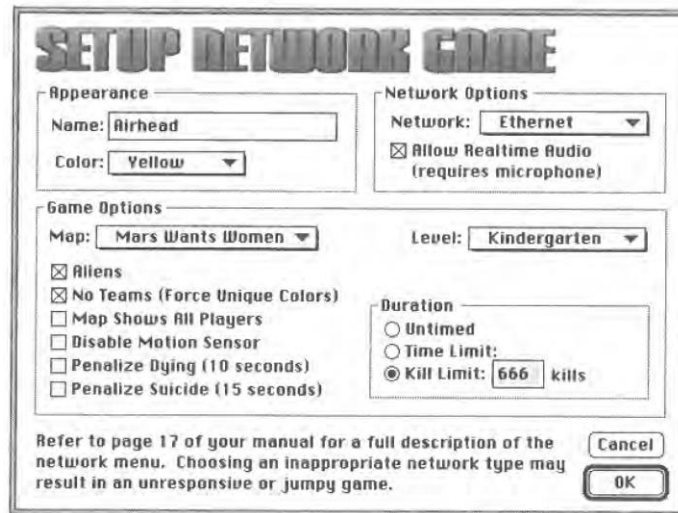
Figure 12 illustrates user A can see both users B and E and user B is closer to user A than user E. *Id.* at 91. Because the cell in which user A is located is potentially visible to the cells in which users B and E are located, user A receives updates regarding users B and E. *See id.* at 87. Moreover, updates regarding user B “could be sent to A at a finer resolution” because user B “may be more important” than user E to user A. *Id.* at 91.

2. *Marathon (Ex. 1021)*

According to the Declaration of Michael Durkin filed by Petitioner, Marathon is a computer game software instruction manual that was included with each copy of software that Petitioner sold and distributed beginning in December 1994. Pet. 8; Ex. 1022 ¶¶ 1–2. Mr. Durkin, an employee of Petitioner since August 2010, also declares that Marathon was obtained from one of the originally packaged boxes available for sale by Petitioner in December 1994. Ex. 1022 ¶¶ 1–3. In addition, Mr. Durkin declares the box was stored, unopened, and in its original shrink wrap until it was opened on May 22, 2015. *Id.* ¶ 3. Mr. Durkin personally witnessed the opening of the box, Marathon’s removal from the box, and photocopying Marathon as Exhibit 1021. *Id.* Accordingly, Petitioner has submitted evidence sufficient to show that Marathon was a printed publication no later than December 1994 because Petitioner has proffered adequate evidence that an interested ordinarily skilled artisan, “exercising reasonable diligence,” could have obtained Marathon no later than December 1994. *See Bruckelmyer*, 445 F.3d at 1378. Patent Owner does not dispute the publication date of Marathon. *See generally* PO Resp.; Tr. Based on the record before us,

Petitioner has shown by a preponderance of the evidence that Marathon qualifies as prior art under 35 U.S.C. § 102(a).

Marathon discusses playing a video game over a network with other players. Ex. 1021, 17. A setup network game menu is reproduced below.



The figure illustrates setting up teams, colors, etc. in an options menu. *Id.* In addition, Marathon shows an overhead map of all players and using the delete key to switch views to other players in the game. *Id.* at 18.

3. Discussion

Petitioner asserts that the subject matter of claims 1, 2, 7, 8, 12, 16, 18, and 20 would have been obvious in view of Funkhouser and Marathon under 35 U.S.C. § 103(a). Pet. 15–36. Petitioner provides a limitation by limitation analysis as to how the combination of Funkhouser and Marathon allegedly teaches or suggests the subject matter of claims 1, 2, 7, 8, 12, 16, 18, and 20. *Id.* Patent Owner contests Petitioner’s obviousness assertions. PO Resp. 25–37.

a. Funkhouser and Marathon Teach the Limitation “[R]endering that [A]llows the [L]ocal [U]ser to [V]iew the [L]ocal [U]ser [A]vatar in the [V]irtual [E]nvironment”

The parties disagree as to whether the combination of Funkhouser and Marathon teaches or suggests the limitation “rendering that allows the local user to view the local user avatar in the virtual environment,” as recited claims 1, 2, and 18. PO Resp. 35–37; Reply 7–8. Because Petitioner has the burden of proof (*see* 35 U.S.C. § 316(e), 37 C.F.R. § 42.20(c)), we begin with Petitioner’s arguments.

Petitioner argues Funkhouser teaches clients include viewing capabilities displaying the virtual environment on the client workstation screen from the perspective of one or more of its entities and a top-down view of a multi-user environment rendered from the perspective of one entity. Pet. 25 (citing Ex. 1004, 3, 9, Plates I and II). Petitioner also argues Marathon teaches switching between two viewpoints (i.e., a viewpoint from the perspective of the local user avatar and a perspective of a remote user avatar) by pressing the delete key. Pet. 25–27 (citing Ex 1021, 10, 12, 18, 19).

In response, Patent Owner argues “Petitioner incorrectly argues that Funkhouser’s Plate I displays a ‘[t]op-down view’ that ‘shows an overhead view of dozens of user avatars.’” PO Resp. 35 (quoting Pet. 26). Patent Owner further argues Petitioner’s reliance on Funkhouser to teach the claimed limitation “rendering that allows the local user to view the local user avatar in the virtual environment” is undermined because Funkhouser fails to teach that Plate I is a rendering of a “local user avatar of a local user,” as recited in claims 1, 2, and 18. PO Resp. 35–36. In particular, Patent Owner

argues Funkhouser teaches that Plate I includes an image “‘captured during tests with 512 entities in a 400 room environment.’” *Id.* at 36 (quoting Ex. 1005, 5).

Patent Owner argues Funkhouser does not teach that Plate I is an image generated and displayed at a client because if a client were to display a top-down view such as the view shown in Plate I, this would pose the same difficulty as Marathon’s perspective-switching, which is each client would need to maintain a surrogate for every entity viewable using the top-down perspective view, or would incur undesirable effects during the perspective change. *Id.* Patent Owner further argues Funkhouser’s Plate I cannot be relied upon to teach the claimed limitation “rendering that allows the local user to view the local user avatar in the virtual environment” because Funkhouser merely teaches avatar visibility solely according to its point-of-view line of sight, such as what is illustrated in Figure 6. *Id.*

In reply, Petitioner argues Patent Owner acknowledged that Funkhouser teaches server-based message culling and Mr. Pesce confirms there was no rebuttal of Dr. Zyda’s opinion that Funkhouser teaches server-side filtering. Reply 7 (citing PO Resp. 30; Ex. 1046, 176:11–16). Petitioner further argues Patent Owner “focuses entirely on whether Funkhouser alone [teaches] this limitation” while “ignor[ing] [Petitioner’s] reliance on the combined teachings of Funkhouser and Marathon for this aspect of the claims.” Reply 7 (citing PO Resp. 35–36).

According to Petitioner, Patent Owner’s argument that Funkhouser does not teach this limitation is “based on the assumption that Funkhouser’s Plate [I] is not an image displayed at a client (i.e., to a local user).” Reply 7 (citing PO Resp. 36). Petitioner further argues “the petition cites numerous

aspects of Funkhouser for this limitation, including the fact that “[c]lients . . . may include viewing capabilities in which the virtual environment is displayed on the client workstation screen from the point of view of one or more of its entities.”” Reply 7 (citing Pet. 25–26; quoting Ex. 1005, 3). Petitioner also refers to Funkhouser’s teaching “that a client ‘may map user input to control of particular entities.’” Reply 7–8 (quoting Ex. 1005, 3).

Furthermore, Petitioner argues Funkhouser teaches “displaying its virtual environment at a client to a user controlling an avatar, and Plate II further teaches that the virtual environment can be displayed from a perspective that is not associated with the viewpoint of a particular avatar and therefore could include the local avatar in the display.” Reply 8. Petitioner further argues the combination of Funkhouser’s Plates I and II teaches this with the display of the avatar in Plate II and the avatar’s perspective in Plate I. *Id.* (citing Ex. 1005, 9). Moreover, Petitioner argues Patent Owner ignores Marathon’s teaching of “switching between two viewpoints (i.e., a viewpoint from the perspective of the local user avatar and a perspective of a remote user avatar).” *Id.* (citing Pet. 25–27). That is, according to Petitioner, Patent Owner does not rebut or address this showing and Petitioner’s reliance on the combination of Funkhouser and Marathon as teaching or suggesting switching between a display that allows the local user to view the local user avatar and a display from the perspective of a remote user avatar. *Id.*

We agree with Petitioner’s showing that the combination of Funkhouser and Marathon teaches or suggests the limitation “rendering that allows the local user to view the local user avatar in the virtual environment,” as recited claims 1, 2, and 18. We disagree with Patent

Owner's arguments disputing Petitioner's showing. As Petitioner argues, Patent Owner acknowledges that Funkhouser teaches server-based message culling and Mr. Pesce confirms there was no rebuttal of Dr. Zyda's opinion that Funkhouser teaches server-side filtering. Reply 7 (citing PO Resp. 30; Ex. 1046, 176:11–16).

We also disagree with Patent Owner because its argument narrowly focuses on whether Funkhouser *alone* teaches the limitation “rendering that allows the local user to view the local user avatar in the virtual environment” while ignoring Petitioner's reliance on the *combination* of Funkhouser and Marathon. Reply 7 (citing PO Resp. 35–36). Patent Owner's argument that Funkhouser does not teach this limitation is based improperly on the assumption that Funkhouser's Plate I is not an image displayed at a client (i.e., to a local user). Reply 7 (citing PO Resp. 36).

The Petition cites numerous excerpts of Funkhouser, including “[c]lients . . . may include viewing capabilities in which the virtual environment is played on the client workstation screen from the point of view of one or more of its entities.” Pet. 25–26 (quoting Ex. 1005, 3). The cited portions of Funkhouser relied upon by Petitioner also teach “that a client ‘may map user input to control of particular entities.’” Reply 7–8 (quoting Ex. 1005, 3). Furthermore, the cited portions of Funkhouser relied upon by Petitioner also teach displaying at a client station a user controlling an avatar, and as Petitioner argues, Plate II further teaches a display from a perspective that is not associated with the viewpoint of a particular avatar and therefore, could include the local avatar in the display. Reply 8 (citing Ex. 1005, 9).

We, therefore, agree with Petitioner’s argument that the combination of Funkhouser’s Plates I and II teaches a “rendering that allows the local user to view the local user avatar in the virtual environment” with Funkhouser’s display of the avatar in Plate II and the avatar’s perspective in Plate I. *Id.* (citing Ex. 1005, 9). Moreover, Patent Owner’s argument ignores Marathon’s teaching of switching between two viewpoints (i.e., a viewpoint from the perspective of the local user avatar and a perspective of a remote user avatar). *Id.*; Ex. 1021, 18. That is, Patent Owner does not rebut or address Marathon’s switching between a viewpoint from the perspective of the local user avatar and a perspective of a remote user avatar, while Petitioner relied on the combination of Funkhouser and Marathon as teaching or suggesting switching between a display that allows the local user to view the local user avatar and a display from the perspective of a remote user avatar. Reply 8.

Accordingly, for the reasons stated above, we agree with Petitioner that the combination of Funkhouser and Marathon teaches or suggests the limitation “rendering that allows the local user to view the local user avatar in the virtual environment,” as recited claims 1, 2, and 18.

b. Funkhouser Is Compatible with Marathon

We next consider the parties’ dispute as to whether modifying Funkhouser would be detrimental to the user experience because Funkhouser teaches to limit sending messages to only a small subset of clients to which the update is relevant. PO Resp. 25–26; Reply 8–9; Pet. 40–43. We begin with Petitioner’s arguments.

Petitioner argues there is nothing precluding the combination of Funkhouser and Marathon because Marathon's perspective-switching feature pertains to client processing and is complementary to the server-based disclosure in Funkhouser. Pet. 42 (citing Ex. 1002 ¶ 81). Petitioner further argues applying Marathon's perspective-switching would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. Pet. 42 (citing Ex. 1002 ¶ 81). Petitioner additionally argues combining Funkhouser and Marathon would represent combining familiar elements according to known methods, yielding the predictable results of increasing a user's enjoyment and reducing the number of transmitted and processed audio messages. Pet. 42–43 (citing Ex. 1002 ¶ 117).

Patent Owner argues Funkhouser's background "discusses the problem caused by distributing every entity's state change to every workstation participating in the virtual environment." PO Resp. 25. Patent Owner further argues Funkhouser states "'it is necessary to develop a system design and communication protocol that does not require sending update messages to all participating hosts for every entity state change.'" *Id.* (quoting Ex. 1005, 2). Patent Owner further argues that Funkhouser's intended purpose is to limit sending messages to only a small subset of clients to which the update is relevant. PO Resp. 26. Patent Owner additionally argues this "means that entities do not receive real-time update messages for other entities that are not visible, and therefore cannot display the virtual environment from another entity's perspective." *Id.*

We agree with Petitioner's showing that Marathon's perspective-

switching feature is compatible with, and would have been obvious to combine with, Funkhouser's system. We disagree with Patent Owner's argument that modifying Funkhouser would have been detrimental to the user experience because of Funkhouser's teaching to limit sending messages to only a small subset of clients to which the update is relevant.

Funkhouser's statement that "it is necessary to develop a system design and communication protocol that does not require sending update messages to all participating hosts for every entity state change" (Ex. 1005, 2) does not imply that Funkhouser is incompatible with Marathon because this implication focuses too narrowly on Funkhouser. Rather, a broad approach should be taken. Indeed, the Supreme Court provided guidance in determining the applicability of a reference's teachings in an obviousness inquiry. In *KSR International Co. v. Teleflex Inc.*, the Court explained that if a feature has been used to improve one device, and a person of ordinary skill in the art would have recognized that it would improve a similar device in that field or another, implementing that feature on the similar device is likely obvious. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

Here, the cited portions of Dr. Zyda's testimony relied upon by Petitioner explain that Marathon's teaching of the perspective-switching feature pertaining to client processing is complementary to the server-based message culling disclosed in Funkhouser. Pet. 42 (citing Ex. 1002 ¶ 81). In addition, the cited portions of Dr. Zyda's testimony relied upon by Petitioner show that perspective-switching would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. Pet. 42 (citing Ex. 1002 ¶ 81).

Accordingly, we find persuasive Petitioner's showing and Dr. Zyda's supporting testimony that combining Funkhouser and Marathon would represent combining familiar elements according to known methods that yield the predictable results of increasing a user's enjoyment and reducing the number of transmitted and processed audio messages. Pet. 42–43 (citing Ex. 1002 ¶ 117). We, therefore, agree with Petitioner's showing on this issue and disagree with Patent Owner's argument that modifying Funkhouser would be detrimental to the user experience.

c. Petitioner's Proposed Combination Is Supported by the Record Evidence

The parties' next dispute focuses on whether Petitioner's proposed combination is supported by evidence. PO Resp. 27–29; Reply 8–10. We begin with Petitioner's arguments.

Petitioner argues nothing precludes the combining Funkhouser and Marathon because Marathon's perspective-switching feature pertains to client processing and complements the server-based disclosure in Funkhouser. Pet. 42 (citing Ex. 1002 ¶ 81). Petitioner further argues applying Marathon's perspective-switching would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. Pet. 42 (citing Ex. 1002 ¶ 81). Petitioner additionally argues combining Funkhouser and Marathon would represent combining familiar elements according to known methods, yielding the predictable results of increasing a user's enjoyment and

reducing the number of transmitted and processed audio messages. Pet. 42–43 (citing Ex. 1002 ¶ 117).

In response, Patent Owner argues Petitioner’s rationale for Funkhouser’s modification, namely that Marathon teaches a multiplayer game that includes features designed to increase user enjoyment and use of the virtual environment product, is not supported by evidence. PO Resp. 27–28. Specifically, Patent Owner argues paragraph 79 of Dr. Zyda’s declaration lacks evidence to support Petitioner’s characterizations of Marathon’s view-switching feature. *Id.* at 28. In addition, Patent Owner argues this paragraph of Dr. Zyda’s declaration parrots the exact same statement as the Petition without presenting any evidence to substantiate it, “thus rendering it worthy of little to no weight under 37 C.F.R. § 42.65(a).” *Id.* Furthermore, Patent Owner argues Dr. Zyda fails to explain if this conclusion is his own or it would have been reached by a person having ordinary skill in the art. *Id.* According to Patent Owner, Dr. Zyda fails to establish how the conclusion pertaining to increasing a user’s enjoyment and using the virtual environment system would have been known to a person having ordinary skill in the art. *Id.*

In its reply, Petitioner argues Patent Owner does not rebut Petitioner’s showing that adding Marathon’s perspective-switching feature to Funkhouser’s virtual environment system would have been consumer-friendly or increased a user’s enjoyment. Reply 9. In response to Patent Owner’s argument that Petitioner provides no supporting evidence, Petitioner argues that Dr. Zyda’s testimony itself is evidence because his credentials (e.g., he is the Founding Director of the University of Southern California (“USC”) GamePipe Laboratory and a USC professor responsible

for developing games, and he has decades of experience researching computer graphics and virtual environments) qualify him to opine on what a person of ordinary skill in the art would have understood. *Id.* (citing Ex. 1002 ¶¶ 1–10). Petitioner also argues Marathon itself is evidence of two benefits to a user of its perspective-switching capability that permits a user to ““see your team-member’s screens”” when playing a multiplayer network game and also allows a user to ““change to a different player’s point of view”” when viewing a replay of the game after its conclusion. *Id.* at 9–10 (quoting Ex. 1021, 19, 20).

We are persuaded that the record evidence supports Petitioner’s showing and are not persuaded by Patent Owner’s argument to the contrary. Patent Owner does not rebut Petitioner’s showing that adding Marathon’s perspective-switching feature to Funkhouser’s virtual environment system would have been consumer-friendly or increased a user’s enjoyment. Reply 9. In addition, we find Dr. Zyda’s testimony on this issue persuasive, and sufficiently explained and supported. Ex. 1002 ¶ 79; *see* Reply 9 (citing Ex. 1002 ¶¶ 1–10). The cited portions of Marathon relied upon by Petitioner provide evidence of two benefits to a user of its perspective-switching capability that permits a user to “see your team-member’s screens” when playing a multiplayer network game and also allows a user to “change to a different player’s point of view” when viewing a replay of the game after its conclusion. Reply 9–10.

For the reasons stated above, record evidence supports Petitioner’s proposed combination.

d. Marathon's Perspective-Switching Feature Is Compatible with Funkhouser's Message Culling System

The parties' dispute whether adding Marathon's perspective-switching feature to Funkhouser's message culling system would be compatible. PO Resp. 29–30; Pet. 40–43. We begin with Petitioner's arguments.

As we explain above, Petitioner argues nothing precludes combining Funkhouser and Marathon because Marathon's perspective-switching feature pertains to client processing and complements the server-based disclosure in Funkhouser. Pet. 42 (citing Ex. 1002 ¶ 81). Petitioner further argues applying Marathon's perspective-switching would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. Pet. 42 (citing Ex. 1002 ¶ 81). Petitioner additionally argues combining Funkhouser and Marathon would represent combining familiar elements according to known methods yielding the predictable results of increasing user enjoyment and reducing the number of transmitted and processed audio messages. Pet. 42–43 (citing Ex. 1002 ¶ 117).

In response, Patent Owner argues that adding Marathon's perspective-switching feature to Funkhouser message culling system would not have been compatible. PO Resp. 29–30. Patent Owner further argues that Petitioner's argument that nothing precludes the combination Funkhouser and Marathon fails to address properly the legal requirements of obviousness; that is, the law of obviousness does not presume references to be combinable in every instance unless rebutted by some reason precluding the combination. *Id.* at 29. In addition, Patent Owner argues even if all

elements of the challenged claims were in existence prior to the earliest effective filing date of the '998 patent, the law of obviousness states the existence of all the claimed elements is not enough to establish obviousness of the challenged claims. *Id.* at 29–30.

We find persuasive Petitioner's arguments and evidence supporting the addition of Marathon's perspective-switching feature to Funkhouser's system, and are not persuaded by Patent Owner's contrary argument that Marathon's perspective-switching feature would have been incompatible with Funkhouser message culling system. The cited portions of Dr. Zyda's testimony relied upon by Petitioner explain that Marathon's perspective-switching feature pertaining to client processing is complementary to the server-based disclosure in Funkhouser. Pet. 42 (citing Ex. 1002 ¶ 81). In addition, the cited portions of Dr. Zyda's testimony relied upon by Petitioner show perspective-switching would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. Pet. 42 (citing Ex. 1002 ¶ 81).

Accordingly, we agree with Petitioner and Dr. Zyda that combining Funkhouser and Marathon would represent combining familiar elements according to known methods that yield the predictable results of increasing a user's enjoyment and reducing the number of transmitted and processed audio messages. Pet. 42–43 (citing Ex. 1002 ¶ 117). Thus, we disagree with Patent Owner's dispute of Petitioner's obviousness showing because Petitioner provides articulated reasoning with rational underpinning to support the rationale to combine the teachings of Funkhouser and Marathon. *See KSR*, 550 U.S. at 418.

e. Adding Marathon's Perspective-Switching Feature to Funkhouser's Message Culling System Would Not Create an Unacceptable Delay

The parties also contest whether adding Marathon's perspective-switching feature to Funkhouser would create an unacceptable delay while the information for the new perspective is sent from the server to the client. PO Resp. 30–33; Reply 10–11, 13–14. We begin with Petitioner's arguments.

As stated *supra* in Part II.E.3.b., Petitioner argues Marathon's perspective-switching feature would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display.

In response, Patent Owner argues that adding a perspective-switching feature results in an unacceptable delay. PO Resp. 30–33. In response, Petitioner argues Patent Owner's argument that adding a perspective-switching feature results in an unacceptable delay is not supported by the record. Reply 10–11. Petitioner further argues Patent Owner mischaracterizes Dr. Zyda's testimony, exaggerating both the amount of delay and the effect of this delay on a user's experience. *Id.* at 11. According to Petitioner, although Dr. Zyda acknowledged "that a teleport feature could result in a system stalling from one frame to four frames while the information" is being loaded, Dr. Zyda explained that "[i]t may not be noticeable." *Id.* (quoting Ex. 2016, 164:8–165:17). According to Petitioner, even at the largest delay Dr. Zyda identified, four frames, and the lowest framerate the NPS system on which Dr. Zyda worked in the early

1990s, three frames per second, the largest delay would have been 1.33 seconds. *Id.* (citing Ex. 2016, 164:8–165:17). In addition, Petitioner argues Mr. Pesce acknowledged that a one or two second delay would not have been irritating to a user and would have been below the threshold of acceptability. *Id.* (citing Ex. 1046, 260:18–261:19). Petitioner also argues the alleged unacceptable lag to a user is “undermined by the fact that [Patent Owner’s] patents themselves provide no solution to this alleged problem” and “would also have been an issue in the system described in [Patent Owner’s] patents,” which similarly perform computations “in the servers before messages are propagated.” Reply 13–14.

Patent Owner argues applying Funkhouser’s message culling “immediately prior to the client determining which remote user perspective to display and what should be included in that display” would have introduced a significant delay “in the teleportation/perspective change, while the new information is downloaded and processed.” PO Resp. 30–31 (emphasis omitted) (citing Ex. 2017 ¶¶ 96–97, 100). In support of its argument, Patent Owner refers to Dr. Zyda’s testimony that users would think a teleport delay is sluggish, which causes users to “get pretty unhappy,” and argues that this contradicts Dr. Zyda’s declaration. PO Resp. 31–32 (quoting Ex. 2016, 164:8–19, 165:2–14, 166:13–16, 163:8–12, 163:22–23). Patent Owner further argues Funkhouser discusses the need for “‘near real-time’ updates ‘since large variances or delays in updates can result in visually perceptible jerky or latent motion, and thus may be disturbing to users’” and Funkhouser’s solution for limiting messages has some built-in latency. PO Resp. 33 (quoting Ex. 1005, 1). Patent Owner also argues Funkhouser states that the “disadvantage of the RING system

design is that extra latency is introduced when messages are routed through servers,’ and ‘[c]omputations are performed in the servers before messages are propagated further adding to latency.’” PO Resp. 33 (quoting Ex. 1005, 4). According to Patent Owner, adding latency that is undesirable to users or disturbing runs contrary to Funkhouser. PO Resp. 33 (citing Ex. 2017 ¶ 104).

We agree with Petitioner’s showing that adding Marathon’s perspective-switching feature to Funkhouser would have not created an unacceptable delay while the information for the new perspective is sent from the server to the client. We disagree with Patent Owner’s argument that adding Marathon’s perspective-switching feature to Funkhouser would have created such an unacceptable delay, thereby allegedly undermining Petitioner’s proposed combination of Funkhouser and Marathon. Regarding Dr. Zyda’s testimony, Patent Owner takes his testimony out of context. Although Dr. Zyda testified that a one to four frame delay may occur and users may be unhappy, Dr. Zyda explained that “[i]t may not be noticeable.” Ex. 2016, 164:8–165:17. That is, as Petitioner points out, the largest delay Dr. Zyda identified was four frames and the lowest framerate his NPS system displayed was three frames per second, which translates to the largest delay being 1.33 seconds. Ex. 2016, 164:8–165:17; *see* Reply 11. In addition, Mr. Pesce acknowledged that a one or two second delay would not have been irritating to a user and would be below the threshold of acceptability. Ex. 1046, 260:18–261:19. In addition, the alleged unacceptable lag to a user is undermined by the fact that the ’998 patent fails to provide a solution to this alleged lag, which also would have been an issue in the system described in the ’998 patent that similarly performs

computations “in the servers before messages are propagated.” Reply 13–14; *see, e.g.*, Ex. 1001, 12:46–63.

As for Patent Owner’s argument that adding latency that is undesirable to users or disturbing runs contrary to Funkhouser, this does not imply that Funkhouser is incompatible with Marathon. In *KSR*, the Court explained that if a feature has been used to improve one device, and a person of ordinary skill in the art would have recognized that it would improve a similar device in that field or another, implementing that feature on the similar device is likely obvious. 550 U.S. at 417.

Here, the cited portions of Dr. Zyda’s testimony relied upon by Petitioner explain that Marathon’s teaching of perspective-switching feature pertaining to client processing complements the server-based disclosure in Funkhouser. Pet. 42 (citing Ex. 1002 ¶ 81). In addition, the cited portions of Dr. Zyda’s testimony relied upon by Petitioner show that perspective-switching would not affect Funkhouser’s server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. *Id.* (citing Ex. 1002 ¶ 81). Accordingly, we are persuaded by Petitioner’s showing and Dr. Zyda’s supporting testimony that combining Funkhouser and Marathon would represent combining familiar elements according to known methods that yield the predictable results of increasing user enjoyment and reducing the number of transmitted and processed audio messages. *Id.* at 42–43 (citing Ex. 1002 ¶ 117).

For the reasons given, we agree with Petitioner that its proposed combination of Funkhouser and Marathon would not have created an unacceptable delay.

f. Any Delay from the Addition of Marathon's Perspective-Switching Feature to Funkhouser's System Would Not Have Been Detrimental to a User's Experience

The parties' next dispute focuses on whether the speed of networks in 1995 was sufficiently slow that the delay caused by adding Marathon's perspective-switching feature to Funkhouser's system would have been detrimental to a user's experience and would have undermined Funkhouser's teaching of providing a real virtual world experience, as Patent Owner argues. PO Resp. 31; Reply 11–13. We begin with Petitioner's arguments.

As stated *supra* in Part II.E.3.b., Petitioner argues Marathon's perspective-switching feature would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display.

In response, Patent Owner argues “[t]he speed of network connections were sufficiently slow that” the lag caused by incorporating Marathon's perspective change into Funkhouser's system “would have been detrimental to a user's virtual world experience and would have undermined Funkhouser's purpose of providing a more real virtual world experience.” PO Resp. 31 (citing Ex. 2017 ¶ 100). Furthermore, Mr. Pesce's declaration states “[i]n the 1995 time period, the speed of network connections were sufficiently slow that this lag would have been detrimental to a user's virtual world experience – anywhere from several seconds to as much as a few minutes – and would have undermined [Funkhouser's] purpose of providing a more real virtual world experience.” Ex. 2017 ¶ 100.

In reply, Petitioner argues Mr. Pesce acknowledged he only considered network transmissions over a 14.4 kilobits per second modem or possibly a 9600 bits per second modem (i.e., the slowest type of network mentioned in Patent Owner's patents) because "all of [Patent Owner's] patents talk about using dial-up systems, not using Ethernet." Reply 12 (quoting Ex 1046, 256:20–257:10, 264:17–265:14; Ex. 2017 ¶ 101). Petitioner further argues the challenged claims of the '998 patent are not limited to a slow dial-up modem and neither are Funkhouser or Marathon. Reply 12. In support of its argument, Petitioner refers to Mr. Pesce's testimony, in which Mr. Pesce acknowledged that Funkhouser and Marathon both teach faster network transmissions. *Id.* (citing Ex. 1046, 266:6–15, 268:22–270:2; Ex. 1005, 5; Ex. 1021, 5, 17). Petitioner also refers to Mr. Pesce's acknowledgement that he failed to analyze if adding a perspective-switching feature would have been feasible in a system with higher transmission speeds, which, according to Petitioner, illustrates that Patent Owner's "argument that the proposed combination would result in unacceptable system lag is based on Mr. Pesce's misconception the system must utilize a dial-up network, rather than the faster networks actually in use at the time and disclosed in the prior art." *Id.* at 12–13 (citing Ex. 1046, 266:16–23, 270:9–19). In addition, Petitioner refers to Mr. Pesce's testimony "on re-direct that his opinions regarding the potential lag only apply to the limited number of dependent claims that require multiple rooms in the virtual space," and argues that Mr. Pesce's opinions only apply to claims of Patent Owner's patents that exclude single-room environments. *Id.* at 13 (citing Ex. 1046, 314:8–315:20).

As above, we find persuasive Petitioner's evidence and reasoning supporting its proposed combination of Marathon's perspective-switching feature with Funkhouser's system. We disagree with Patent Owner's argument that the network speed was sufficiently slow that any delay caused by this addition would have been detrimental to a user's experience and would have undermined Funkhouser's teaching of providing a real virtual world experience. Mr. Pesce acknowledges he only considered network transmissions over a 14.4 kilobits per second modem or possibly a 9600 bits per second modem (i.e., the slowest type of network mentioned in Patent Owner's patents), because "all of [Patent Owner's] patents talk about using dial-up systems, not using Ethernet." Ex 1046, 256:20–257:10, 264:17–265:14; Ex. 2017 ¶ 101.

The instituted claims of the '998 patent, however, are not limited to a slow dial-up modem and neither are Funkhouser or Marathon. Reply 12. In particular, Mr. Pesce acknowledges that Funkhouser and Marathon both teach faster network transmissions compared to a dial-up modem. Ex. 1046, 266:6–15, 268:22–270:2; Ex. 1005, 5; Ex. 1021, 5, 17. Mr. Pesce also acknowledges that he failed to analyze if adding a perspective-switching feature would have been feasible in a system with higher transmission speeds, which illustrates that Patent Owner's argument that the combination of Funkhouser and Marathon would have resulted in unacceptable system delay is based on Mr. Pesce's flawed premise that the system must utilize a slower dial-up network, rather than the faster networks in use at the time and taught in Funkhouser and Marathon. Ex. 1046, 266:16–23, 270:9–19. Accordingly, we disagree with Mr. Pesce's testimony on this point.

Moreover, although we disagree with Patent Owner's argument and Mr. Pesce's testimony as to all claims of the '998 patent for the reasons given above, we further note that on re-direct examination, Mr. Pesce indicates that his opinions regarding the potential delay only apply to the limited number of dependent claims (i.e., claims 7 and 16) that require multiple rooms in the virtual world. Ex. 1046, 314:8–315:20. That is, Mr. Pesce's opinions only apply to claims of Patent Owner's patents that exclude single-room environments. *Id.*

We, therefore, agree with Petitioner's showing that the speed of the networks in 1995 would not have created an unacceptable system delay that would have prevented or undermined Petitioner's proposed combination.

g. Marathon's Perspective-Switching Would Not Expand the Potentially Visible Area to the Entire Virtual Environment

The parties' final dispute centers on whether Marathon's perspective-switching would have expanded the potentially visible area to the entire virtual environment, thus requiring the server to send positional updates for all users in the entire virtual environment and negating Funkhouser's message culling, as Patent Owner argues. PO Resp. 33–35; Reply 10. We begin with Petitioner's arguments.

As stated *supra* in Part II.E.3.b., Petitioner argues Marathon's perspective-switching feature would not affect Funkhouser's server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display.

In response, Patent Owner argues another option for combining Funkhouser and Marathon is for the entities to maintain all the surrogates for all other entities, which comports with Dr. Zyda's interpretation of Funkhouser sending updates for all entities that are potentially visible in the next couple frames. PO Resp. 33 (citing Ex. 2017 ¶ 108). Patent Owner refers to Dr. Zyda testifying “‘from reading the [Funkhouser] paper, you’ll notice that it sends more stuff than just exactly what the client can see. So it might – it will send things that could potentially become visible, say, in the next couple of frames.’” PO Resp. 33–34 (quoting Ex. 2016, 43:2–15). According to Patent Owner, Dr. Zyda “also testified that something is ‘[p]otentially visible [if] it’s not in the field of view, but it could be in the field of view in a frame or two.’” PO Resp. 34 (quoting Ex. 2016, 57:2–6). Patent Owner also argues that Dr. Zyda testified that every other avatar could potentially be visible in the next frame or two if an avatar has the ability to teleport. PO Resp. 34 (citing Ex. 2016, 162:9–12). According to Patent Owner, Dr. Zyda’s testimony implies requiring Funkhouser in the proposed combination with Marathon to provide each entity with updates from all other entities because, under Patent Owner’s interpretation of Dr. Zyda’s testimony, they are all potentially visible in the next frame or two and if the updates are not provided, this will lead to undesirable effects of perspective-switching. PO Resp. 34 (citing Ex. 2016, 34:10–15). Patent Owner further argues Dr. Zyda’s testimony implies that each client workstation would “‘waste storage space [and] behavior simulation processing’ for all remote entities” and “‘increase[es] the client workstation processing burden,” which frustrates the teaching of Funkhouser. PO Resp. 34–35 (citing Ex. 1005, 3, 4; quoting Ex. 2017 ¶ 108). Patent Owner argues

Petitioner does not recognize nor reconcile the inconsistency between Funkhouser and Marathon. PO Resp. 35.

In reply, Petitioner argues Patent Owner's argument that Marathon's perspective-switching would have expanded the potentially visible area to the entire virtual environment, thus requiring the server to send positional updates for all users in the entire virtual environment and negating Funkhouser's message culling, is mutually exclusive from Patent Owner's argument that adding Marathon's perspective-switching feature to Funkhouser would have created an unacceptable delay while the information for the new perspective is sent from the server to the client. Reply 10. According to Petitioner, Patent Owner's two arguments are mutually exclusive because "[i]f the server sends updates for the entire virtual space there would be no possibility of additional lag as it downloads updates for a specific location after a perspective switch" and "[c]onversely, if the server sends updates for only a limited portion of the environment potentially visible to a user avatar based on its location (as Funkhouser discloses) there would be no need to send updates for the entire space as the potentially visible region could be recalculated after a perspective switch." *Id.* Petitioner further argues Patent Owner's argument that Marathon's perspective-switching would have expanded the potentially visible area to the entire virtual environment, thus requiring the server to send positional updates for all users in the entire virtual environment and negating Funkhouser's message culling, can be dismissed easily. *Id.* Petitioner explains Patent Owner's argument "depends on eliminating server-side message culling," which runs contrary to both Funkhouser's teaching and Petitioner's ground of unpatentability that was instituted by the Board. *Id.*

We agree with Petitioner that Patent Owner’s argument “depends on eliminating server-side message culling,” which runs contrary to both Funkhouser’s server-side message culling and Petitioner’s asserted ground of unpatentability. Reply 10. We disagree with Patent Owner’s argument that Marathon’s perspective-switching would expand the potentially visible area of Funkhouser’s clients to the entire virtual environment, thus requiring the server to send positional updates for all users in the entire virtual environment and negating Funkhouser’s message culling. In addition, the cited portions of Dr. Zyda’s testimony relied upon by Petitioner demonstrate that perspective-switching would not affect Funkhouser’s server-based message culling because the message culling could still be applied prior to the client determining which remote avatar perspective to display and what should be included in that display. Pet. 42 (citing Ex. 1002 ¶ 81). Accordingly, combining Funkhouser and Marathon would represent combining familiar elements according to known methods that yield the predictable results of increasing a user’s enjoyment and reducing the number of transmitted and processed audio messages. Pet. 42–43 (citing Ex. 1002 ¶ 117).

Thus, Petitioner provides articulated reasoning with rational underpinning to support the rationale to combine the teachings of Funkhouser and Marathon. *See KSR Int’l*, 550 U.S. at 418 (quoting *Kahn*, 441 F.3d at 989).

h. Undisputed Limitations of Claims 1, 2, 7, 8, 12, 16, 18, and 20

We have reviewed the arguments and evidence presented in the Petition regarding how the combination of Funkhouser and Marathon

teaches or suggests the remaining limitations of claims 1, 2, 7, 8, 12, 16, 18, and 20.¹⁵ Pet. 15–43. Patent Owner does not contest that the combination of Funkhouser and Marathon teaches or suggests these limitations. *See* PO Resp. 25–37; *see also* Reply 6–13. Based on our review of the Petition and the supporting evidence, we find persuasive Petitioner’s arguments and evidence, including citations to the references and Dr. Zyda’s testimony, and we adopt them as the basis for our determination that the combination of Funkhouser and Marathon teaches or suggests these limitations, thereby rendering unpatentable for obviousness claims 1, 2, 7, 8, 12, 16, 18, and 20. Pet. 15–43.

i. Conclusion

In conclusion, for the reasons given above and based on our review of the arguments and evidence of record, Petitioner has shown by a preponderance of the evidence that the subject matter of claims 1, 2, 7, 8, 12, 16, 18, and 20 of the ’998 patent would have been obvious over Funkhouser and Marathon.

¹⁵ We note that claim 20 states “displaying the plurality of avatars.” “[T]he plurality of avatars” lacks explicit antecedence. “[T]he plurality of avatars” may refer to either: 1) both “the local user avatar” and “the remote user avatars,” or 2) as merely “the remote user avatars.” We are persuaded that Marathon teaches the claim limitation under either reading. Ex. 1021, 18. Specifically, Marathon teaches an overhead map of all players and using the delete key to switch views to other players in the game. *Id.*

F. Obviousness of Claim 3 in View of Funkhouser, Marathon, and Sitrick

1. Sitrick (Ex. 1013)

We first assess Sitrick's prior art status. Petitioner argues Sitrick is prior art under 35 U.S.C. § 102(b), and Patent Owner has not disputed Petitioner's position. Pet. 43; *see generally* PO Resp.; Tr. We agree with Petitioner that Sitrick, a U.S. patent that was issued on June 4, 1985, more than one year before the earliest possible effective filing date of the '998 patent, constitutes § 102(b) prior art. *See* 35 U.S.C. § 102(b); Ex. 1001, [60], [63]; Ex. 1013, [22], [45].

Sitrick describes providing a multi-player gaming system on a network. Ex. 1013, Abs., 1:4–5, 3:56–57, 4:48–51. In addition, Sitrick discusses a user selecting a distinguishable visual image as her or his avatar. *Id.* at Abs., 1:4–5, 3:56–57, 4:48–51. The user selection includes the color, size, shape, or a digitized image of the user's face. *Id.* at Abs.

2. Discussion

The parties' dispute regarding the instituted ground challenging claim 3 as obvious over Funkhouser, Marathon, and Sitrick focuses on whether the cited prior art teaches a custom avatar. PO Resp. 38–39; Reply 38. We begin with Petitioner's arguments.

Petitioner argues the combination of Funkhouser's avatars having a geometric description and behavior, Marathon's team color selection or unique color selection in a multi-player game, and Sitrick's selection of a distinguishable visual image representation by which a user is identified teaches the claimed "custom avatar." Pet. 43–44.

In response, Patent Owner argues the combination of Funkhouser, Marathon, and Sitrick fails to teach or suggest a custom avatar. PO Resp. 38–39. Patent Owner also argues Petitioner acknowledged that the combination of Funkhouser and Marathon fails to teach the claimed limitation “the local user is associated with a custom avatar created based on input from the local user” (*see* Pet. 33–34), because Funkhouser’s spheres that appear identical regardless of orientation fail to teach or suggest any customization of entities and Marathon’s team color selection fails to teach a custom “avatar.” PO Resp. 38. Patent Owner further argues Petitioner relies on Sitrick to teach the claimed “avatar”; however, according to Patent Owner, Sitrick fails to teach “avatar” as properly construed (i.e., Sitrick’s avatar is not three-dimensional). *Id.*

Patent Owner also highlights that Sitrick was first filed on September 30, 1982. *Id.* (citing Ex. 1013, 1). Patent Owner argues Sitrick’s teaching of a user selecting a distinguishable image representation to identify themselves is a two-dimensional image and, therefore, insufficient to teach the three-dimensional “custom avatar” limitation recited in claim 3. *Id.* According to Patent Owner, the ’998 patent describes “N two-dimensional panels,” which the combination of Sitrick, Marathon, and Funkhouser fails to teach or suggest. *Id.* at 39. Patent Owner concludes its argument by explaining the combination of Funkhouser, Marathon, and Sitrick fails to teach or suggest “avatar” as properly construed. *Id.*

In reply, Petitioner argues Patent Owner’s argument attacks Sitrick for its failure to teach customization of a *three-dimensional* avatar. Reply 14. Petitioner further argues Patent Owner is left with no recourse should the Board reject Patent Owner’s construction of “avatar” and adopt the

construction proposed by Petitioner. *Id.* Petitioner argues Patent Owner focuses too narrowly on whether Sitrick *alone* teaches customizable avatar while failing to address the teaching of the *combination* of Funkhouser, Marathon, and Sitrick. *Id.*

Petitioner argues even if we applied Patent Owner’s proposed construction, Sitrick teaches a customizable user “representation” and Funkhouser teaches three-dimensional avatars. *Id.* (citing Ex. 1013, Abstract, 11:41–45; Ex. 1005, 1, Plates I and II). In addition, Petitioner argues Marathon teaches customizable avatars using its color-selection feature. *Id.* (citing Ex. 1021, 17–19). According to Petitioner, Dr. Zyda explains that a person having ordinary skill in the art would have understood this feature to permit users to customize the appearance of avatars such that players may identify teammates and opponents in multiplayer games visually. *Id.* at 14–15 (citing Ex. 1002 ¶ 147).

Petitioner argues Patent Owner merely argues that Marathon’s choosing a team color fails to teach a custom avatar under its three-dimensional construction without any explanation. *Id.* at 15. Petitioner further argues it cannot respond to Patent Owner’s conclusory argument other than to point out it is insufficient to rebut the showing in the Petition. *Id.* Petitioner also argues aside from asserting that Sitrick teaches customizable two-dimensional avatars rather than three dimensional avatars, Patent Owner did not identify why these differences would have rendered claim 3 non-obvious in view of the *combination* of Funkhouser, Marathon, and Sitrick. *Id.* Petitioner concludes its argument by explaining Patent Owner failed to rebut the obviousness challenge in the Petition. *Id.*

We find persuasive Petitioner’s argument and evidence that the combination of Funkhouser, Marathon, and Sitrick teaches or suggests customization of an “avatar,” and are not persuaded by Patent Owner’s arguments disputing Petitioner’s showing on this issue. As discussed *supra* in Part II.C, we construed the claimed “avatar” as “a graphical representation of a user.” The portions of Sitrick cited by Petitioner teach a customizable user “representation” and Funkhouser teaches three-dimensional avatars. Reply 14 (citing Ex. 1013, Abs., 11:41–45; Ex. 1005, 1, Plates I and II). Moreover, we note that Patent Owner, during the oral hearing, explicitly stated that it does not dispute that Funkhouser teaches an “avatar” even under its proposed narrower construction, which would require the graphical representation to be “three-dimensional.” Tr. 67:12–68:2. In addition, the cited portions of Marathon relied upon by Petitioner teach customizable avatars using its color-selection feature. *Id.* (citing Ex. 1021, 17–19). Dr. Zyda explains that a person having ordinary skill in the art would have understood this feature to permit users to customize their appearance of avatars such that players may identify teammates and opponents in multiplayer games visually. *Id.* at 14–15 (citing Ex. 1002 ¶ 147).

As for Patent Owner’s argument that Sitrick was filed on September 30, 1982, to the extent that Patent Owner is suggesting a 1982 filing date proves Sitrick does not teach avatars, we disagree with Patent Owner. As discussed *supra* in Part II.C., we construed “avatar” as a graphical representation of a user. Using our definition of “avatar” and Patent Owner’s acknowledgement that Sitrick teaches a user selecting a distinguishable image representation to identify themselves is a two-dimensional image (PO Resp. 38), Sitrick teaches a custom avatar.

Moreover, as we note above, Funkhouser teaches three-dimensional avatars, and Petitioner's obviousness arguments are based on a combination of Funkhouser, Marathon, and Sitrick. *See* Ex. 1005, Plates I & II; Tr. 67:12–68:2.

Accordingly, for the reasons given, Petitioner has shown persuasively that the combination of Funkhouser, Marathon, and Sitrick teaches a custom avatar.

3. Undisputed Limitations of Claim 3

We have reviewed the arguments and evidence presented in the Petition regarding how the combination of Funkhouser, Marathon, and Sitrick teaches or suggests the remaining limitations of claim 3. Pet. 43–46. Patent Owner does not contest that the combination of Funkhouser, Marathon, and Sitrick teaches or suggests these limitations. *See* PO Resp. 38–39; *see also* Reply 14–15. Based on our review of the Petition and the supporting evidence, we find persuasive Petitioner's arguments and evidence, including citations to the references and Dr. Zyda's testimony, and we adopt them as the basis for our determination that the combination of Funkhouser, Marathon, and Sitrick teaches or suggests these limitations of claim 3, thereby rendering it unpatentable for obviousness. Pet. 43–46.

4. Conclusion

In conclusion, for the reasons given above and based on our review of the arguments and evidence of record, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 3 of the '998 patent would have been obvious over Funkhouser, Marathon, and Sitrick.

G. Obviousness of Claims 13–15 in View of Funkhouser, Marathon, and Funkhouser '93

1. Funkhouser '93 (Ex. 1017)

Petitioner has submitted evidence to show that Funkhouser '93 was a printed publication by August 6, 1993 and, thus, constitutes prior art to the '998 patent under § 102(b). Pet. 9–10. Funkhouser '93 is an article included in a collection of presentation materials (Ex. 1018, “1993 Conference Book”), compiled for a conference sponsored by the ACM held on August 1–6, 1993. Ex. 1018, cover, 1–8, 247; Ex. 1002 ¶ 51. Dr. Zyda testifies that all participants in the conference, including Dr. Zyda, received a copy of the 1993 Conference Book. Ex. 1002 ¶ 51. The 1993 Conference Book and Funkhouser '93 feature a 1993 copyright date and permit copying, generally without a fee and with “a fee and/or specific permission” if for “direct commercial advantage.” Ex. 1018, 2, 247; Ex. 1017, 247. The 1993 Conference Book also provides information for ACM and non-ACM members to order the 1993 Conference Book. Ex. 1018, 2. Accordingly, Petitioner has submitted evidence sufficient to show that Funkhouser '93 was a printed publication by August 6, 1993—the last day of the conference. *See Mass. Inst. of Tech.*, 774 F.2d at 1109. Patent Owner does not dispute the publication date of Funkhouser '93. *See generally* PO Resp.; Tr. Based on the record before us, Petitioner has shown by a preponderance of the evidence that Funkhouser '93 qualifies as prior art under 35 U.S.C. § 102(b).

Funkhouser '93 discusses an adaptive display algorithm that allows users to set target frame rates. Ex. 1017, 247. In addition, Funkhouser '93 discusses workstations rendering image quality at less than full detail in exchange for faster target frame rates when rendering complex images. *Id.*

Funkhouser '93 also describes the omission of books in bookshelves when applying the faster target frame rate. *Id.* at 253–54.

2. Discussion

a. Funkhouser Teaches the Claimed “First Processor”

The parties dispute whether the claimed “first processor” is located on a client side that produces a graphics display. Pet. 7–8, 16–17; PO Resp. 16–17 (citing Ex. 2017 ¶ 90). We first discuss Petitioner’s arguments.

Petitioner argues Funkhouser teaches both a server-based determination and a client-based determination of which avatars to display to the client user. Pet. 16–17 (citing Ex. 1005, 3, 4, 8). In response, Patent Owner argues the claimed first processor is on a client side that includes a graphics display and relies on Mr. Pesce’s testimony that U.S. Patent No. 5,659,691 (Ex. 1008, “Durward”) does not teach this limitation. PO Resp. 16–17 (citing Ex. 2017 ¶ 90).

We agree with Petitioner’s showing (*see* Pet. 16–17 (citing Ex. 1005, 3, 4, 8)) that Funkhouser teaches both a server-based determination and a client-based determination of which avatars to display to the client user. We disagree with Patent Owner’s argument that the claimed “first processor” is located on a client side because claim 2, from which claims 13–15 depend directly or indirectly, is silent as to where the processor is located. That is, claim 2 simply recites “[a] system . . . comprising . . . a first processor” absent of any language that the processor must be located on a client side. Ex. 1001, 19:31–56. In addition, even if the “first processor” were required to be on the client side, as Patent Owner argues, the cited portions of Funkhouser relied upon by Petitioner teach both a server-based

determination and a client-based determination of which avatars to display to the client user. Pet. 16–17 (citing Ex. 1005, 3, 4, 8).

Furthermore, Patent Owner’s reliance on paragraph 90 of Mr. Pesce’s Declaration is misplaced. Paragraph 90 refers to Durward and opines that Durward fails to teach any “avatars” as construed by Patent Owner. Ex. 2017 ¶ 90. Durward, however, is not relied upon by Petitioner in this alleged ground of unpatentability. Rather, Petitioner relies upon the combination of Funkhouser, Marathon, and Funkhouser ’93 to teach the limitations of claims 13–15.

Accordingly, for the reasons stated above, Petitioner has shown that Funkhouser teaches the recited “first processor,” and we are not persuaded by Patent Owner’s argument contesting this showing.

b. Funkhouser ’93 Teaches Omitting Objects

The parties disagree over whether the combination of Funkhouser ’93’s omitting objects and Funkhouser’s avatars teaches or suggests “programmed to limit the number of remote user avatars,” as recited in claims 13–15. PO Resp. 17–20; Reply 16–17. We begin with Petitioner’s arguments.

Petitioner argues Funkhouser ’93’s teaching of “levels of detail representing ‘no polygons at all’” teaches omitting objects. *See* Pet. 48 (citing Ex. 1017, 249). Petitioner also argues Funkhouser teaches remote user avatars. Pet. 23–24.

In response, Patent Owner argues Petitioner misstates Funkhouser ’93’s teachings. PO Resp. 17. In particular, Patent Owner disputes Petitioner’s assertion that Funkhouser ’93 teaches an optimization algorithm

that generates and displays virtual environments that may cause the omission of some objects within the environment if the objects exceed a maximum number determined based on the result of a cost/benefit analysis and the performance capabilities of the computer generating and displaying the virtual environment. *Id.* That is, Patent Owner argues Funkhouser '93 teaches “omission of books on bookshelves and texture on doors” rather than omitting objects or avatars. *Id.* at 17–18. Patent Owner refers to Dr. Zyda’s testimony to support its argument that Funkhouser '93 does not teach avatars. *Id.* at 18–20 (citing Ex. 2016, 259:16–260:13, 260:17–261:8). According to Patent Owner, in Funkhouser '93, the bookshelf in Figure 11 is the object and the books reflect a texture that can be adjusted to reach a uniform frame rate.

In reply, Petitioner argues that the issue we should focus on is whether the *combination* of Funkhouser, Marathon, and Funkhouser '93 teaches the limitations of claims 13–15 not whether Funkhouser '93 *alone* teaches claims 13–15. Reply 15 (citing PO Resp. 35–37). Furthermore, Petitioner argues Patent Owner does not rebut the fact that Funkhouser teaches avatars. Reply 15 (citing PO Resp. 35–37). Petitioner argues that Funkhouser '93 distinguishes between textures and omitted books, which teaches both omission of books on bookshelves and omission of texture. Reply 16 (citing Ex. 1017, 253). Petitioner also argues Funkhouser '93’s disclosure of “levels of detail representing ‘no polygons at all’” expressly refers to omitting entire objects, and a “‘no polygons at all’ detail level . . . will result in [objects] being omitted from the display once the maximum number of objects displayable within the ‘maximum cost’ is exceeded.” *Id.* at 16 (quoting Ex. 1017, 249, 251).

We find persuasive Petitioner’s showing that the combination of Funkhouser, Marathon, and Funkhouser ’93 teaches or suggests “programmed to limit the number of remote user avatars,” as recited in claims 13–15. We are not persuaded by Patent Owner’s argument that Funkhouser ’93 fails to teach omitting objects or avatars because one cannot show nonobviousness “by attacking references individually” where the challenges are based on combinations of references. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (citing *In re Keller*, 642 F.2d 413, 426 (CCPA 1981)). In this case, Funkhouser teaches the claimed “avatar,” explaining, for example, that “[c]lients execute the programs necessary to generate behavior for their entities” and “[t]hey may . . . include viewing capabilities in which the virtual environment is displayed on the client workstation screen from the point of view of one or more of its entities” and depicting its entities as three-dimensional graphical representations. Ex. 1005, 85, 209 (Plate II). Petitioner’s showing that Funkhouser teaches avatars is unrebutted. *See generally* PO Resp.; Tr. Patent Owner, during the oral hearing, explicitly stated that it does not dispute that Funkhouser teaches an “avatar” even under its proposed narrower construction, which would require the graphical representation to be “three-dimensional.” Tr. 67:12–68:2.

We agree with Petitioner’s showing that Funkhouser ’93 teaches omitting objects from the display under certain circumstances. As Petitioner points out, Funkhouser ’93 makes clear the possibility that the “target frame time [may] not [be] long enough to render all potentially visible objects even at the lowest level of detail” and explains that its approach can handle such a situation “if levels of detail representing ‘no polygons at all’ are allowed,”

such that “only the most ‘valuable’ objects are rendered.” *Id.* at 249; *see id.* at 253, Fig. 11. Even Patent Owner acknowledged at the oral hearing that Funkhouser ’93’s reference to “levels of detail representing ‘no polygons at all’” means “no object” or, in other words, “exclud[ing]” objects. Tr. 69:11–20, 71:8–22, 74:22–25; *see id.* at 189:3–5. These disclosures demonstrate that Funkhouser ’93 teaches that objects that cannot be rendered within the target frame rate, even at the lowest detail or accuracy level, may be excluded or omitted from the display. *See* Reply 16; Tr. 55:1–7, 191:14–192:12.

In addition, in discussing Figure 11, Funkhouser ’93 distinguishes between textures and omitted books, i.e., “omission of *texture* on the bookshelves in Figure 11b1 . . . and omission of *books* on bookshelves and *texture* on doors in Figure 11 c1.” Reply 16 (citing Ex. 1017, 253). We find these disclosures regarding Figure 11 and the figure itself to lend additional support to Funkhouser ’93 teaching or at least suggesting omitting objects where they cannot be rendered at the target frame rate.

For the reasons given, we agree with Petitioner’s showing that the combination of Funkhouser, Marathon, and Funkhouser ’93 teaches or suggests “programmed to limit the number of remote user avatars” as recited in claims 13–15.

c. Funkhouser ’93 Teaches a Limit of Remote User Objects Shown

Regarding the next dispute, the parties contest whether Funkhouser ’93 teaches “limit[ing] the number of remote user” objects “shown on the graphic display,” as recited in claims 13–15. PO Resp. 20–22; Reply 16–17. We start with Petitioner’s arguments.

Petitioner relies on pages 249 and 251 of Funkhouser '93, which, according to Petitioner, teaches that objects can be assigned a “no polygons at all” detail level that results in objects being omitted from the display once the maximum number of objects displayable within the “maximum cost” is exceeded. Pet. 10, 48 (citing Ex. 1017, 249, 251).

In response, Patent Owner argues that Funkhouser '93 does not feature a limit of the remote user avatars that are shown. PO Resp. 20. Rather, according to Patent Owner, Funkhouser '93's optimization algorithm renders each object at the level of detail chosen by the cost/benefit optimization algorithm of Funkhouser '93 such that cost heuristic represents “an estimate of the time required” to render an object and the benefit heuristic represents “an estimate of the ‘contribution to model perception’” of an object. *Id.* Patent Owner argues Funkhouser '93 does not teach excluding a number of objects after the maximum cost is claimed; rather, according to Patent Owner, Funkhouser '93 teaches an algorithm for each potentially visible object based on value, but does not teach omitting objects/avatars having lower value once the maximum cumulative benefit is reached. PO Resp. 20. According to Patent Owner, this may result in objects having a lower value (i.e., a bookshelf reduced texture and a lower accuracy level), which results in books being omitted, which is not the same as filtering objects based on computing resources or user selection. *Id.* at 21–22.

In reply, Petitioner argues that Funkhouser '93 teaches that objects can be assigned a “no polygons at all” detail level that results in objects being omitted from the display once the maximum number of objects

displayable within the “maximum cost” is exceeded. Reply 16 (citing Ex. 1017, 249, 251).

We agree with Petitioner’s showing that Funkhouser ’93 teaches “limit[ing] the number of remote user” objects “shown on the graphics display,” as recited in claims 13–15. We are not persuaded by Patent Owner’s argument that Funkhouser ’93 fails to teach or suggest a limit of remote user avatars shown because, as explained above, Funkhouser ’93 teaches a level of detail representing “no polygons” and refers to using such a detail level “where the target frame time is not long enough to render all potentially visible objects even at the lowest level of detail,” such that “only the most ‘valuable’ objects are rendered.” Ex. 1017, 249. And Patent Owner acknowledged at the hearing that this disclosure refers to the possibility of omitting objects. Tr. 69:11–20, 71:8–22, 74:22–25; *see id.* at 189:3–5. Moreover, Funkhouser ’93 teaches that its optimization algorithm results in books on a bookshelf being omitted (i.e., limit the number of remote user objects) as a result of “a selection made by the local user” (i.e., user selection) and the “optimization algorithm” (i.e., based on computing resources or user selection). Pet. 50 (citing Ex. 1017, 247); Reply 16 (citing Ex. 1017, 253).

As for the “avatar” limitation, as stated *supra* in Part II.C, we construed “avatar” as “a graphical representation of a user” without the three-dimensional modifier proposed by Patent Owner. In addition, Patent Owner explicitly stated that it does not dispute that Funkhouser teaches an “avatar” even under its proposed narrower construction, which would require the graphical representation to be “three-dimensional.” Tr. 67:12–68:2.

Accordingly, Petitioner has shown that the combination of Funkhouser, Marathon, and Funkhouser '93 teaches or suggests “to limit the number of remote user avatars,” as recited in claims 12–14. We disagree with Patent Owner’s arguments disputing this showing.

d. The Combination of Funkhouser, Marathon, and Funkhouser '93 Does Not Lack Motivation

The parties’ next arguments focus on whether the combination of Funkhouser, Marathon, and Funkhouser '93 lack motivation. PO Resp. 22–25; Reply 17. We begin with Petitioner’s arguments.

Petitioner argues it would have been obvious to a person having ordinary skill in the art to combine Funkhouser '93’s optimization algorithm with Funkhouser’s system. Pet. 50–53. Petitioner advances specific rationale for the combination in its Petition as discussed further below. *See id.*

In response, Patent Owner argues although Funkhouser cross-references Funkhouser '93, Petitioner and Dr. Zyda fail to provide an explanation as to what Funkhouser’s cross-reference to Funkhouser '93 means. PO Resp. 22. In particular, Patent Owner argues that Petitioner and Dr. Zyda each fail to provide any explanation as to how this reference means that Funkhouser '93’s optimization algorithm directed to a level of detail selection would have been used to modify Funkhouser’s message scheme. *Id.* at 22–23. Moreover, Patent Owner argues that Dr. Zyda’s inconsistent testimony should be disregarded or entitled to little weight. PO Resp. 23–25. According to Patent Owner, Mr. Pesce opines the cross-reference of Funkhouser '93 in Funkhouser does not support Petitioner’s proposed

combination and it should be limited to explaining that an algorithm for determining the optimal set of messages can be based on factors that affects frames-per-second, such as in Funkhouser '93. *Id.* at 25 (citing Ex. 2017 ¶¶ 69–70).

In reply, Petitioner argues that Funkhouser '93's level of detail determination occurs separately from the field of view calculation taught in both Funkhouser and Funkhouser '93, and therefore, "it would have been a simple matter to add the process taught in Funkhouser '93 to the system described in Funkhouser." Reply 17 (citing Ex. 1002 ¶¶ 162, 164). Petitioner refers to Mr. Pesce's testimony that a field of view determination occurs in a first step, and then an optimization algorithm is applied and that the optimization objectives of both Funkhouser '93 and Funkhouser are not incompatible. Reply 17 (citing Ex. 1046, 215:19–216:7, 216:8–25).

We agree with Petitioner. Petitioner articulates a sufficient rationale to combine Funkhouser '93's optimization algorithm and Funkhouser's system, and we do not find persuasive Patent Owner's argument that there is no motivation to combine Funkhouser, Funkhouser '93, and Marathon. Pet. 50–51. In particular, Petitioner argues that it would have been obvious to one of ordinary skill in the art to combine Funkhouser '93's optimization approach with the system taught in Funkhouser, and with Marathon's perspective-switching feature, resulting in the client determining which objects, including other user avatars, to display based on the orientation of the client avatar, on the performance capabilities of the client computer, and desired frame rate of the displayed environment as selected by the user. *Id.* (citing Ex. 1002 ¶¶ 162–163). Although Dr. Zyda's testimony regarding Funkhouser's cross-reference to Funkhouser '93 is inconsistent in that he

initially did not recall this cross-reference referenced in his declaration, this inconsistency does not persuade us to disregard or entitle little weight to his testimony. Even Mr. Pesce acknowledges that field of view is the first step (i.e., in both Funkhouser '93 and Funkhouser), “then the next step would be to take everything that was in the field of view and run the [Funkhouser '93] benefit heuristic on it,” and he also acknowledges the optimization goals of both Funkhouser '93 and Funkhouser are not incompatible. Ex. 1046, 215:19–216:25.

We, therefore, do not disregard or give little weight to paragraphs 162–163 of Dr. Zyda’s testimony because we determine paragraphs 162–163 provide sufficient support for Petitioner’s articulated reasoning with rational underpinnings to support the motivation to combine the teachings of Funkhouser '93, Funkhouser, and Marathon. *Kahn*, 441 F.3d at 989.

e. Undisputed Limitations of Claims 13–15

We have reviewed the arguments and evidence presented in the Petition regarding how the combination of Funkhouser, Marathon, and Funkhouser '93 teaches or suggests the remaining limitations of claims 13–15. Pet. 46–53. Patent Owner does not contest that the combination of Funkhouser, Marathon, and Funkhouser '93 teaches or suggests these limitations. *See* PO Resp. 16–25; *see also* Reply 15–17. Based on our review of the Petition and the supporting evidence, we find persuasive Petitioner’s arguments and evidence, including citations to the references and Dr. Zyda’s testimony, and we adopt them as the basis for our determination that the combination of Funkhouser, Marathon, and

Funkhouser '93 teaches or suggests these limitations of claims 13–15, thereby rendering claims 13–15 unpatentable for obviousness. Pet. 46–53.

f. Conclusion

In conclusion, for the reasons given above and based on our review of the arguments and evidence of record, Petitioner has shown by a preponderance of the evidence that the subject matter of claims 13–15 of the '998 patent would have been obvious over Funkhouser, Marathon, and Funkhouser '93.

H. Obviousness of Claim 17 in View of Funkhouser, Marathon, and Wexelblat

1. Wexelblat (Ex. 1020)

We first assess Wexelblat's prior art status. Petitioner argues Wexelblat is prior art under 35 U.S.C. § 102(b), and Patent Owner has not disputed Petitioner's position. Pet. 54; *see generally* PO Resp.; Tr. We agree with Petitioner that Wexelblat, a U.S. patent that issued on June 4, 1991—more than one year before the earliest possible effective filing date of the '998 patent, constitutes § 102(b) prior art. *See* 35 U.S.C. § 102(b); Ex. 1001, [60], [63]; Ex. 1020, [22], [45].

Wexelblat discusses an artificial reality with interacting users. Ex. 1020, 6:61–7:10. In addition, Wexelblat discusses a user teleporting from a current location to another location. *Id.*

2. Discussion

The parties' dispute on this ground focuses on whether it would have been obvious to combine Wexelblat's teleportation feature with

Funkhouser's system, as Petitioner proposes. PO Resp. 37–38; Reply 18. We begin with Petitioner's arguments.

Petitioner argues combining Funkhouser, Marathon, and Wexelblat would represent combining familiar elements according to known methods, yielding the predictable results of returning to a location of interest after an initial visit to another location. Pet. 54–55 (citing Ex. 1002 ¶¶ 177–178).

Patent Owner responds by arguing incorporating Wexelblat's teleportation into Funkhouser's system “poses the same unresolved problems as incorporating perspective changes” discussed above with respect to the combination of Funkhouser's system and Marathon's perspective-switching. PO Resp. 37 (citing Ex. 2017 ¶¶ 94, 101, 104, 108). According to Patent Owner, in one scenario, a user's experience is harmed because of delays in switching to a new perspective view or avatars popping up out of nowhere in the new view while the client is downloading the avatars. PO Resp. 37 (citing Ex. 2017 ¶¶ 100–101). According to Patent Owner, in other scenarios, Dr. Zyda's interpretation implies “the client processes data for all other avatars could be ‘potentially visible,’ *i.e.* visible in the next couple of frames.” PO Resp. 37–38 (citing Ex. 2017 ¶ 108). Patent Owner concludes its argument by explaining that “one of ordinary skill in the art would not have been motivated to implement Wexelblat's teleportation into Funkhouser.” PO Resp. 38 (citing Ex. 2017 ¶ 110).

In response, Petitioner argues because Patent Owner relies on the same rationale as it does for the combination of Funkhouser's system and Marathon's perspective-switching, Patent Owner's arguments fail for the same reasons explained with respect to the rationale for combining Funkhouser and Marathon. Reply 18.

Here, we agree with Petitioner's showing regarding its proffered addition of Wexelblat's teleportation feature to the combination of Funkhouser and Marathon. In particular, we agree with Petitioner's showing that applying Wexelblat's teaching that allows users to navigate from room to room in a virtual environment with Marathon's perspective-switching and Funkhouser's system would allow users to return quickly to a location of interest after an initial visit. Pet. 54–55 (citing Ex. 1002 ¶ 177; Ex. 1020, 6:67–7:5). Furthermore, we agree with Petitioner's showing that combining Funkhouser, Marathon, and Wexelblat would represent combining familiar elements according to known methods, yielding the predictable results of returning to a location of interest after an initial visit to another location. Pet. 54–55 (citing Ex. 1002 ¶¶ 177–178). We are not persuaded by Patent Owner's argument because Patent Owner largely repeats the same arguments against the combination of Funkhouser and Wexelblat as what was argued already against the combination of Funkhouser's system and Marathon's perspective-switching. *See supra* Part II.E; PO Resp. 37–38. Accordingly, for the reasons discussed *supra* in Part II.E, we disagree with Patent Owner's argument that it would not have been obvious to combine Wexelblat's teleportation feature with Funkhouser's system.

3. Undisputed Limitations of Claim 17

We have reviewed the arguments and evidence presented in the Petition regarding how the combination of Funkhouser, Marathon, and Wexelblat teaches or suggests the remaining limitations of claim 17. Pet. 53–55. Patent Owner does not contest that the combination of Funkhouser, Marathon, and Wexelblat teaches or suggests these limitations.

See PO Resp. 37–38; *see also* Reply 17–18. Based on our review of the Petition and the supporting evidence, we find persuasive Petitioner’s arguments and evidence, including citations to the references and Dr. Zyda’s testimony, and we adopt them as the basis for our determination that the combination of Funkhouser, Marathon, and Wexelblat teaches or suggests these limitations of claim 17. Pet. 53–55.

4. Conclusion

In conclusion, for the reasons given above and based on our review of the arguments and evidence of record, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 17 of the ’998 patent would have been obvious over Funkhouser, Marathon, and Wexelblat.

I. Real Parties-in-Interest

Patent Owner argues Activision Publishing, Inc. (“Activision”) is an unnamed real party in interest, who was served with a complaint in the District Court Case more than one year before the Petition was filed. PO Resp. 39–45. Thus, according to Patent Owner, the Petition fails to comply with 35 U.S.C. § 312(a)(2) and 37 C.F.R. § 42.8, and institution of review was barred under 35 U.S.C. § 315(b). PO Resp. 39–45. Patent Owner argues the Board erred in denying its Motion for Routine or Additional Discovery related to this issue (Paper 9) and in instituting review despite Patent Owner’s assertions of Activision’s status as a real party in interest. PO Resp. 39–45.

The Response repeats largely the same arguments Patent Owner raised in its discovery motion and Preliminary Response, for example, relying on the same provisions of the Software Publishing and Development

Agreement between Activision and Petitioner to support its assertion that Activision had the opportunity to control and is funding this *inter partes* review. *See, e.g., id.*; Prelim. Resp. 23–30; Reply 18. We addressed Patent Owner’s arguments and evidence in detail in our pre-institution order denying Patent Owner’s Motion for Routine or Additional Discovery and the Institution Decision. *See* Inst. Dec. 21–28 (§ II.H); Paper 11. We note that Patent Owner did not seek rehearing of the Institution Decision or permission for a renewed request for discovery after institution. Nonetheless, having reconsidered the issue in light of Patent Owner’s arguments in the Response, we remain unpersuaded that there is sufficient evidence that Activision is an unnamed real party in interest for the reasons given in the Institution Decision. Inst. Dec. 21–28 (§ II.H).

J. Alleged Unconstitutionality

Patent Owner argues that an unpatentability ruling in this *inter partes* review proceeding constitutes an impermissible taking of a private right without Article III oversight. PO Resp. 45–47. Petitioner responds that the U.S. Court of Appeals for the Federal Circuit has addressed such arguments and held that the *inter partes* review process is not unconstitutional. Reply 18–19. Petitioner is correct that the Federal Circuit has addressed the issue and rejected a challenge to the constitutionality of *inter partes* reviews as violative of Article III. *See MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1289–92 (Fed. Cir. 2015), *cert. denied*, 2016 WL 1724103 (U.S. Oct. 11, 2016). Accordingly, we disagree with Patent Owner’s arguments on this issue.

K. Patent Owner's Motion to Exclude

In its Motion to Exclude, Patent Owner seeks to exclude five exhibits, specifically Exhibits 1033, 1034, 1037, 1041, and 1042. *See generally* Mot. We have not relied on four of these exhibits—Exhibits 1033, 1034, 1037, and 1042—in reaching our decision and, therefore, Patent Owner's arguments as to these exhibits are moot. For Exhibit 1042, in particular, we note that Petitioner does not cite this exhibit in its Petition or its Reply and, thus, has not proffered any argument relying on this exhibit. *See id.* at 9; Opp. 11; *see generally* Pet.; Reply. Accordingly, Patent Owner's Motion to Exclude is *dismissed* as moot as to Exhibits 1033, 1034, 1037, and 1042.

The remaining exhibit, Exhibit 1041, is an excerpt from an interview of Mr. Pesce at the 1999 AllChemical Arts conference in which Mr. Pesce discusses his use of psychedelic drugs beginning in college and how this usage has affected and facilitated his work and career. Ex. 1041. Patent Owner objects to its admissibility under Rules 402, 403, 404, 405, and 608. Mot. 7. Specifically, Patent Owner argues Petitioner uses the exhibit “to attack Mr. Pesce through irrelevant and improper evidence directed to general character and specific instances of conduct, rather than to his qualifications to testify on the knowledge and understanding of a person of ordinary skill in the art. *See* Fed. R. Evid. 402, 404, 405, 608.” Mot. 8; *see* Mot. Reply 6. In addition, Patent Owner asserts that even if the Board were to conclude that Exhibit 1041 is “relevant to any issue in this proceeding,” the exhibit should be excluded under Rule 403 because “any probative value” is substantially outweighed by the “risk of unfair prejudice,” “namely, that Mr. Pesce's entire testimony would be entitled to no weight due to any use of psychedelics.” Mot. 8.

Petitioner contends Exhibit 1041 is relevant and admissible because it “bears on the credibility of Patent Owner’s expert and the reliability of his testimony in this proceeding, including his ability to accurately recall details from the relevant time period.” Opp. 6–7; *see id.* at 10. In other words, according to Petitioner, Exhibit 1041 is relevant to Mr. Pesce’s “capacity to remember details” and “recall events” from the 1990s, including “virtual reality technology,” as well as “the quality of any such recollections.” *Id.* at 7–9. Petitioner contends Exhibit 1041 “is not submitted to attack Mr. Pesce’s character” and “thus, Patent Owner’s citations to [Rules] 404, 405, and 608 are misplaced.” *Id.* at 7 & n.1. Petitioner also asserts Patent Owner’s argument regarding Rule 403 “should . . . be denied,” because the only unfair prejudice Patent Owner alleges is that the Board will give Mr. Pesce’s testimony little or no weight but this would be “the correct outcome” for the reasons identified in its Reply. *Id.* at 10.

Patent Owner responds that Petitioner has “no basis to argue that the contents of Exhibit 1041 weigh on Mr. Pesce’s memory of events in the mid-1990s.” Mot. Reply 5. As support, Patent Owner argues that even Petitioner’s counsel acknowledged in referring to events in April 1993 that it is “hard to remember” events from such a “long time ago.” *Id.* at 5–6 (quoting Ex. 1046, 28:8–13).

We first address Exhibit 1041’s admissibility as to Mr. Pesce’s capacity to recall events from the 1990s as well as the reliability of such recollections. As part of his testimony regarding claim construction and unpatentability in this proceeding, Mr. Pesce offers testimony, both in his declaration and at his deposition, regarding developments in virtual reality from approximately 1991 through 1996 and the status of the art at various

points of that time period. *See, e.g.*, Ex. 2017 ¶¶ 36–44, 49.a.iv, 59; Ex. 1046, 85:4–21, 89:10–90:7, 204:12–205:20, 222:1–223:6. Therefore, Exhibit 1041, featuring excerpts of an interview of Mr. Pesce from 1999 documenting his drug use beginning in college¹⁶ and how this usage facilitated and impacted his work, is relevant to his capacity to perceive and recall these details and events on which he testifies, and the reliability of such perceptions and recollections. *See, e.g.*, *Jarrett v. United States*, 822 F.2d 1438, 1445–46 (7th Cir. 1987) (holding that a “witness’s use of drugs” is “relevant” to, and may be used to attack, the witness’s “ability to perceive the underlying events”); *United States v. Apperson*, 441 F.3d 1162, 1195–96 (10th Cir. 2006) (quoting *Jarrett*, 822 F.2d at 1446); *United States v. Robinson*, 583 F.3d 1265, 1272 (10th Cir. 2009) (recognizing that drug use bears on a witness’s “capacity,” which is significant “at the time of the event,” and that “[a] witness’s credibility may always be attacked by showing that his or her capacity to observe, remember, or narrate is impaired”) (internal citations and quotations omitted); *United States v. Dixon*, 38 Fed. App’x 543, 548 (10th Cir. 2002) (unpublished) (“Evidence of a witness’s drug use may be admitted to show the effect of the drug use on the witness’s memory or recollection of events.”); *United States v. Smith*, 156 F.3d 1046, 1055 (10th Cir. 1998) (upholding allowance of witness questioning regarding drug use twenty years earlier as relevant to her “ability to remember the [relevant] events” or her “recall and recollection”).

When offered for this purpose, Rules 404, 405, and 608 do not prohibit Exhibit 1041’s admissibility. Rule 404, and related Rule 405, do

¹⁶ According to his declaration, Mr. Pesce left MIT in 1982. Ex. 2017 ¶ 3.

not bar admission of Exhibit 1041 for this purpose because it is not being offered as character evidence to “show that on a particular occasion [Mr. Pesce] acted in accordance with” a particular “character” or “trait.” Fed. R. Evid. 404(a)(1), (b)(1); *see* Fed. R. Evid. 405 (providing for allowable methods of proving a person’s character when such evidence is admissible); *see also United States v. Skelton*, 514 F.3d 433, 441 (5th Cir. 2008) (concluding that “Rule 404(b) does not bar the evidence at issue because it is not being offered as character evidence to show action in conformity therewith”). Nor does Rule 608(b) apply. Rule 608(b) provides, in pertinent part, that “[e]xcept for a criminal conviction under Rule 609, extrinsic evidence is not admissible to prove specific instances of a witness’s conduct in order to attack or support the witness’s *character for truthfulness*.” Fed. R. Evid. 608(b) (emphasis added). Therefore, by its express terms, “[t]he application of Rule 608(b) to exclude extrinsic evidence of a witness’s conduct is limited to instances where the evidence is introduced to show a witness’s *general character for truthfulness*.” *Skelton*, 514 F.3d at 441–42; *see United States v. Taylor*, 426 Fed. App’x 702, 705–06 (11th Cir. 2011) (unpublished). In other words, the Rule acts as an “absolute prohibition on extrinsic evidence . . . only when the *sole* reason for proffering that evidence is to attack or support the witness’ character for truthfulness” or “veracity.” *United States v. Epstein*, 426 F.3d 431, 439 n.4 (1st Cir. 2005); Fed. R. Evid. 608(b) advisory committee’s note to 2003 amendments (emphasis added). Accordingly, Rule 608(b) does not bar the admissibility of Exhibit 1041 because it is being offered as evidence of Mr. Pesce’s capacity and reliability in perceiving and recalling events from the 1990s.

Given that Exhibit 1041 is relevant for this purpose and its admission is not barred by Rules 404, 405, and 608, we turn to Rule 403 to consider whether it should nonetheless be excluded because its “probative value is substantially outweighed by a danger of . . . unfair prejudice.” Fed. R. Evid. 403.¹⁷ Here, the probative value of Exhibit 1041 as to Mr. Pesce’s ability to perceive and recall events and details from the art in the early to mid-1990s is limited as, for example, it lacks specific details regarding the extent and regularity of his drug use. Yet, on the other hand, the risk of unfair prejudice is minimal. To begin with, an unfair prejudice analysis is not well suited to a bench trial, such as this. *See, e.g., Schultz v. Butcher*, 24 F.3d 626, 632 (4th Cir. 1994) (“[I]n the context of a bench trial, evidence should not be excluded under 403 on the ground that it is unfairly prejudicial.”); *Gulf States Utilities Co. v. Ecodyne Corp.*, 635 F.2d 517, 519 (5th Cir. 1981) (holding that “exclusion of evidence under Rule 403’s weighing of probative value against prejudice was improper” and was a “useless procedure” because “[t]his portion of Rule 403 has no logical application to bench trials”). Moreover, the only “unfair prejudice” that Patent Owner alleges is that all of Mr. Pesce’s testimony will be given little to no weight—which is not accurate, as we are considering the admissibility of Exhibit 1041 only for its relevance to his capacity and reliability in perceiving and recalling events and other details from the early to mid-1990s, on which he offers testimony. *See* Mot. 8. Although we are cognizant of the sensitive nature of evidence of drug use, there is minimal

¹⁷ Rule 403 lists other considerations but Patent Owner does not argue that any of these apply, and we conclude that they do not. *See id.*; Mot. 7–8.

risk of any unfair prejudice from considering Exhibit 1041 for this limited purpose. In sum, the probative value of Exhibit 1041 for this limited purpose is not “substantially outweighed” by any danger of unfair prejudice and, thus, exclusion under Rule 403 is not warranted.

We turn to the alleged relevance and admissibility of Exhibit 1041 regarding “Mr. Pesce’s credibility” generally. Opp. 7; *see id.* at 6, 10. Petitioner, in addition to specifying that Exhibit 1041 is relevant to Mr. Pesce’s “capacity” and “ability to accurately recall details from the relevant time period” and “the quality of any such recollections,” makes more general references to the exhibit’s alleged relevance to his “credibility.” *Id.* at 6–10. To the extent Petitioner is suggesting that we consider Exhibit 1041 to assess Mr. Pesce’s truthfulness, Rule 608(b) bars the admissibility of extrinsic evidence to attack a “witness’s character for truthfulness,” as explained above. Fed. R. Evid. 608(b). Also, evidence of drug use generally is not considered relevant to or probative of truthfulness. *See United States v. Tanksley*, No. 93-6346, 2016 WL 502659, at *3 (6th Cir. 1997) (unpublished) (“Evidence of prior drug use generally is not relevant to the issue of truthfulness . . .”).

We recognize a witness’s credibility may involve aspects beyond truthfulness. For example, “Rule 608(b) was amended by substituting ‘character for truthfulness’ in place of ‘credibility,’” *Epstein*, 426 F.3d at 439 n.4, because, as the advisory committee explains, “*use of the overbroad term ‘credibility’* had been read ‘to bar extrinsic evidence for bias, competency and contradiction impeachment since they too deal with credibility,” Fed. R. Evid. 608(b) advisory committee’s note to 2003 amendments (emphasis added); *see also Skelton*, 514 F.3d at 441–42;

Taylor, 426 Fed. App'x at 705. Petitioner, however, in discussing Exhibit 1041 in its Reply and in opposing Patent Owner's Motion to Exclude, does not articulate any relevance of Exhibit 1041 as to Mr. Pesce's credibility that is distinct from his truthfulness, for which its admission is barred under Rule 608(b), and his capacity and reliability in recalling events in the art in the 1990s, for which we have determined above the evidence is relevant and admissible. *See* Reply 3; Opp. 6–10. Nor do we see any such relevance. In addition, courts have often held that evidence of a witness's drug use, though relevant to the witness's capacity to perceive and recall relevant events, cannot be used to attack the witness's "general credibility." *E.g.*, *Jarrett*, 822 F.2d at 1446 ("A witness's use of drugs may not be used to attack his or her general credibility but only his or her ability to perceive the underlying events and testify lucidly at trial."); *Apperson*, 441 F.3d at 1195–96 (quoting *Jarrett*, 822 F.2d at 1446) (holding that "the district court correctly concluded that evidence of [the witness's] alleged prior drug use could not be used to attack [his] general credibility"); *see also, e.g.*, *United States v. Cousins*, 842 F.2d 1245, 1249 (11th Cir. 1988) ("[A]lthough extrinsic evidence of prior drug use could not properly be used just to attack [defendant]'s credibility, such evidence could be used to refute the specifics to which [defendant] had previously testified.").

Accordingly, we admit Exhibit 1041 and consider it for the limited purpose of assessing Mr. Pesce's capacity to perceive and recall events and details from the relevant art from the 1990s about which he testifies, as well as the reliability of such perceptions and recollections. We do not, however, consider Exhibit 1041 for Mr. Pesce's credibility more generally and particularly, his truthfulness. Thus, Patent Owner's Motion to Exclude is

denied as to Exhibit 1041.

III. CONCLUSION

In conclusion, Petitioner has shown by a preponderance of the evidence that: claims 1, 2, 7, 8, 12, 16, 18, and 20 of the '998 patent are unpatentable under 35 U.S.C. § 103(a) in view of Funkhouser and Marathon; claim 3 is unpatentable under 35 U.S.C. § 103(a) in view of Funkhouser, Marathon, and Sitrick; claims 13–15 are unpatentable under 35 U.S.C. § 103(a) in view of Funkhouser, Marathon, and Funkhouser '93; and claim 17 is unpatentable under 35 U.S.C. § 103(a) in view of Funkhouser, Marathon, and Wexelblat.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 7, 8, 12–18, and 20 of the '998 patent are unpatentable;

FURTHER ORDERED that Patent Owner's motion to exclude (Paper 33) is *dismissed* as to Exhibits 1033, 1034, 1037, and 1042 and *denied* as to Exhibit 1041; and

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

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Patent 8,145,998 B2

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