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Paper 32
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROSOFT CORPORATION,
Petitioner,

v.

D3D TECHNOLOGIES, INC.,
Patent Owner.

IPR2021-00647
Patent 8,384,771 B1

Before JAMESON LEE, BARBARA A. PARVIS, and SCOTT RAEVSKY, *Administrative Patent Judges*.

RAEVSKY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Microsoft Corporation ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting *inter partes* review of claims 1–21 of U.S. Patent No. 8,384,771 B1 (Ex. 1001, "the '771 patent"). D3D Technologies, Inc. ("Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp."). Based on these and other preliminary submissions, we instituted an *inter partes* review of claims 1–21. Paper 10 ("Decision" or "Dec."). Subsequent filings include a Patent Owner Response (Paper 14, "PO Resp."), a Petitioner Reply (Paper 23, "Reply"), and a Patent Owner Sur-reply (Paper 25, "Sur-reply"). An oral hearing was held on May 31, 2022, and a copy of the transcript was entered into the record. Paper 31 ("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 1–21 of the '771 patent are unpatentable. *See* 35 U.S.C. § 316(e). We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a).

II. BACKGROUND

A. Related Matters

The parties identify the following related district court litigation: *D3D Technologies, Inc. v. Microsoft Corporation*, No. 6:20-cv-01699 (M.D. Fla. Sept. 16, 2020). Pet. 95; Paper 4, 2. Patent Owner also identifies the following *inter partes* reviews of related patents: IPR2021-00648 and IPR2021-00703. Paper 4, 2. Petitioner has also filed two petitions for *inter partes* review of U.S. Patent No. 9,980,691 B2 (IPR2021-00877 and IPR2021-00878).

B. The '771 patent

The '771 patent relates to the field of medical imaging. Ex. 1001, 13. The '771 patent describes "a process for combining slices generated by medical imaging devices to create a volume of interest and then presenting this volume in a three-dimensional representation to a Head Display Unit (HDU)." *Id.* at 4:59–65. "[I]image processing techniques" can be used to "enable the user to rotate and view the volume of interest from alternative viewpoints; to enable tissue subtraction to facilitate unobstructed viewing of a region of interest; to identify differing tissues with color schematics; and to zoom in for optimal viewing." *Id.* at 4:65–5:3.

Figure 1 depicts a system that can perform this process:

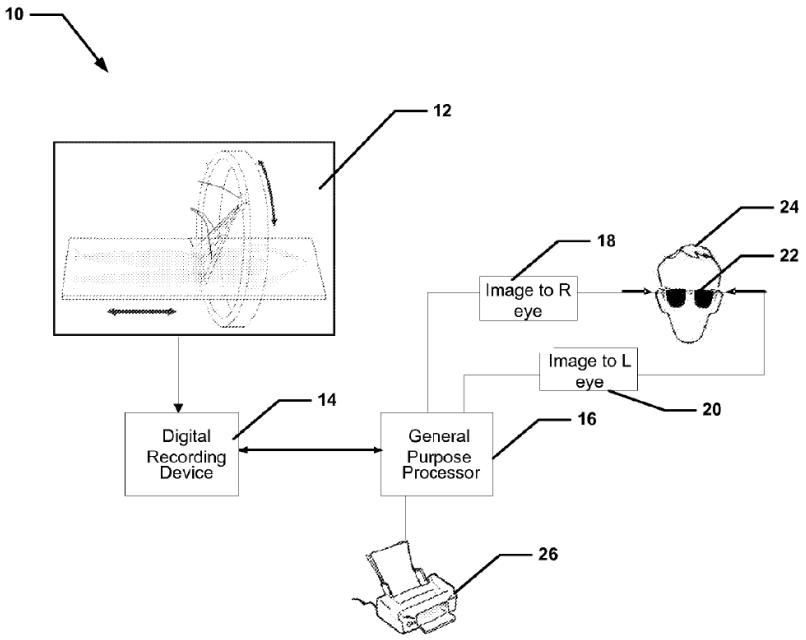


FIGURE 1

Id. at 4:29–31. In Figure 1, imaging device 12 is in communication with digital recording device 14, which records slices of imagery. *Id.* at 5:5–9. Processor 16 generates an image for the right eye 18 and an image for the

left eye 20. *Id.* at 5:19–20. The images are sent to head display 22 as a volumetric mass so that the image seen by the right and left eyes is the volume of interest selected by the user. *Id.* at 5:27–34.

The '771 patent also describes a process for filtering an image. *Id.* at 9:60–10:17. In this process, a user selects tissues to be filtered from an image, and software eliminates the selected tissue from the displayed volume of interest. *Id.* at 9:60–10:11.

C. Challenged Claims

Petitioner challenges claims 1–21 of the '771 patent. Claim 1 is illustrative:[1]

> 1. A method of three-dimensional viewing of images by a user comprising:
>
> [a] selecting a volume of interest from a collection of image slices;
>
> [b] arranging said slices corresponding to said volume of interest;
>
> [c] selecting an initial viewing angle of said slices;
>
> [d] selecting a first viewpoint for a left eye;
>
> [e] selecting a second viewpoint for a right eye, wherein said first viewpoint and said second viewpoint are different viewpoints;
>
> [f] displaying, in a head display unit (HDU), a first image for said left eye based on said initial viewing angle, said first viewpoint for said left eye and said volume of interest;
>
> [g] displaying, in said HDU, a second image for said right eye based on said initial viewing angle, said second viewpoint for said right eye, and said volume of interest and wherein said first image for said left eye and said second

[1] For convenience, we use Petitioner's element labeling. *See* Pet. v–vi.

image for said right eye produce a three-dimensional image to said user; and

[h] selecting items of said image to be filtered, wherein said selecting items of said image to be filtered comprises:

[i] selecting items of said image to be subtracted from said image to produce a filtered image;

[j] displaying, in said HDU, a filtered image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest; and

[k] displaying, in said HDU, a filtered image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said filtered image for said left eye and said filtered image for said right eye produce a filtered three-dimensional image to said user.

D. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. 1–2), supported by the declarations of Dr. Michael Zyda (Exs. 1003, 1035):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–21	102(b) and/or 103(a)[2]	Schoolman[3]
2	103(a)	Schoolman, Bauch[4]

[2] 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. Because the challenged patent was filed before March 16, 2013, we refer to the pre-AIA version of §§ 102, 103.

[3] U.S. Patent No. 5,488,952 to Schoolman ("Schoolman") (Ex. 1005).

[4] U.S. Pub. No. 2002/0183607 A1 to Bauch et al. ("Bauch") (Ex. 1007).

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–21	102(e) and/or 103(a)	Murphy[5]
2	103(a)	Murphy, Bauch

III. ANALYSIS

A. Principles of Law

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).

To show anticipation under 35 U.S.C. § 102, each and every claim element, arranged as in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359 (Fed. Cir. 2008). The prior art need not, however, use the same words as the claims. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009). The anticipation inquiry takes into account the literal teachings of the prior art reference, and inferences the ordinarily skilled person would draw from it. *Eli Lilly and Co. v. Los Angeles Biomedical Res. Inst. at Harbor-UCLA Med. Ctr.*, 849 F.3d 1073, 1074–75 (Fed. Cir. 2017). Thus, "a reference can anticipate a claim even if it does not expressly spell out all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would at once envisage the claimed arrangement or combination." *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (internal quotation marks omitted).

[5] WIPO No. WO 2007/059477 A2 to Murphy et al. ("Murphy") (Ex. 1010).

A claim is unpatentable as obvious if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). 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) any secondary considerations or objective evidence of nonobviousness.[6] *See Graham v. John Deere Co.*, 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] person of ordinary skill in the art . . . (a "POSITA") would have had at least a Bachelor's degree in an academic area emphasizing electrical engineering, computer science, or a similar discipline, and at least two years of experience in the field working with, teaching, or researching stereoscopic and/or virtual/augmented reality (VR/AR) display technologies. . . . Superior education could compensate for a deficiency in work experience, and vice-versa.

Pet. 6 (citing Ex. 1003 ¶¶ 15–16).

Patent Owner "mostly agrees with this position, but like the Board believes that the use of the term 'at least' is inappropriate inasmuch as it

[6] Patent Owner has not submitted any objective evidence of nonobviousness.

would extend to persons having more than ordinary skill." PO Resp. 18. We are persuaded that Petitioner's proposal is consistent with the problems and solutions in the '771 patent and prior art of record. We adopt Petitioner's definition of the level of skill but delete the two qualifiers "at least" to keep the articulation from extending to the realm of an expert.

C. Claim Construction

In *inter partes* review, we construe claims using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2020).

At the Petition stage, Petitioner asserted that no terms required express construction. Pet. 5. Patent Owner, in its Preliminary Response, disagreed, proposing constructions for two terms: "volume" and "volume of interest." Prelim. Resp. 14–15. In our Institution Decision, we preliminarily construed "volume" and one additional term in dispute: "subtracted." Dec. 15–19. In the post-institution briefing, the parties now agree that "volume" means "three-dimensional pixels" and focus their dispute on the term "subtracted." PO Resp. 19–23; Reply 2–6; Sur-reply 4–8. For reasons stated in our Institution Decision, we agree with the parties that "volume" means "three-dimensional pixels." Dec. 15–17. We now construe "subtracted."

1. "subtracted"

a. Our Institution Decision

In our Decision, we noted that each of the independent claims recites "selecting items of said image to be subtracted from said image to produce a filtered image." Dec. 17 (citing Ex. 1001, 16:37–38, 17:56–57, 19:24–25). We noted that the Specification does not define "subtracted" but identified the following relevant passage, which describes the concept of subtraction:

> Method 500 begins with processing block 502 which recites selecting items of the image to be *subtracted* from the image to produce a filtered image. The user selects the tissues to be filtered. Several filtering processes are possible, including by composition (e.g. Houndsfeld unit or signal intensity) or position (x, y, z) of the tissue.

Id. at 17–18 (citing Ex. 1001, 9:60–67 (emphasis added)). We stated that this passage appears to equate subtracting from an image with filtering an image. *Id.* at 18. We further noted that the Specification discloses "[s]everal filtering processes [that] are possible" to effect subtraction. *Id.* Thus, we viewed the Specification as using "subtracted" expansively. *Id.*

We preliminarily adopted the following construction of "subtracted" based on a dictionary definition that comported with the broad Specification embodiments: "withdrawn or taken away, as a part from a whole." *Id.* at 18–19 (citing Ex. 3001, 1).

b. The parties' post-institution arguments

Patent Owner contends that "subtracted" means "eliminated from the volume of interest." PO Resp. 21 (citing Ex. 1001, 10:9–11; Ex. 2020 ¶ 48). In Patent Owner's view, subtraction represents "actual elimination of data (voxels) from the underlying three-dimensional model from which the images are created." *Id.* Patent Owner relies on the following statement

from the Specification: "Software reviews each element of tissue throughout the volume, selects tissue to be filtered and eliminates the selected tissue from the volume of interest." *Id.* (citing Ex. 1001, 10:9–11).

For example, Patent Owner contends, in the Specification's "so-called histogram method of filtering, 'the user [can] select which tissues to be eliminate from the observed volume.'" *Id.* at 21–22 (citing Ex. 1001, 14:15–16; Ex. 2019, 25:8–31:1). Pointing to another Specification example, Patent Owner asserts that

> in a Geometric Boundary method, '[c]omplex boundaries [can] be created to eliminate particular shapes at direction of the user [and f]or multiple voxels with the same theta and alpha, . . . this technique [is used] to determine which voxel and its associated H. unit to place in the HDU.

Id. at 22 (citing Ex. 1001, 14:18–26; Ex. 2019, 31:2–22). Thus, Patent Owner concludes, "subtraction is not merely concerned with the displaying operation but actual[] elimination of information from the selected volume of interest ('the observed volume')." *Id.* (citing Ex. 1001, 10:9–11, 14:15–16; Ex. 2020 ¶ 48).

Petitioner disputes Patent Owner's construction and agrees with our institution construction. Reply 2–6; Tr. 14:3–17 ("So we think our view is fully compatible and consistent with what was laid out in the Institution Decision."). Petitioner disagrees that "subtracted" requires elimination of underlying data because the plain claim language requires selected items to be "subtracted ***from said image to produce a filtered image***," and thus, subtraction is "applied ***to the image***." Reply 4 (citing Ex. 1035 ¶ 8). In addition, Petitioner views Patent Owner as "extracting isolated statements from the specification." *Id.* Petitioner echoes our Institution Decision, agreeing that the '771 patent uses "subtracted" more expansively, "including

'filtering' an image, 'eliminating' selected tissue, and 'ignoring' certain voxels." *Id.* (citing Dec. 18; Ex. 1001, 9:60–67, 10:9–11, 13:15–18). Not only that, but Petitioner views Patent Owner's position to be "inconsistent with its own specification" because "[w]ere the underlying data deleted, . . . there would be nothing left to be 'ignored' or 'filtered.'" *Id.* (citing Ex. 1035 ¶ 7). Finally, Petitioner asserts that during prosecution, "Patent Owner clarified that subtraction requires 'selecting items of an image to be filtered by subtracting them from an image.'" *Id.* at 5 (citing Ex. 1002, 236).

In the Sur-reply, Patent Owner asserts that its construction is "well-grounded in the specification" because the '771 patent explains that "subtraction" is "actual elimination of data (voxels) from the underlying three-dimensional model from which images are created." Sur-reply 5 (citing Ex. 1001, 10:9–11, 14:15–16). Patent Owner further asserts that Petitioner's interpretation of "subtracted" relies on an incorrect view that the claimed three-dimensional image is an image displayed on a display. *Id.* at 5–6. The three-dimensional image does not occur on a display, Patent Owner argues, but rather only in the viewer's mind. *Id.* at 6 (citing Ex. 1001, 6:4–7). Patent Owner argues that the Specification supports this view by teaching, "Each eye will see the image from a different angle. The brain will interpret the left eye viewing angle's image and the right eyes' viewing angle image together to give depth perception. Thus, a three-dimensional image will be seen." *Id.* (citing Ex. 1001, 6:4–7). Moreover, Patent Owner argues, the Specification explains that "it is the 'volume of interest' from which selected items are removed." *Id.* at 7 (citing Ex. 1001,

10:12–17 ("After viewing the volume of interest with the tissue selected having been removed . . . .")).

c. Analysis

We begin with the claim language. *See Allergan Sales, LLC v. Sandoz, Inc.*, 935 F.3d 1370, 1373 (Fed. Cir. 2019) ("[C]laim construction must begin with the words of the claims themselves.") (quoting *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 457 F.3d 1293, 1301 (Fed. Cir. 2006)). Claim 1 recites in part:

> [h] selecting items of said image to be filtered, wherein said selecting items of said image to be filtered comprises:
>
> > [i] selecting items of said image to be subtracted from said image to produce a filtered image[.]

As Petitioner correctly points out, the claim requires "selecting items of said image to be subtracted ***from said image*** to produce a filtered image," or in other words, "the subtraction is being applied ***to the image***." Reply 4 (citing Ex. 1035 ¶ 8) (emphasis changed). Nothing in the claim explicitly requires "actual elimination of data (voxels) from the underlying three-dimensional model from which the images are created," as Patent Owner urges. *See* PO Resp. 21. To the contrary, the plain claim language states that it is the *image* that is filtered. Thus, absent some definition or disclaimer in the intrinsic record (whether explicit or implicit), there is no requirement to eliminate underlying data. *See Trustees of Columbia University v. Symantec*, 811 F.3d 1359, 1363–64 (Fed. Cir. 2016).

There is no such definition or disclaimer in the Specification. Rather, Patent Owner relies only on embodiments and examples in the Specification to support its construction. For instance, the main statement upon which Patent Owner relies is, "Software reviews each element of tissue throughout

the volume, selects tissue to be filtered and eliminates the selected tissue from the volume of interest." PO Resp. 21 (citing Ex. 1001, 10:9–11). But this statement occurs in a section of the '771 patent describing "a particular embodiment of a method 500 for filtering an image." Ex. 1001, 9:60–61, 10:9–11. Patent Owner also relies on the Specification's "histogram method of filtering" and "Geometric Boundary method," but the '771 patent describes these as "two example methods." PO Resp. 21–22; Ex. 1001, 13:66–14:23.

It is axiomatic that we must not "import into a claim limitations that are not a part of the claim." *See SuperGuide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004); *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1346–47 (Fed. Cir. 2015) ("This court has repeatedly cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification." (internal quotation omitted)). Thus, "a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment." *SuperGuide*, 358 F.3d at 875.

Patent Owner does not give any explanation why these embodiments and examples should be limiting, only saying that they are so. *See* PO Resp. 21–23. Not only that, but closer inspection of the Specification language Patent Owner relies on completely undermines Patent Owner's argument. One statement upon which Patent Owner relies is, "Software reviews each element of tissue throughout the volume, selects tissue to be filtered and eliminates the selected tissue from the volume of interest." *Id.* at 21 (citing Ex. 1001, 10:9–11). Another statement that Patent Owner draws to our attention is, "the user could select which tissues to eliminate from the

observed volume." Ex. 1001, 14:15–16. Neither of these statements mentions deleting underlying data. Rather, each statement refers to eliminating displayed "*tissue*." It takes a logical leap to suggest that eliminating displayed tissue means eliminating the data underlying the displayed tissue. This is particularly evident because the preceding Specification passage refers to eliminating tissues from the "observed" volume, i.e., from an image. *Id.* Thus, even if the statements Patent Owner relies on were somehow not merely describing a preferred embodiment, they do not convey the meaning Patent Owner reads into them.

There are also contrary examples in the Specification that suggest a broader interpretation of "subtracted." For instance, when describing "filtering an image" by "selecting items of the image to be subtracted," the Specification broadly contemplates that "[s]everal filtering processes are possible." *Id.* at 9:60–65. These processes "includ[e] by composition (e.g. Houndsfeld unit or signal intensity) or position (x, y, z) of the tissue." *Id.* at 9:65–67. Elsewhere, the Specification refers to an example of ignoring, not deleting, data: "In order to display only the bones, one method would be to *ignore* all voxels with H. units less than 500 and display all voxels with H. unit of greater than 500." *Id.* at 13:15–18 (emphasis added). Similarly, the Specification describes a Geometric boundary method (upon which Patent Owner relies), that creates a "surface representation" that changes grayscale values, rather than deleting data. *Id.* at 14:18–39; *see also id.* at 14:35–39 ("If only the bones were chosen to be displayed, the grayscale used could be either black or white (i.e., for Hounsfeld unit<500, use 0 (black) and for H. unit>500 use 1 (white))."). Thus, even if "eliminates the selected tissue from the volume of interest" means deleting underlying data (which it does

not), because the '771 patent discloses multiple filtering processes, we cannot limit the claimed "subtracted" to deletion of underlying data. *See id.* at 10:11.

We view as irrelevant Patent Owner's assertion that the claimed three-dimensional image does not occur on a display but only in the viewer's mind. *See* Sur-reply 6–7 (citing Ex. 1001, 6:4–7). The assertion that the underlying data must be deleted does not follow from the '771 patent's disclosure that the brain will interpret the left and right eye images to give depth perception. *See* Ex. 1001, 6:4–7. Patent Owner supplies no explanation for why the brain's perception of three-dimensional images has anything to do with how the filtering operation takes place, and we can find no explanation in the intrinsic evidence that supports Patent Owner's position. *See* Sur-reply 6–7.

Turning to the extrinsic evidence, we agree with Dr. Zyda's testimony that "if the underlying data had to be deleted each time, as Patent Owner suggests, there would be no need to 'ignore' voxels or 'filter' the image as per the '771 patent; thus, Patent Owner's proposed construction is inconsistent with the actual specification of the '771 patent." Ex. 1035 ¶ 7. As we explained above, the '771 patent discloses "ignoring" voxels as an embodiment that Patent Owner does not persuasively account for. *See* Ex. 1001, 13:15–18. We also agree with Dr. Zyda, for reasons discussed in detail above, that

> the claims make it clear that the subtraction process is being applied ***to the image*** in order to produce a ***filtered image***. This clear language is at odds with the position advanced by Patent Owner and Dr. Bajaj under which subtraction somehow involves "actual elimination of data (voxels) from the

> underlying three dimensional model from which the images are created.

Ex. 1035 ¶ 8.

We further find persuasive Dr. Zyda's opinion that "[n]ot only would such "subtraction" be inconsistent with the claim language, it would be inconsistent with a POSITA's desire to quickly and efficiently manipulate 3D images in real time by, for instance, repeatedly removing and re-adding different tissue sections." *Id.* (citing Ex. 1001[7], 10:12–17). We find Dr. Zyda's testimony more credible than Dr. Bajaj's, as Dr. Bajaj was unable to supply a credible answer for where the patent describes reloading deleted volume data from an archive. *See* Ex. 1036, 31:12–44:10. Instead, Dr. Bajaj relied on the '771 patent's generic disclosure that "the user can then select additional tissues for removal . . . or to be re-added." *See id.* at 32:12, 43:7; Ex. 1001, 10:12–17. But, as the previously quoted sentence explains, the disclosure of "removal" or "re-added" refers to displayed *tissues*, not the underlying data. Ex. 1001, 10:12–17. As the '771 patent lacks *any* discussion of deleting underlying data and reloading such data from an archive, we credit Dr. Zyda's testimony that a POSITA would not have done so in order to more "quickly and efficiently manipulate 3D images in real time." Ex. 1035 ¶ 8.

Because the intrinsic record does not define the term "subtracted," we look to a dictionary definition for clarification. *See* Dec. 18–19; *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1377 (Fed. Cir. 2014) (finding that where the patents' specification did not use a term restrictively, a

[7] Dr. Zyda omits "1001" here as a typo, but he is plainly referring to Ex. 1001.

"broader dictionary definition . . . is preferable").[8] Neither party supplies any dictionary definitions, but we relied on a dictionary definition at institution. Dec. 18–19 (citing Ex. 3001). That dictionary defines "subtract" as "to withdraw or take away, as a part from a whole." Ex. 3001, 1 (Dictionary.com (2006)). This definition encompasses the '771 patent's embodiments because the disclosed "filtering," "ignoring," and "eliminat[ing] [tissue] from the observed volume" withdraw from view those previously visible parts of the observed volume. *See* Ex. 1001, 9:60–67, 13:15–18, 14:15–16, 35–39. We therefore maintain our institution construction of "subtracted" as "withdrawn or taken away, as a part from a whole."

2. Remaining terms

Based on our review of the record, no other terms require construction. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms that are in controversy, and only to the extent necessary to resolve the controversy.") (internal quotation omitted).

D. Asserted Anticipation by and Obviousness over Murphy

Petitioner contends that claims 1–21 are anticipated by or would have been obvious over Murphy. Pet. 53–87. For the reasons that follow,

[8] We also find Petitioner's citation to the prosecution history unilluminating. Reply 5–6. Petitioner asserts that during prosecution, "Patent Owner clarified that subtraction requires 'selecting items of an image to be filtered by subtracting them from an image.'" *Id.* at 5 (citing Ex. 1002, 236). But Patent Owner's prosecution argument largely parrots the claim language and therefore does not shed further light on the meaning of "subtracted."

Petitioner has proven by a preponderance of the evidence that claim 1 is anticipated by and would have been obvious over Murphy.

Because this ground is dispositive of all the claims, we do not reach Petitioner's remaining grounds. *See Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. Apr. 30, 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").

1. Overview of Murphy

Murphy describes "a stereoscopic display system" that can display "data representing human anatomy" in a virtual environment. Ex. 1010 ¶¶ 15–16. Murphy's system can "create complete, anatomically detailed, three-dimensional representations of the normal male and female human bodies" based on data obtained from medical imaging. *Id.* ¶ 33. A displayed user interface can allow rotation, translation, and alterations to the displayed virtual patient. *Id.* ¶ 41. For example, a user can select a part of a virtual patient to display by selecting any part or sub-part of the virtual patient. *Id.*

2. Independent Claim 1

a. Undisputed limitations

Petitioner contends that Murphy discloses the preamble and limitations 1[a]–1[h], 1[j], and 1[k]. Pet. 53–87. Patent Owner does not dispute these contentions. *See generally* PO Resp. Petitioner supports its arguments with specific citations to Murphy and Dr. Zyda's declaration. Pet. 53–87 (citing Ex. 1010, *passim*; Ex. 1003 ¶¶ 166–183, 185, 186). Based

on our review of the entire record, we agree with Petitioner that Murphy discloses the preamble and limitations 1[a]–1[h], 1[j], and 1[k]. *Cf. LG Elecs., Inc. v. Conversant Wireless Licensing S.A.R.L.*, 759 F. App'x 917, 925 (Fed. Cir. 2019) (nonprecedential) ("The Board is not required to address undisputed matters or arguments about limitations with which it was never presented.") (internal quotation omitted). We need not determine whether the preamble is limiting because even if it were, we determine that Petitioner has shown that Murphy discloses it.

b. 1[i] selecting items of said image to be subtracted from said image to produce a filtered image

Petitioner contends that Murphy discloses this limitation by teaching filtering out selected items by completely removing them from an image. Pet. 66. According to Petitioner, Murphy does this by either hiding, cutting away, or making the items completely transparent. *Id.* (citing, e.g., Ex. 1010 ¶¶ 32, 44, 57; Ex. 1003 ¶ 184). One of ordinary skill in the art, Petitioner argues, "would have recognized and/or found it obvious that selecting items of the image to be hidden, cut away, or otherwise made transparent corresponds to subtracting the selected items from the image to produce a filtered image in which the subtracted regions are no longer visible." *Id.* (citing Ex. 1003 ¶ 184).

Patent Owner argues that Murphy's disclosure of "[r]emoval [of] an item from a displayed image is not eliminating the item from the volume of interest." PO Resp. 46 (citing Ex. 2020 ¶ 69). For example, Patent Owner contends that Murphy's opacity component, or making something hidden or transparent, can be accomplished by forcing the opacity component to zero. *Id.* at 47 (citing Ex. 1010 ¶ 45). That is, Patent Owner asserts, "the desired

effect can be achieved simply through pixel property manipulation, which involves no elimination of anything from the volume of interest." *Id.* (citing Ex. 2020 ¶ 70). Patent Owner also attacks Dr. Zyda's testimony as conclusory and duplicative of the Petition. *Id.* at 47–48.

We agree with Petitioner. Patent Owner's arguments rely on a claim construction that we have not adopted. As we explained above, we construe "subtracted" to mean "withdrawn or taken away, as a part from a whole." Petitioner relies on Murphy's "ability to [h]ide and show each anatomical feature" (Ex. 1010 ¶ 32); "arbitrarily-chosen regions of the Virtual Patient can be made transparent" (*id.* ¶ 44); and "they can cut away sections arbitrarily with cutting planes, spheres, etc." (*id.* ¶ 57). Pet. 66. Murphy's hiding, cutting away, and making items completely transparent teaches withdrawing or taking away items from an image. *See* Ex. 1003 ¶ 184. We credit Dr. Zyda's testimony that "[one of ordinary skill in the art] would have understood that selecting items of the image to be hidden, cut away, or otherwise made transparent corresponds to subtracting the selected items from the image to produce a filtered image." *Id., cited in* Pet. 66. Contrary to Patent Owner's assertions, we do not view Dr. Zyda's testimony as defective because Murphy's teachings corroborate Dr. Zyda's testimony under our construction of "subtracted." *Compare id., with* Ex. 1010 ¶¶ 32, 44, 57.

Accordingly, Petitioner has persuasively shown that Murphy discloses limitation 1[i]. We also agree with Petitioner's contention, as supported by Dr. Zyda's testimony, that a POSITA would have recognized and/or found it obvious that selecting items of the image to be hidden, cut away, or

otherwise made transparent corresponds to the claimed subtracting. Pet. 66 (citing Ex. 1003 ¶ 184).

c. Summary as to Claim 1

For the reasons stated above, we find that Petitioner has proven by a preponderance of the evidence that claim 1 is anticipated by and would have been obvious over Murphy.

3. Independent Claims 8 and 15

Petitioner asserts that independent claims 8 and 15 are similar to claim 1 and identifies pertinent differences. Pet. 75–78, 80–86. Petitioner's detailed analysis explaining where Murphy teaches or suggests the limitations in these claims is similar to the analysis discussed above with respect to claim 1. *Id.* Patent Owner relies on the same arguments for claims 8 and 15 as it does for claim 1. *See* PO Resp. 49. For the reasons discussed above with respect to claim 1, we determine that Petitioner has proven by a preponderance of the evidence that claims 8 and 15 are anticipated by and would have been obvious over Murphy.

4. Dependent Claims 2–5, 9–12, and 16–19

Petitioner contends that dependent claims 2–5, 9–12, and 16–19 are unpatentable as anticipated or obvious over Murphy. Pet. 67–75, 78–80, 86–87. Petitioner provides a detailed analysis explaining where Murphy discloses the limitations in dependent claims 2–5, 9–12, and 16–19. *Id.* Patent Owner does not offer separate arguments for these claims or contest Petitioner's analysis. *See generally* PO Resp. We agree with all of Petitioner's assertions for dependent claims 2–5, 9–12, and 16–19, regarding both anticipation and obviousness. For the reasons discussed above, we determine that Petitioner has shown by a preponderance of the evidence that

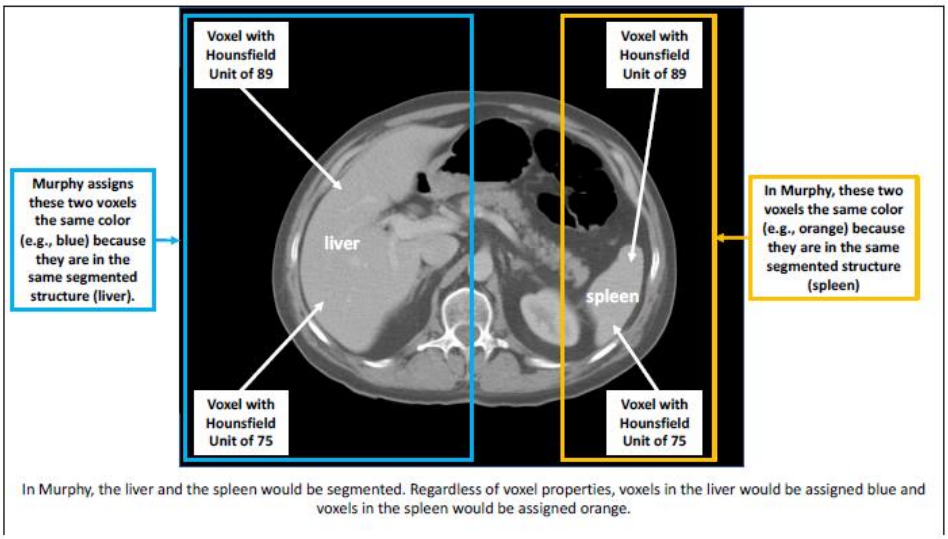
claims 2–5, 9–12, and 16–19 is anticipated by and would have been obvious over Murphy.

5. Dependent Claims 6, 13, 20

Patent Owner contends that Murphy fails to disclose the following recitation of claim 6 and similar recitations in claims 13 and 20: "sorting voxels of said items by a property of said voxel; [and] applying colors to groups of sorted voxels to obtain a colored image." PO Resp. 50. In particular, Patent Owner asserts that "Murphy does not teach or suggest such sorting or application of color." *Id.* (citing Ex. 2020 ¶¶ 72–74).

Patent Owner views Murphy's color assignment to be "based on anatomical features, not voxels sorted according to their properties." *Id.* (citing Ex. 2020 ¶ 73; Ex. 1010 ¶ 32). According to Patent Owner, it is Murphy's segmentation algorithms that are used to differentiate skin, bone, and other anatomical features, and "[t]his differentiation is what allows for different colors to be assigned to different anatomical features." *Id.* (citing Ex. 1010 ¶ 32).

Patent Owner argues that voxels in the same anatomical structure in Murphy would be assigned the same color, as shown in the following illustration by Dr. Bajaj:



Id. at 51 (citing Ex. 2020 ¶ 73). In the above image, voxels of a spleen and liver are shown, with an orange box around the spleen voxels and a blue box around the liver voxels. *Id.* Patent Owner asserts that in Murphy, the spleen voxels would be assigned one color (e.g., orange) and the liver voxels would be assigned another color (e.g., blue) because "[t]his is what coloring based on anatomical features entails." *Id.* The claimed color assignment process differs from Murphy's process, Patent Owner argues, because in the claims, "voxels are sorted by their properties and colored accordingly." *Id.* at 52. For example, Patent Owner explains, spleen voxels with different Hounsfield values would be assigned different colors even though they are of the same anatomical feature. *Id.* (citing Ex. 2020 ¶ 71).

Petitioner responds that Murphy teaches, "all voxels that are inside the desired segment fall on one side of the threshold value, and all voxels that are outside the desired segment fall on the other side of the threshold value." Reply 21 (citing Ex. 1010 ¶ 42; Pet. 72; Ex. 1003 ¶¶ 199–200). "In other words," Petitioner argues, "it is the threshold values, not some arbitrary outline of segments, that results in different colors being assigned to the

various voxels in Murphy." *Id.* (citing Ex. 1035 ¶ 35). Thus, Petitioner contends, "Murphy discloses sorting voxels and applying colors according to 'a property of said voxel.'" *Id.* (citing Ex. 1035 ¶ 35).

In the Sur-reply, Patent Owner responds that Murphy's thresholding "is not the basis on which color assignment is made, [but] rather it is used in the segmentation process." Sur-reply 16 (citing Ex. 1010 ¶ 42). And Patent Owner asserts that the Reply ignores that Murphy's color assignment is based on anatomical features, not voxels sorted according to their properties. *Id.* (citing Ex. 1010 ¶ 32).

Petitioner has the better argument. Patent Owner reads too much into the word "property." Murphy discloses performing image segmentation by "creating new segment volumes" in which "all voxels that are inside the desired segment fall on one side of the threshold value, and all voxels that are outside the desired segment fall on the other side of the threshold value." Ex. 1010 ¶ 42. We find that the values of these voxels (which are compared with a threshold) are properties of the voxels. *See* Ex. 1035 ¶ 35 ("[I]t is the threshold values . . . that result[] in different colors being assigned to the various voxels in Murphy."). Murphy's teaching that the voxel values are compared with a threshold to assign the voxels to a segment therefore teaches claim 6's "sorting voxels of said items by a property of said voxel." *See id.*

We further agree with Petitioner that Murphy discloses claim 6's "applying colors to groups of sorted voxels to obtain a colored image." Pet. 72; Reply 21. Murphy describes "volume rendering" that involves "the forming of an RGBA volume from the data," which is a "3D dataset with 4 vectors *in each voxel*, namely, the red, green, blue and opacity values."

Ex. 1010 ¶ 45. As Murphy renders color for "each voxel," which therefore includes those voxels in segment volumes, Murphy discloses "applying colors to groups of sorted voxels to obtain a colored image." *Id.*; Ex. 1003 ¶ 201; Ex. 1035 ¶ 35. Thus, we agree with Petitioner's assertions for dependent claims 6, 13, and 20, regarding both anticipation and obviousness.

Accordingly, Petitioner has shown by a preponderance of the evidence that Murphy anticipated or would have rendered obvious claim 6 and similar claims 13 and 20.

6. Dependent Claims 7, 14, 21

Patent Owner contends that Murphy fails to disclose claim 7's "zooming in on a portion of [an] image" by selecting new left eye and right eye viewpoints, and displaying left eye and right eye images based on an initial viewing angle, the new left eye/right eye viewpoints, and the volume of interest, as well as similar limitations in claims 14 and 21. PO Resp. 54. Patent Owner argues that Murphy discloses "conventional enlargement," which the '771 patent describes as replicating pixels "in both the x and y directions," resulting in an "area of interest [that] is proportionally large but some of the volume may no longer be visible." *Id.* at 54–55 (quoting Ex 1001, 11:21–27). In contrast, Patent Owner asserts, the claims require that "the viewpoints [are moved] closer to the volume of interest, thus reducing the totality of the volume observed, but enlarging the area that is actually being observed." *Id.* at 55 (quoting Ex. 1001, 11:32–35). Dr. Bajaj testifies that Murphy's zoom does not entail altering the left eye or right eye viewpoints, "so Murphy cannot be said to teach or suggest the zooming recited in claims 7, 14, and 21." *Id.* (citing Ex. 2020 ¶ 78).

Petitioner responds that Patent Owner fails to rebut or even address Dr. Zyda's explanation that "[a] POSITA would have also understood that being able to free move the 3D image as in Murphy includes moving toward (or away from) a volume of interest, namely decreasing (or increasing) the distance between the 3D volume and the user's viewpoint." Reply 22 (citing Ex. 1003 ¶ 206). According to Petitioner, Dr. Zyda further testified that "decreasing the distance between the 3D volume and the user's viewpoint corresponds to a selection of new viewpoints for each of the user's eyes in which the image is enlarged as viewed by the user." *Id.* (citing Ex. 1003 ¶ 206; Ex. 1009, 4:56–5:29). Thus, Petitioner concludes, "the type of zoom contemplated by Petitioner includes moving closer to the volume of interest to enlarge the area of interest." *Id.* at 22–23 (citing Ex. 1035 ¶ 37). Patent Owner does not address these arguments in the Sur-reply.

Petitioner persuades us that one of ordinary skill in the art would have understood that Murphy discloses the limitations of claim 7. Murphy discloses that "viewers can select pre-defined views, they can move and rotate the Virtual Patient in any direction or angle, [and] they can zoom in to view particular features in detail." Ex. 1010 ¶ 57. Dr. Zyda credibly explains that "[a] POSITA would have also understood that being able to free move the 3D image as in Murphy includes moving toward (or away from) a volume of interest, namely decreasing (or increasing) the distance between the 3D volume and the user's viewpoint." Ex. 1003 ¶ 206 (citing Ex. 1009, 4:56–5:29). We further credit Dr. Zyda's testimony that "decreasing the distance between the 3D volume and the user's viewpoint corresponds to a selection of new viewpoints for each of the user's eyes in which the image is enlarged as viewed by the user." *Id.*

Patent Owner, in contrast, asks us to import limitations into the claim from the Specification. This we cannot do. Patent Owner argues that the claims require that "the viewpoints [are moved] closer to the volume of interest, thus reducing the totality of the volume observed, but enlarging the area that is actually being observed." PO Resp. 55 (citing Ex. 1001, 11:32–35). But claim 7 recites none of these things. Claim 7 does not recite that "the viewpoints [are moved] closer to the volume of interest," but rather recites, "selecting a new viewpoint for a left eye" and "selecting a new viewpoint for a right eye." Claim 7 also does not recite "reducing the totality of the volume observed" or "enlarging the area that is actually observed." Claim 7 merely recites displaying images for the left and right eyes based on, among other things, the new viewpoints for the left and right eyes. Ex. 1001, 17:22–29.

Our reviewing court has explained, "each claim does not necessarily cover every feature disclosed in the specification," and "it is improper to limit the claim to other, unclaimed features." *Ventana Med. Sys., Inc. v. BioGenex Labs., Inc.*, 473 F.3d 1173, 1181 (Fed. Cir. 2006). Furthermore, our reviewing court "has repeatedly cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification." *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1346–47 (Fed. Cir. 2015); *SuperGuide Corp. v. DirecTVEnters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (noting that "it is important not to import into a claim limitations that are not a part of the claim"). "[I]t is the *claims*, not the written description, which define the scope of the patent right." *Williamson*, 792 F.3d at 1346–47; *see also Phillips*, 415 F.3d at 1312 (noting that "[i]t is a bedrock principle of patent law that the claims of a patent define the

invention to which the patentee is entitled the right to exclude"). We decline Patent Owner's invitation to limit the claims to unclaimed features.

Consequently, we find less credible Dr. Bajaj's testimony that "the zoom described by Murphy does not entail altering the left eye / right eye viewpoints." PO Resp. 55 (citing Ex. 2020 ¶ 78[9]). Like Patent Owner's argument, Dr. Bajaj's testimony is based on importing limitations from the Specification of the '771 patent into the claim. *See* Ex. 2020 ¶ 83 ("The '771 patent itself explains the distinction."). But as we explained above, this importation of limitations from the Specification is improper, and thus, Dr. Bajaj's testimony is less credible than Dr. Zyda's testimony.

Thus, we agree with all of Petitioner's assertions for dependent claims 7, 14, and 21, regarding both anticipation and obviousness. Accordingly, Petitioner has shown by a preponderance of the evidence that Murphy anticipated or would have rendered obvious claim 7 and similar claims 14 and 21.

[9] This citation appears to be in error as this paragraph refers to claim 6, not claim 7.

IV. CONCLUSION[10]

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis[11]	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–21	102(b) and/or 103(a)	Schoolman		
2	103(a)	Schoolman, Bauch		
1–21	102(e) and/or 103(a)	Murphy	1–21	
2	103(a)	Murphy, Bauch		
Overall Outcome			**1–21**	

V. ORDER

It is, therefore,

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1–21 of the '771 patent are unpatentable; and

[10] 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).

[11] As we noted above, we do not reach the grounds over Schoolman alone, Schoolman and Bauch, and Murphy and Bauch because the challenge based on Murphy is dispositive of all the challenged claims.

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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