

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC., META PLATFORMS TECHNOLOGIES,
LLC, and TWISTED PIXEL GAMES, LLC,
Petitioner,

v.

EIGHT KHZ, LLC,
Patent Owner.

IPR2023-01019
Patent 10,368,179 B1

Before JUSTIN T. ARBES, LYNNE H. BROWNE, and
SCOTT RAEVSKY, *Administrative Patent Judges*.

RAEVSKY, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

Dismissing-in-Part and Denying-in-Part Patent Owner's Motion to Exclude

35 U.S.C. § 318(a)

I. INTRODUCTION

Meta Platforms, Inc., Meta Platforms Technologies, LLC, and Twisted Pixel Games, LLC (collectively, “Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–20 of U.S. Patent No. 10,368,179 B1 (Ex. 1001, “the ’179 patent”). Pet. 2. Eight kHz, LLC (“Patent Owner”) filed a Preliminary Response (Paper 6). Petitioner filed a Reply to the Preliminary Response (Paper 7), and Patent Owner filed a Sur-reply (Paper 8). Based on these filings, we instituted an *inter partes* review of all challenged claims (Paper 10, “Decision on Institution” or “Dec.”).

Subsequent filings include a Patent Owner Response (Paper 22, “PO Resp.”), a Petitioner Reply (Paper 25, “Reply”), and a Patent Owner Sur-reply (Paper 35, “Sur-reply”). Patent Owner also filed a Motion to Exclude (Paper 38, “Mot.”). Petitioner filed an Opposition to Patent Owner’s Motion to Exclude (Paper 39, “Opp.”). Patent Owner filed a Reply to Petitioner’s Opposition to Patent Owner’s Motion to Exclude (Paper 41, “Reply to Opp.”). We held an oral hearing on September 5, 2024, a transcript of which has been entered into the record (Paper 47, “Tr.”).

We have jurisdiction over this proceeding under 35 U.S.C. § 6(b). After considering the evidence and arguments of the parties, we determine that Petitioner has proven by a preponderance of the evidence that claims 1–20 are unpatentable.

II. BACKGROUND

A. Related Matters

The parties identify the following infringement lawsuit involving the '179 patent: *Eight kHz, LLC v. Meta Platforms, Inc.*, No. 6:22-cv-00575-ADA-DTG (W.D. Tex. Jun. 3, 2022). Pet. 65; Paper 5, 1.

The following *inter partes* review has also been filed against related U.S. Patent No. 10,448,184 B1: *Meta Platforms, Inc. v. Eight kHz, LLC*, IPR2023-01020 (PTAB filed June 8, 2023).

B. Real Parties-in-Interest

Meta Platforms, Inc., Meta Platforms Technologies, LLC, and Twisted Pixel Games, LLC identify themselves as the only real parties-in-interest (RPI). Pet. 65. Patent Owner identifies itself as the sole RPI. Paper 5, 1.

C. The '179 Patent

The '179 patent describes a method for providing binaural sound to a person through electronic earphones. Ex. 1001, code (57). The binaural sound localizes to a sound localization point (SLP) in empty space that is away from but proximate to the person. *Id.* When an event occurs, the binaural sound switches or changes to stereo sound, to mono sound, or to altered binaural sound. *Id.* Figure 1 is reproduced below.

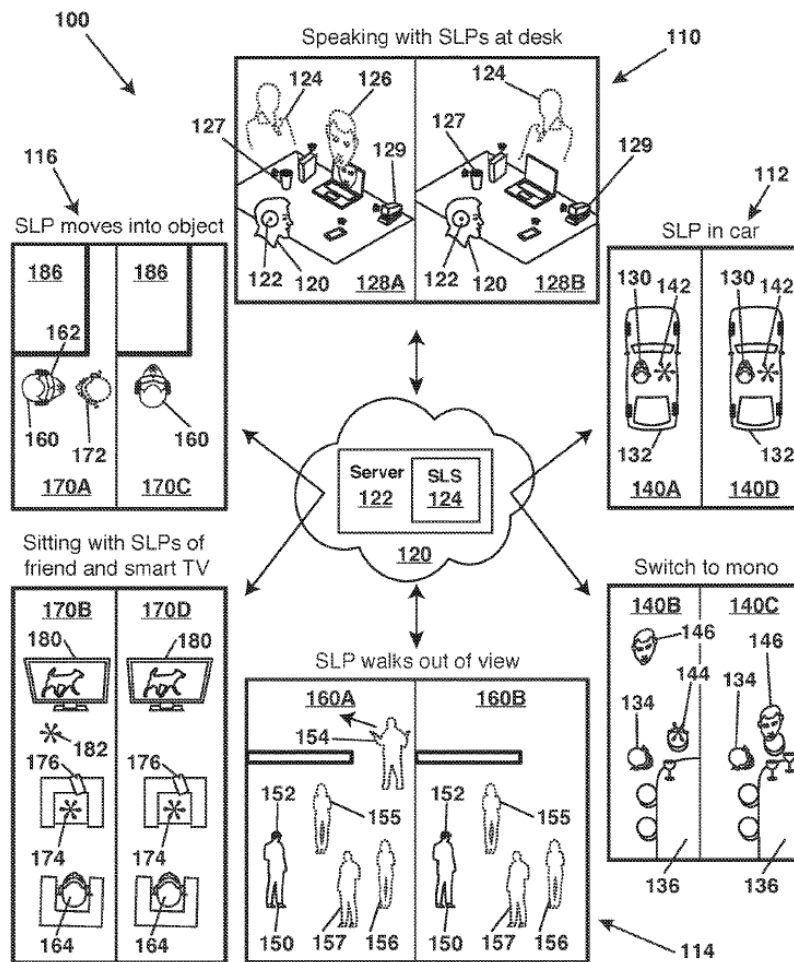


Figure 1

Figure 1 depicts computer system 100 with example scenarios (110, 112, 114, 116) of changing binaural sound. *Id.* at 6:8–10. For example, in scenario 110, a user 120 wears electronic earphones 122 while simultaneously localizing a voice of an intelligent personal assistant (IPA) to a first sound localization point 124 and a voice of a friend to a second sound localization point 126. *Id.* at 6:13–17. As shown in box 128A, the user 120 localizes the voice of the IPA to his left and localizes the voice of his friend in front of himself and above his laptop computer that is situated on his desk.

Id. at 6:17–20. An image of the friend appears on a display of the laptop while the SLP 126 appears above the laptop. *Id.* at 6:20–22.

As another example, in scenario 112, a user 130 drives a car 132 while talking to another user 134 who wears headphones with microphones and sits at a table 136. *Id.* at 6:32–34. As shown in box 140A, user 130 localizes a voice of user 134 to a sound localization point 142 (indicated with an asterisk-like symbol) that is located in an empty passenger seat in the front of the car 132. *Id.* at 6:34–37.

In scenario 114, a user 150 wears an optical head mounted display (OHMD) 152 that simultaneously provides a plurality of sound localization points 154, 155, 156, and 157 during a conference call with four individuals (each individual being represented with a visual image and accompanying SLP). *Id.* at 6:60–65. In scenario 116, a user 160 wears electronic glasses 162 and talks to another user 164 who sits in a chair in his family room and wears a headphone with mics. *Id.* at 7:8–10.

D. Challenged Claims

Claim 14, below, is illustrative of the challenged claims. Petitioner's claim element labels are included for ease of reference.

14. A method executed by one or more electronic devices, the method comprising:

- [a] storing head-related transfer functions (HRTFs) in memory;
- [b] displaying, with a wearable electronic device (WED) worn on a head of a user, a virtual image in an environment;
- [c] processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment;
- [d] determining, with the WED, when the user is leaving the environment; and
- [e] alerting the user that the user is leaving the environment by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user.

Ex. 1001, 47:41–48:16; *see* Pet. 15–23.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. 2):

Claim(s) Challenged	35 U.S.C. §¹	Reference(s)/Basis
1, 3, 4, 6–10, 14–19	103	Clement, ² Osman, ³ Sauk ⁴
1–20	103	Lyren, ⁵ Reif ⁶

Petitioner also relies on two declarations by Dr. Agnieszka Roginska (Exs. 1003, 1146). Patent Owner relies on the declaration of Dr. Durand R. Begault (Ex. 2012).

III. ANALYSIS

A. Principles of Law

A claim is unpatentable as obvious if “the differences between the [claimed invention] and the prior art are such that the [claimed invention] as a whole would have been obvious [before the effective filing date of the

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102, 103 effective March 16, 2013. The ’113 patent’s earliest claimed priority application was filed after March 16, 2013, so the AIA versions of §§ 102, 103, 112 apply. Ex. 1001, code (63).

² U.S. Patent No. 9,690,374 B2 to Clement, issued June 27, 2017 (Ex. 1005).

³ U.S. Patent No. 9,037,468 B2 to Osman, issued May 19, 2015 (Ex. 1006).

⁴ U.S. Patent No. 7,876,903 B2 to Sauk, issued Jan. 25, 2011 (Ex. 1007).

⁵ U.S. Publication No. 2017/0188168 A1 to Lyren, published June 29, 2017 (Ex. 1008). Petitioner’s reliance on Lyren relies on its argument that the ’179 patent is not entitled to a priority date earlier than its actual filing date. *See* Pet. 35–39.

⁶ U.S. Publication No. 2018/0373412 A1 to Reif, published Dec. 27, 2018 (Ex. 1009). Petitioner’s reliance on Reif relies on its argument that the ’179 patent is not entitled to a priority date earlier than its actual filing date. *See* Pet. 35–39, 41.

claimed invention] to a person having ordinary skill in the art to which [the claimed invention] pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). We resolve the question of obviousness based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the prior art and the claims; (3) the level of skill in the art; and (4) when in evidence, objective indicia of nonobviousness. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

We apply these principles to the Petition’s challenges.

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention. *Graham*, 383 U.S. at 13, 17. Petitioner asserts that

A POSA [person of ordinary skill in the art or “POSITA”] in the relevant timeframe (2015 to 2019) would have had a Bachelor’s degree in computer science/engineering, music technology, or a related field, and at least two years of industry experience, or academic research experience, in virtual/augmented reality, audio engineering, or an equivalent. Additional education can compensate for less experience, and vice-versa.

Pet. 6 (citing Ex. 1003 ¶¶ 34–36).

Patent Owner accepts Petitioner’s proposed level of skill in the art. PO Resp. 13. We are persuaded that Petitioner’s proposal is consistent with the problems and solutions in the ’179 patent and prior art of record. We adopt Petitioner’s definition of the level of ordinary skill.

C. Claim Construction

In *inter partes* review, we construe a claim using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in

accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b).

The Petition does not propose any claim constructions. *See* Pet. 6–7. Patent Owner proposes construing the terms “environment,” “3D virtual environment,” and “determining, with the WED, when the user is leaving the environment.” PO Resp. 8–13. Petitioner disputes these constructions. Reply 2–7.

1. *environment*

Patent Owner initially argues that “environment” should mean “physical surroundings in which a user operates.” PO Resp. 8. Petitioner responds that the plain meaning of environment “encompasses physical and virtual environments.” Reply 2.

During the hearing, Patent Owner conceded that Petitioner’s construction for environment is correct. Tr. 49:24–50:10.

We agree with this construction and apply it here. *See, e.g.*, Ex. 1001, 28:16 (referring to “a physical or a virtual environment”). “Environment” encompasses physical and virtual environments.

2. *3D virtual environment*

Patent Owner initially argues that “3D virtual environment” means “three-dimensional perceived surroundings in which a user operates that incorporates a virtual image and/or sound.” PO Resp. 10. Petitioner responds that a 3D virtual environment “cannot be a sound-only environment.” Reply 4.

As with its previous construction, Patent Owner conceded in the hearing that Petitioner’s construction is correct. Tr. 49:24–50:10. Patent

Owner later clarified that it proposes replacing the conjunction “and/or” in its original construction with just “and.” *Id.* at 52:6–20 (agreeing to take out the word “or,” “[g]iven the claim language that requires a virtual image”). Petitioner later proposed construing the term as “[three]-dimensional perceived surroundings in which a user operates that includes *at least one* virtual image and sound,” and Patent Owner agreed with this construction. *Id.* at 78:17–23 (emphasis added to show Petitioner’s change); 97:25–98:14 (agreeing to Petitioner’s “adding the ‘at least one’ before virtual image”).

We agree with this construction and apply it here.

3. *determining, with the WED, when the user is leaving the environment*

Patent Owner contends that this phrase means “determining, with the WED and independent of a stationary tracking device, when the user is leaving the environment.” PO Resp. 12. Petitioner asserts that Patent Owner’s addition of the phrase “independent of a stationary tracking device” is inconsistent with the claim language, the intrinsic record, and the extrinsic record. Reply 6.

We decline to adopt Patent Owner’s proposed construction because it is unnecessary to resolve the meaning of this phrase to reach a decision here, as we determine below that a different limitation lacks support in an earlier priority application. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Asserted Obviousness over Lyren and Reif

We solely address Petitioner’s contention that claims 1–20 would have been obvious over the combination of Lyren and Reif because this ground is dispositive of all claims. *See* Pet. 35–64.

1. Overview of Lyren

Lyren is the publication of the earliest application to which the ’179 patent claims priority. *Cf.* Ex. 1008, *with* Ex. 1001, code (63). As such, the disclosure of Lyren is similar to the ’179 patent’s disclosure. *See* PO Resp. 48 (asserting that Lyren’s specification and the specification of the ’179 patent are identical).

2. Overview of Reif

Reif discloses a virtual reality (VR) system that identifies a bounding box including a safe region. Ex. 1009, code (57). The bounding box encloses an area that allows a user wearing a head mounted display (HMD) to safely view content of a virtual world. *Id.* The VR system identifies the user’s location relative to the bounding box and tracks the user’s location. *Id.* When it is determined that the user is located outside the safe region of the bounding box, the VR system can modify what is presented to the user via the HMD, can warn the user, and/or can suggest that the user move back to the safe region. *Id.*

3. ’179 Patent’s Effective Filing Date

Petitioner contends that the ’179 patent’s priority chain is broken at its immediate parent, Application No. 16/106,140 (“the ’140 application,” Ex. 1028, 92–191). Pet. 37. As a result, Petitioner contends, the ’179 patent’s claims are not entitled to the benefit of any date earlier than their actual filing date. *Id.* Thus, Petitioner argues, Lyren, which is the publication of

the earliest priority application of the '179 patent, is prior art. *Id.* at 35.
Patent Owner disputes this. PO Resp. 45–62.

a. Legal principles for establishing priority

In *inter partes* review, the petitioner bears the burden to demonstrate unpatentability, and that burden never shifts to the patentee. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Once a petitioner provides invalidating art, however, the burden of production shifts to the patentee to “show that the prior art does not actually invalidate the patent or that it is not prior art because the asserted claim is entitled to the benefit of an earlier filing date.” *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 870 (Fed. Cir. 2010); *see also Dynamic Drinkware*, 800 F.3d at 1379–80; *Technology Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327–28 (Fed. Cir. 2008) (once the patent challenger provides invalidating art, the patent owner has “the burden of going forward with evidence [that the cited art] is not prior art because the asserted claim is entitled to the benefit of a filing date prior to the alleged prior art,” which “requires [the patent owner] to show not only the existence of the earlier application, but why the written description in the earlier application supports the claim,” then “the burden of going forward again shifts” to the patent challenger to prove that the patent owner “is not entitled to the benefit of the earlier filing date”). Thus, “a patentee bears the burden of establishing that its claimed invention is entitled to an earlier priority date than an asserted prior art reference.” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1376 (Fed. Cir. 2016) (citing *Dynamic Drinkware*, 800 F.3d at 1379).

“In order to gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earlier application must comply with the written description requirement of 35 U.S.C. § 112.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571 (Fed. Cir. 1997). To satisfy this written description requirement, one must show that “the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date,” which “requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). “One does that by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention.” *Lockwood*, 107 F.3d at 1572. “Although the exact terms need not be used *in haec verba*, . . . the specification must contain an equivalent description of the claimed subject matter.” *Id.* “A description which renders obvious the invention for which an earlier filing date is sought is not sufficient.” *Id.*

b. Overview of the parties’ arguments

Petitioner contends that the ’140 application does not provide support for any of the independent claims, and thus the priority chain is broken. Pet. 36–39.

Petitioner asserts that all of the claims “recite the HMD/WED sensing or determining when the user is leaving the 3D environment, and alerting or warning that user of that fact by reducing the sound’s volume and/or otherwise altering it.” *Id.* at 37. Petitioner contends that although the ’140 application teaches altering sound “upon detecting various *other* ‘events,’”

those “events do not include the user leaving the environment as recited in the independent claims.” *Id.* (citing Ex. 1003 ¶¶ 225–229). Petitioner acknowledges that the ’140 application determines a location but argues that it does not disclose using that location “to determine and warn the user that *the user is leaving the virtual environment*, as recited.” *Id.* at 38; *see also* Reply 20–24.

Patent Owner argues that the ’140 application supports (1) alerting the user that the user is leaving the physical environment, (2) alerting the user that the user is leaving the 3D virtual environment, (3) determining, with the WED, when the user is leaving the physical or 3D virtual environment, and (4) implicitly warning or alerting the user by adjusting binaural sound or reducing volume. PO Resp. 50–60.

c. Warning or alerting that a user is leaving an environment

We focus on the following similar limitations in the independent claims because they are dispositive: “warning the user that the user is leaving the 3D virtual environment” (claim 1) and “alerting the user that the user is leaving the environment” (claims 7 and 14). For convenience, we sometimes refer to these limitations using the shorthand “alerting” without mentioning “warning,” but our analysis likewise applies to the “warning” limitation.

One key difference between these limitations is the recitation of “3D virtual” in claim 1 and its absence in claims 7 and 14. At the institution stage, we questioned whether Petitioner had shown that claims 7–20 are unsupported because it was unclear, at that stage, what “environment” means. *See* Dec. 28, 34–35. Now it is clear, and the parties have agreed,

that “environment” encompasses both physical and virtual environments. *See supra* Section III.C.1 (construing “environment”). This implies that to establish priority, the ’140 application must support the full scope of the term “environment”—including both physical and virtual environments. *See LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed. Cir. 2005) (determining that to find support, the specification must “demonstrate that the patentee possessed the full scope of the invention recited in [a] claim,” but recognizing that a claim does not lack written description support “simply because the embodiments of the specification do not contain examples explicitly covering the full scope of the claim language”; “only enough must be included to convince a person of skill in the art that the inventor possessed the invention”).

For the reasons that follow, we conclude that the ’140 application does not support warning or alerting a user that a user is leaving a virtual environment, and thus, does not support the full scope of the claims.⁷ The ’179 patent is therefore not entitled to claim priority to the ’140 application.

(1) Leaving a physical environment

We now turn to Patent Owner’s pre-hearing argument that the ’140 application supports alerting that a user is leaving a physical environment in claims 7 and 14. *See* PO Resp. 50–52. Although Patent Owner later

⁷ For simplicity, we omit “3D” from “3D virtual environment,” which appears solely in claim 1, and use the term “virtual environment” to address each of the three independent claims together. Because “virtual environment” is a broader term, if a “virtual environment” is not supported, then a “3D virtual environment” would also be unsupported. The parties also do not impute any particular meaning to “3D” that would materially change our analysis.

conceded that “environment” is not limited to physical environments, Tr. 49:24–50:10, this argument still lays the foundation for Patent Owner’s later “virtual” environment argument. In the next section, we explain how Patent Owner extends its physical environment argument to address support for a user leaving a virtual environment. *See* PO Resp. 52–57.

Patent Owner refers, for example, to Figure 6 of the ’140 application, which we reproduce below:

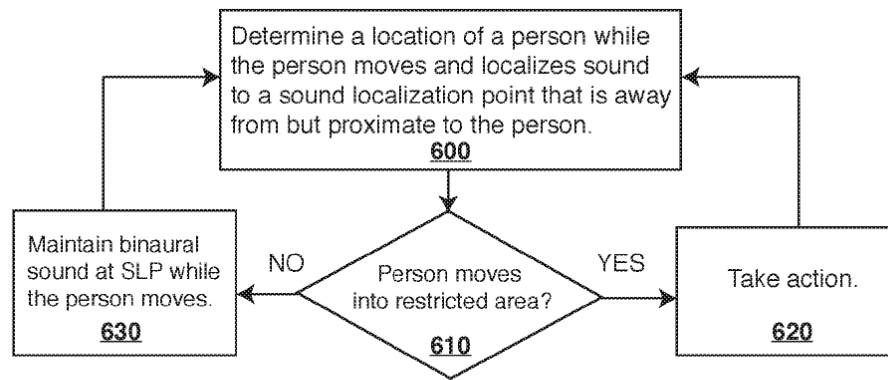


Figure 6

Id. at 51–52. Figure 6 is “a method to determine a location of a person and to take an action when the person moves into a restricted area.” Ex. 1028, 119:18–19. Patent Owner argues that this “restricted area” is a physical location and that one of the disclosed “actions” is altering binaural sound, which discloses “alerting the user that the user is leaving the physical environment.” PO Resp. 50–52.

Patent Owner refers to the following example described in the ’140 application, in which a user, Alice, leaves a non-restricted area and enters a restricted area, causing sound to change from binaural to mono:

Consider an example in which Alice wears earphones and localizes a voice of Bob in front of her during a phone call. While talking to Bob, Alice gets into her car and begins to drive. The state where Alice is located, however, prohibits drivers from localizing sound while driving a motorized vehicle. The earphones immediately stop localizing the voice of Bob and switch the call from providing Alice with binaural sound to providing Alice with mono sound.

Ex. 1028, 120:13–18; *see* PO Resp. 50–51; *see also id.* at 120:20–27 (sensor in car determines Alice is on a binaural call and instructs a handheld device to switch the call to mono). Patent Owner argues that “when the user leaves one physical environment,” such as outside the car, “and moves into another physical environment,” such as the restricted area inside the car, “the user is alerted by the change in the 3D sound.” Sur-reply 18 (citing Ex. 2012 ¶ 52); PO Resp. 52.

In Reply, Petitioner argues that Patent Owner’s initial narrow construction of “environment” as only including a “physical environment” is incorrect and insufficient to establish support. Reply 23–24. We agree. Because Patent Owner later conceded that “environment” encompasses a virtual environment, Tr. 49:24–50:10, we now turn to Patent Owner’s argument under that interpretation.⁸

(2) Leaving a virtual environment

Patent Owner raises three main contentions that the ’140 application supports leaving a virtual environment as recited in claims 1, 7, and 14. *See* PO Resp. 52–57; Sur-reply 21.

⁸ We need not opine on whether Patent Owner establishes support for alerting that a user is leaving a *physical* environment because it is sufficient to reach a decision here that Patent Owner does not show support for alerting that a user is leaving a *virtual* environment.

Patent Owner's first contention depends on its now-conceded construction for "3D virtual environment" as "three-dimensional perceived surroundings in which a user operates that incorporates a virtual image and/or sound." *See* PO Resp. 52–54. Patent Owner contends that 3D virtual sound alone is a virtual environment, so disclosure of a user leaving that sound environment in the '140 application meets the limitation. *Id.* at 53 (citing, e.g., Ex. 2012 ¶¶ 52–56). Petitioner argues that "3D virtual environment" cannot be a "sound-only environment" because the claimed 3D virtual environment "includes a *virtual image*["]. Reply 4, 20. We agree and find Patent Owner's first argument, based on its now-conceded construction, unpersuasive. *See supra* Section III.C.2.

Patent Owner's second argument is that although Figure 6's restricted area may be a physical location, other disclosure in the '140 application indicates that the restricted area "corresponds to both a physical space and a virtual space." PO Resp. 54–55 (citing Ex. 2012 ¶ 55). Patent Owner relies on the following disclosure for this assertion: "[e]xamples herein can take place in physical spaces, in computer rendered spaces (VR), in partially computer rendered spaces (AR), and in combinations thereof." *Id.* at 54 (citing Ex. 1028, 168:15–16).

Petitioner, in the Reply, argues that "this general disclosure is not sufficient to show that the inventors had possession of the specific claimed invention." Reply 22. Essentially, Petitioner argues, this "general disclosure" is boilerplate language. *Id.* Petitioner further contends that "there is no suggestion of the specific claimed combination nor that a [POSITA] would alter Figure 6 in the precise way [Patent Owner]

proposes.” *Id.* (citing Ex. 1146 ¶ 82). Petitioner adds that there is no “disclosure that 3D audio would not be permitted in a 3D virtual space.” *Id.*

Patent Owner responds that the language it relies on is not boilerplate because it is more specific than other language found by the courts to be boilerplate. Sur-reply 19 (citing, e.g., *D Three Enters., LLC v. SunModo Corp.*, 890 F.3d 1042 (Fed. Cir. 2018)). Patent Owner argues that “the language in the ’140 [a]pplication provides particular alternative environments (e.g., physical, VR, and AR) in which the examples extensively described throughout the specification can be applied.” *Id.* at 19–20.

We agree with Petitioner that the language Patent Owner relies on is insufficient to support the concept of alerting a user that the user is leaving a virtual environment. In so deciding, we need not address the parties’ contentions about boilerplate. Regardless of whether the sentence at 168:15–16 of the ’140 application is boilerplate, we agree with Petitioner that “there is no suggestion of the specific claimed combination.” Reply 22 (citing Ex. 1146 ¶ 82).

That is, if one views the “[e]xamples herein” from Figure 6 as taking place “in computer rendered spaces (VR)” or “in partially computer rendered spaces (AR),” there is still no disclosure of alerting a user that a user is leaving a virtual environment. *See* Ex. 1028, 168:15–16. For instance, if Alice in the Figure 6 example mentioned above is entering a virtual car instead of a real car, Alice is still in a virtual environment. *See id.* at 120:13–27. Thus, relying on Figure 6 to take place “in computer rendered spaces (VR)” does not support alerting that a user is *leaving* those virtual spaces. *See id.* at 168:15–16.

Petitioner also correctly identifies a problem with analogizing the Alice example to a virtual environment—namely, it would no longer make sense to give Alice an audible warning. *See* Reply 22 (citing Ex. 1146 ¶ 82). In the example, Alice’s earphones switch from binaural sound to mono sound when Alice enters a real car because “[t]he state where Alice is located . . . prohibits drivers from localizing sound while driving a motorized vehicle.” Ex. 1028, 120:15–18. But it would not make sense (nor does the ’140 application disclose) for a state to prohibit Alice to localize sound while driving a *virtual* vehicle. We therefore find compelling Petitioner’s argument, supported by the testimony of Dr. Roginska, which we credit, that there is no “disclosure that 3D audio would not be permitted in a 3D virtual space.” Reply 22 (citing Ex. 1146 ¶ 82). Accordingly, Patent Owner’s second support argument fails.⁹

Patent Owner’s final argument is that “the ’140 [a]pplication describes events related to the user’s physical and virtual environment that trigger altering binaural sound.” PO Resp. 56. Patent Owner points to the following events:

“a change in the ability to detect . . . *position in a physical or a virtual environment*”;

“cues indicating . . . a *changing in a physical or virtual environment*”; and

⁹ During the hearing, Patent Owner argued for the first time that the disclosed event “may be a user leaving one virtual space to enter another virtual space.” Tr. 58:1–2 (discussing Paper 45, slide 42, reproducing Ex. 1028, 113:13–16, which was not relied upon by Patent Owner in its papers during trial); *see also id.* at 57:19–58:5. As Patent Owner raised this argument for the first time at the hearing, it is an improper new argument, and we do not consider it. *See Dell Inc. v. Acceleron, LLC*, 884 F.3d 1364, 1369 (Fed. Cir. 2018).

“a degradation in the *visibility of a user’s physical or virtual environment.*”

Id. (citing Ex. 1028, 140:31–141:10, 141:15–20). According to Patent Owner, each of these disclosures corresponds to, among other things, “a change from a virtual to a physical environment.” *Id.* at 57 (citing Ex. 2012 ¶¶ 57–58). Degradation, for instance, includes degradation in visibility “triggered when the user leaves the 3D virtual environment,” Patent Owner argues. *Id.*

Petitioner contends that these “other general disclosures” likewise fail to establish support. Reply 22–23. We agree. The ’140 application’s disclosure of detecting a “change in” a virtual environment, and a “change in” position “in a . . . virtual environment,” do not disclose a user leaving a virtual environment. *See* Ex. 1028, 141:2–3, 141:9–10. Instead, Dr. Roginska testifies, and we agree, that a POSITA would understand the disclosed “change in . . . position in . . . a virtual environment” to encompass detecting a difference in position *within* the virtual environment, not necessarily a user *leaving* a virtual environment. *See* Ex. 1146 ¶ 85; Ex. 1028, 141:2–3. We also find unpersuasive Patent Owner’s argument that the ’140 application discloses “a change from a virtual to a physical environment” because the ’140 application does not say this. *See* PO Resp. 57. The ’140 application describes a “change in . . . a virtual environment” and a “change in . . . position *in* a physical or a virtual environment,” not a change from a virtual to a physical environment. Ex. 1028, 141:2–3, 141:9–10.

Likewise, we find unpersuasive Patent Owner’s assertion that “degradation in visibility” would be “triggered when the user leaves the 3D virtual environment” because the ’140 application does not say this either.

See PO Resp. 57. Rather, we agree with Petitioner and Dr. Roginska that this degradation in visibility discloses a “[c]hange in a user’s ability to associate visual cues or images with the associated audio cues.” Reply 23 (citing Ex. 1028, 141:15–20; Ex. 1146 ¶ 87). In other words, Dr. Roginska testifies, and we agree, that this example relates to “a change *in* the environment—not the user leaving the environment.” Ex. 1146 ¶ 87 (emphasis added); *see also id.* ¶ 86.

Patent Owner also reiterates that other disclosure in the ’140 application indicates that each of the above example events “can take place in physical spaces, in computer rendered spaces (VR), in partially computer rendered spaces (AR), and in combinations thereof.” PO Resp. 56 (citing Ex. 1028, 168:15–16). Accordingly, Patent Owner contends, a POSITA would have recognized that the disclosed change in position in a physical or virtual environment “reasonably corresponds to a change in the ability to detect position in a physical environment, a virtual environment, or both.” *Id.* (citing Ex. 2012 ¶ 55). We view this argument as essentially a rehash of Patent Owner’s argument combining the ’140 application’s VR/AR disclosure with Figure 6. That the example events may take place *in* VR or AR spaces does not teach alerting that the user is *leaving* those spaces.

Accordingly, we are not persuaded that the ’140 application supports the claimed concept of warning or alerting a user that the user is leaving the virtual environment. Thus, the ’140 application does not support the full scope of the limitations “warning the user that the user is leaving the 3D virtual environment” in claim 1 and “alerting the user that the user is leaving the environment” in claims 7 and 14. The parties have not made any additional arguments regarding support in the ’140 application for

limitations of the dependent claims. We conclude that no claim of the '179 patent is entitled to priority to the '140 application.

We need not reach the parties' other support arguments because this issue is dispositive of all claims.

d. Summary regarding '179 patent's effective filing date

For the reasons explained above, Patent Owner has not met its burden of production to show that the written description in the '140 application supports the claims, and Petitioner persuades us by a preponderance of the evidence that the '179 patent is not, in fact, entitled to priority to the '140 application. *See Technology Licensing*, 545 F.3d at 1327–28. Lyren is therefore prior art to the challenged claims.

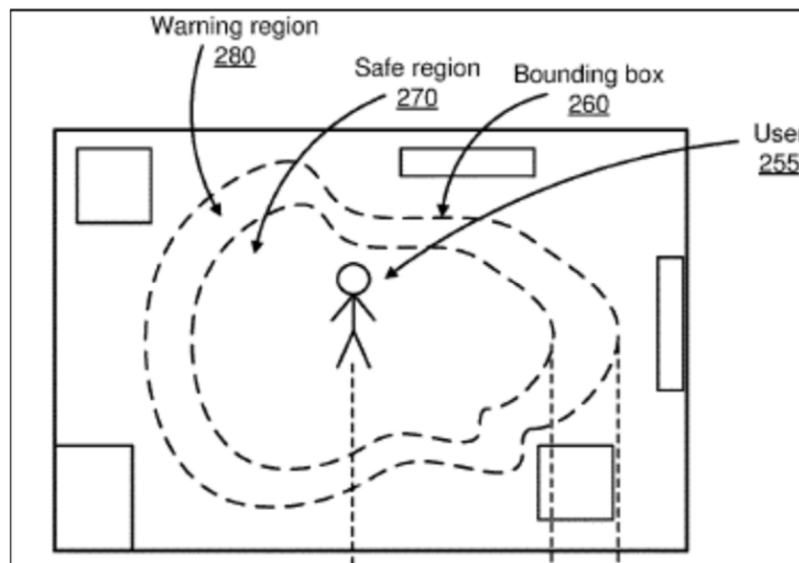
4. Independent Claims 1, 7, and 14

Petitioner asserts that the combination of Lyren and Reif discloses all the limitations of independent claims 1, 7, and 14. Pet. 45–60. Patent Owner does not dispute that any of the limitations are taught by the combination of Lyren and Reif. PO Resp. 45–62. At most, Patent Owner asserts that if the '179 patent maintains priority to the '140 application, Reif is also not valid prior art because it was filed after the '179 patent's effective priority date. *Id.* at 62. As we explain above, the '179 patent is not entitled to priority to the '140 application, so this argument is unpersuasive.

As Patent Owner concedes that the specifications of Lyren and the '179 patent are identical, *id.* at 48, we do not summarize Petitioner's arguments for the undisputed limitations mapped to Lyren. Based on our review of Petitioner's arguments and evidence, we agree with Petitioner that Lyren discloses all such limitations of independent claims 1, 7, and 14. *See* Pet. 45–60.

Although also undisputed, we address Petitioner’s mapping to Reif in more detail. We focus on the example of claim 14, but Petitioner raises similar arguments for claims 1 and 7. *See* Pet. 56–60. For instance, Petitioner concedes that Lyren does not disclose limitations 14[d] and 14[e], arguing that Lyren “does, however, teach determining when ‘a wide variety of different types of [other] events’ occur, and altering the binaural sound by . . . reducing its volume and/or switching it to stereo or mono.” *Id.* at 49 (citing Ex. 1008 ¶¶ 25, 63–97, 103). Petitioner contends that Reif discloses the missing limitations and “also explains that a [POSITA] implementing a[n] HMD or other WED for viewing a virtual environment (as in Lyren) would have included such functionality for safety reasons, i.e., to help protect users from injury by bumping or tripping over objects in the real world.” *Id.*

Petitioner refers to Reif Figure 2C,¹⁰ reproduced below:



¹⁰ Petitioner mistakenly refers to this as Fig. 2B. Pet. 50.

Id. at 49–50. Reif’s Figure 2C illustrates an example scenario involving bounding box 260, including safe region 270 and warning region 280, within which user 255 is located. Ex. 1009 ¶ 26. Petitioner quotes Reif as teaching: “when it is determined that the user is located outside the safe region of the bounding box, the VR system can modify what is presented to the user via the HMD, can warn the user, and/or can suggest that the user move back to the safe region.” Pet. 50 (citing Ex. 1009, code (57), ¶¶ 2–5, 16–19; Ex. 1003 ¶¶ 252–256).

Petitioner contends that Reif’s sensors on the user’s HMD are used to determine the user’s location in the real world, and thus the user’s location relative to the bounding box in Figure 2C. *Id.* (citing Ex. 1009 ¶ 33). Petitioner further argues that Reif discloses a warning that a user is leaving the environment, for example, by issuing an audible alert. *Id.* at 50–51 (citing Ex. 1009 ¶¶ 16–18, 36, 39; Ex. 1003 ¶ 254). For the claimed warning, Petitioner also refers to Lyren’s altering of the binaural sound by reducing its volume or switching from stereo to mono sound. *Id.* at 51 (citing Ex. 1008 ¶ 103). In particular, Petitioner contends that a POSITA “would have used these audible alerts/warnings taught in Lyren to alert the user that the user is leaving the safe zone (and thus the virtual environment), as taught by Reif, to help keep users safe.” *Id.* (citing Ex. 1003 ¶¶ 250–263).

One benefit Petitioner proposes to support a rationale to combine is that a POSITA “would have implemented this feature to help protect the users from injury by bumping, hitting, tripping over, etc., real-world objects when moving around while viewing the virtual environment in the HMD (i.e., a type of head-mounted WED).” *Id.* at 43 (citing, e.g., Ex. 1003 ¶¶ 90, 251–254). Petitioner provides additional argument and evidence supporting

a motivation to combine, with a reasonable expectation of success. *See id.* at 41–45.

We agree that, in the combination, a POSITA would have implemented Lyren’s audible alerts to alert the user that the user is leaving Reif’s safe zone (and thus the virtual environment) to help keep users safe. *Id.* at 51 (citing Ex. 1003 ¶¶ 250–263). We also agree with Petitioner’s articulated benefit that the combination would “help protect the users from injury by bumping, hitting, tripping over, etc., real-world objects when moving around while viewing the virtual environment in the HMD (i.e., a type of head-mounted WED).” *Id.* at 43.

Accordingly, we agree with Petitioner that the combination of Lyren and Reif discloses each limitation of claim 14, as well as similar limitations of claims 1 and 7, and that one of ordinary skill in the art would have combined Lyren and Reif in the manner proposed, with a reasonable expectation of success.

a. Summary as to Claims 1, 7, and 14

Petitioner has shown by a preponderance of the evidence that claims 1, 7, and 14 would have been obvious over the combination of Lyren and Reif.

5. Dependent Claims 2–6, 8–13, and 15–20

Petitioner contends that dependent claim 2–6, 8–13, and 15–20 would have been obvious over the combination of Lyren and Reif, providing detailed explanations as to how the references teach the limitations of the claims and why a person of ordinary skill in the art would have been motivated to combine the references’ teachings. Pet. 52–64. Patent Owner does not contest these contentions. Based on our review of the full trial

record and evidence, we determine that Petitioner has shown by a preponderance of the evidence that the combination of Lyren and Reif would have rendered obvious claims 2–6, 8–13, and 15–20. *See id.*

IV. MOTION TO EXCLUDE

Patent Owner’s Motion to Exclude requests exclusion of certain paragraphs of Dr. Roginska’s declarations in Exhibits 1003 and 1146. Mot. 1; Reply to Opp. 1. Some of these paragraphs support Petitioner’s challenge based on Clement, Osman, and Sauk. Mot. 2–5, 7–11. Because we do not reach Petitioner’s challenge based on Clement, Osman, and Sauk, we do not rely on the portions of Dr. Roginska’s declarations addressing Clement, Osman, and Sauk. Accordingly, we dismiss this portion of Patent Owner’s Motion to Exclude as moot.

Patent Owner also requests the exclusion of several paragraphs of Dr. Roginska’s declaration related to Petitioner’s challenge based on Lyren and Reif. *Id.* at 5–6, 11–13. For example, Patent Owner argues that “Dr. Roginska . . . mischaracterizes the disclosure in the ’179 [patent] specification and the Lyren reference.” *Id.* at 5. Patent Owner also points out allegedly “conclusory and erroneous statement[s]” by Dr. Roginska. *Id.* at 6. In addition, Patent Owner asserts that Dr. Roginska’s testimony “ignores the clear disclosure of the ’140 [a]pplication.” *Id.* at 11. Patent Owner further argues that “Dr. Roginska’s testimony fails to provide any ‘underlying facts or data’ to support her opinion.” *Id.* at 12. Lastly, Patent Owner argues that Dr. Roginska fails to consider Dr. Begault’s contrary testimony and mischaracterizes other references cited by Petitioner. *Id.* at 13–15.

Petitioner argues that “under the guise of the Federal Rules of Evidence and 37 C.F.R. § 42.62, [Patent Owner] uses its motion to circumvent its sur-reply page limits, disputing the merits, not admissibility, of Dr. Roginska’s opinions.” Opp. 1. We agree with Petitioner that Patent Owner’s objections go more to the weight that we should give Dr. Roginska’s testimony, rather than to its admissibility. *See Liquid Dynamics Corp. v. Vaughan Co.*, 449 F.3d 1209, 1221 (Fed. Cir. 2006) (“[S]uch an attack goes more to the weight of the evidence than to its admissibility.”). And we have broad discretion to assign the proper weight to declarations. *See Velander v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) (“It is within the discretion of the trier of fact to give each item of evidence such weight as it feels appropriate.”). As we explain above, we cite certain paragraphs of Dr. Roginska’s testimony in our analysis and find those portions credible. The relied upon portions of Dr. Roginska’s testimony are credibly supported by other evidence of record, including the teachings of the ’140 application. Accordingly, we deny the portion of Patent Owner’s Motion to Exclude directed to paragraphs of Dr. Roginska’s declaration related to Petitioner’s challenge over Lyren and Reif.

For the reasons given above, we dismiss in part and deny in part Patent Owner’s Motion to Exclude.

V. CONCLUSION¹¹

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 3, 4, 6–10, 14–19	103	Clement, Osman, Sauk ¹²		
1–20	103	Lyren, Reif	1–20	
Overall Outcome			1–20	

¹¹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

¹² We do not address this ground because the Lyren and Reif ground is dispositive of all claims. See *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

VI. ORDER

It is, therefore,

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1–20 of the '179 patent are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed-in-part* and *denied-in-part*; and

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

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