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Paper 9
Date: September 5, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIGHTRICKS LTD.,
Petitioner,

v.

PLOTAGRAPH, INC. and SASCHA CONNELLY,
Patent Owner.

IPR2023-00153
Patent 10,346,017 B2

Before PATRICK R. SCANLON, CHARLES J. BOUDREAU, and IFTIKHAR AHMED, *Administrative Patent Judges.*

AHMED, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Lightricks Ltd. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–18 of U.S. Patent No. 10,346,017 B2 (Ex. 1001, "the '017 patent"). Plotagraph, Inc. and Sascha Connelly (collectively, "Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp."). With our authorization, Petitioner filed a Preliminary Reply (Paper 7, "Reply") and Patent Owner filed a Preliminary Sur-Reply (Paper 8, "Sur-reply") for additional briefing concerning the 35 U.S.C. § 315(b) issue raised by Patent Owner in its Preliminary Response.

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2022). To institute an *inter partes* review, we must determine that the information presented in the Petition shows "a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Based on the information presented in the Petition and the supporting evidence, we are persuaded that there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, we institute an *inter partes* review of the challenged claims on the grounds set forth in the Petition.

Our factual findings and conclusions at this stage of the proceeding are based on the evidentiary record developed thus far. This is not a final decision as to patentability of the challenged claims. Any final decision will be based on the full trial record, including any response to the Petition timely filed by Patent Owner.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 1. Patent Owner identifies Plotagraph, Inc. and Sascha Connelly as the real parties in interest. Paper 5, 1.

B. Related Matters

The parties identify the following proceeding as a related matter involving the '017 patent: *Plotagraph, Inc. v. Lightricks Ltd.*, No. 4:21-cv-03873 (S.D. Tex.), the dismissal of which is on appeal in *Plotagraph, Inc. v. Lightricks Ltd.*, No. 23-1048 (Fed. Cir.). Pet. 1 (citing Ex. 1021); Paper 5, 2. Patent Owner further identifies the following Board proceedings involving patents related to the '017 patent: IPR2023-00152 (challenging U.S. Patent No. 10,558,342 B2), IPR2023-00154 (challenging U.S. Patent No. 10,621,469 B2), IPR2023-00569 (challenging U.S. Patent No. 11,301,119 B2), and IPR2023-00568 (challenging U.S. Patent No. 11,182,641 B2). Paper 5, 2. On June 20, 2023, we denied institution of *inter partes* review in IPR2023-00152. IPR2023-00152, Paper 7.

C. The '017 patent

The '017 patent, titled "Automated Pixel Shifting within a Digital Image," issued July 9, 2019, with claims 1–18. Ex. 1001, codes (45), (54), 13:66–18:22. The '017 patent discloses "systems, methods, and computer-readable media that automate the shifting of pixels within a digital image." *Id.* at 3:32–34. In one embodiment, a user selects portions of a digital image in which to automate the shifting of pixels and controls the speed, magnitude, direction, and other attributes of the pixel shifting. *Id.* at 3:40–45. The user also applies masks to the digital image to prevent

pixels within specific portions of the digital image from moving. *Id.* at 3:45–47.

Figures 5A–5D of the '017 patent are reproduced below.

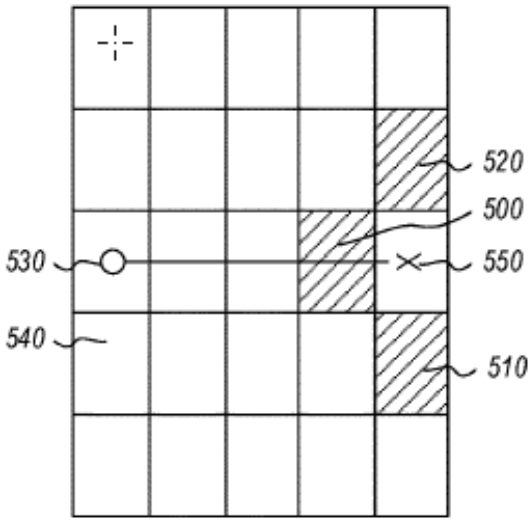


Fig. 5A

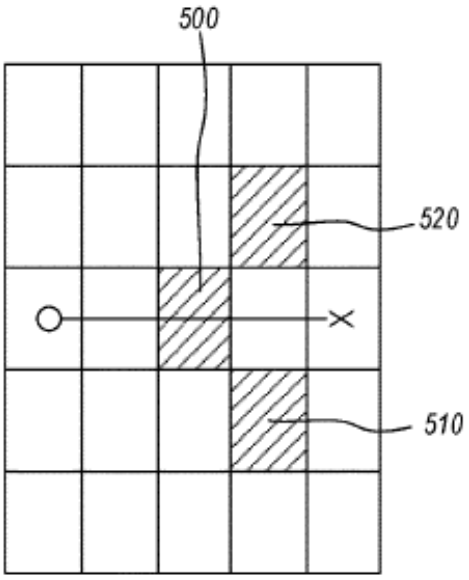


Fig. 5B

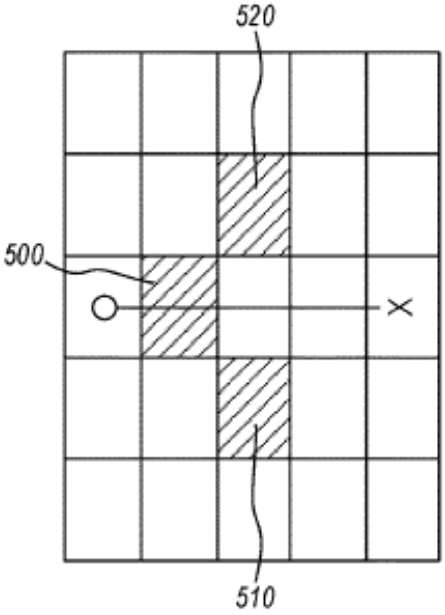


Fig. 5C

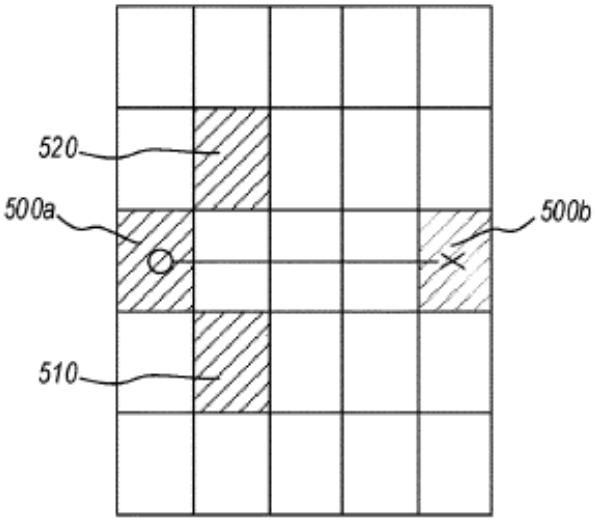


Fig. 5D

Figures 5A–5D illustrate individual pixels being shifted. Ex. 1001, 3:19–20. Figure 5A depicts starting point 550, ending point 530, and associated link 540, as well as pixels 500, 510, and 520 in their original state within the image. *Id.* at 7:21–29.

Figure 5B depicts pixels 500, 510, 520 after being shifted one space left, along the direction of the link, and Figure 5C depicts pixels 500, 510, 520 after being shifted one more space left. *Id.* at 7:32–35, 7:65–65. "In FIG. 5D the pixels 500, 510, 520 are shown at yet another step along the shift, but in this step the pixels 500, 510, 520 are beginning to loop around." *Id.* at 7:66–8:1.

D. Challenged Claims

Petitioner challenges claims 1–18 of the '017 patent. Claims 1, 8, and 14 are independent. Claim 1 is illustrative of the claimed subject matter and is reproduced below:

1. [1pre] A computer system for automating the shifting of pixels within a digital image, comprising:

one or more processors; and

one or more computer-readable media having stored thereon executable instructions that when executed by the one or more processors configure the computer system to perform at least the following:

[1a] access, from memory, a digital image file, wherein the digital image file comprises information that corresponds to individual pixels within the digital image;

[1b] receive a first starting point through a user interface, wherein the first starting point is received through a user selection of a first beginning portion of the digital image;

[1c] render a first visual indication of the first starting point on the user interface;

[1d] receive a first ending point through the user interface, wherein the first ending point is received through a user selection of a first ending portion of the digital image;

[1e] render a second visual indication of the first ending point on the user interface;

[1f] render, on the user interface, a first rendered link between the first starting point and the first ending point, wherein the first rendered link comprises:

a first direction extending from the first starting point to the first ending point; and

a first length between the first starting point and the first ending point;

[1g] identify a first set of pixels that are:

parallel to the first rendered link,

within a user-defined threshold distance from the first rendered link, and

extending from the first starting point to the first ending point;

[1h] automatically shift the first set of pixels in the first direction, wherein shifting the first set of pixels comprises rendering and re-rendering in a loop the first set of pixels being shifted;

[1i] receive a second starting point through the user interface, wherein the second starting point is received through a user selection of a second starting portion of the digital image, the second starting portion being different than both the first starting portion and the first ending portion;

[1j] render a third visual indication of the second starting point on the user interface;

[1k] receive, through the user interface, a second ending point associated with the second starting point, wherein the second ending point is received through a user selection of a second ending portion of the digital image,

the second ending portion being different than both the first starting portion and the first ending portion;

[1l] render a fourth visual indication of the second end point on the user interface;

[1m] render, on the user interface, a second link between the second starting point and the second ending point;

[1n] identify a second set of pixels that are:

parallel to the second rendered link,

within the user-defined threshold distance from the first rendered link, and

extending from the second starting point to the second ending point; and

[1o] automatically shift the second set of pixels between the second starting point and the second ending point, wherein shifting the second set of pixels comprises rendering in a loop the second set of pixels being shifted.

Ex. 1001, 13:66–14:67 (Petitioner's annotations added); Pet. x–xii.

E. Asserted Grounds of Unpatentability

Petitioner contends that the challenged claims are unpatentable based on the following grounds:

Claims Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–18	102(a)(1)/103	AEM[2]

[1] Because the challenged claims of the '017 patent have an effective filing date after March 16, 2013, patentability is governed by the AIA versions of 35 U.S.C. §§ 102, 103.

[2] Adobe After Effects Help and tutorials, Adobe (2013) (Ex. 1003).

Claims Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–3, 5–11, 13–16, 18	103	IMU,[3] Okabe[4]
2–4, 10–12, 15–17	103	IMU, Okabe, Li[5]

Pet. 3. Petitioner relies on the Declaration of Philip Greenspun, Ph.D. (Ex. 1002) to support its challenges.

[3] Wayback Machine Capture dated Mar. 27, 2012 of Anthony Thyssen, *Examples of ImageMagick Usage (Version 6)*, ImageMagick (Mar. 15, 2011), http://www.imagemagick.org/Usage/ (retrieved from https://web.archive.org/web/20120327064501/http://www.imagemagick.org/Usage/ (*see* Pet. viii)) (Ex. 1004); WayBack Machine Capture dated Mar. 29, 2012 of Anthony Thyssen, *ImageMagick v6 Examples -- Distorting Images*, ImageMagick (Mar. 21, 2012), http://www.imagemagick.org/Usage/distorts/ (retrieved from https://web.archive.org/web/20120329131929/http://www.imagemagick.org/Usage/distorts/ (*see* Pet. viii)) (Ex. 1005); Wayback Machine Capture dated Sept. 28, 2012 of Anthony Thyssen, *ImageMagick v6 Examples -- Masks*, ImageMagick (Mar. 10, 2011), http://www.imagemagick.org/Usage/masking/ (retrieved from https://web.archive.org/web/20120928070642/http://www.imagemagick.org/Usage/masking/ (*see* Pet. viii)) (Ex. 1006); Wayback Machine Capture dated Mar. 10, 2012 of Anthony Thyssen, *ImageMagick v6 Examples -- Animation Basics*, ImageMagick (Feb. 8, 2011), http://www.imagemagick.org/Usage/anim_basics/ (retrieved from https://web.archive.org/web/20120310193613/http://www.imagemagick.org/Usage/anim_basics/ (*see* Pet. viii)) (Ex. 1007); Wayback Machine Capture dated Apr. 5, 2012 of Anthony Thyssen, *ImageMagick v6 Examples --Usage under Windows*, ImageMagick (Mar. 21, 2012), http://www.imagemagick.org/Usage/windows/ (retrieved from https://web.archive.org/web/20120405151502/http://www.imagemagick.org/Usage/windows/ (*see* Pet. viii–ix)) (Ex. 1008). Petitioner asserts that Exhibits 1004–1008 comprise a single reference, which Petitioner refers to as IMU. Pet. 4 n.3 (citing Ex. 1002 ¶ 44 n.6).

[4] Makoto Okabe et al., *Creating Fluid Animation from a Single Image using Video Database*, 30 Computer Graphics Forum 7 (2011) (Ex. 1009).

[5] Yin Li et al., *Lazy Snapping*, 23 ACM Transactions on Graphics 303 (2004) (Ex. 1010).

III. ANALYSIS

A. 35 U.S.C. § 315(b) Time Bar

Section 315(b) of title 35 of the United States Code states that "[a]n inter partes review may not be instituted if the petition requesting the proceeding is filed more than 1 year after the date on which the petitioner . . . is served with a complaint alleging infringement of the patent." The Petition's filing date is January 17, 2023 (Paper 3, 1), and the § 315(b) bar date, one year before, is January 17, 2022.

Patent Owner asserts that it first served Petitioner with its district court complaint at Petitioner's Haifa, Israel office on December 23, 2021, and then served Petitioner with its complaint at Petitioner's Jerusalem, Israel office on January 4, 2022. Prelim. Resp. 1–2 (citing Ex. 2002, 5, 7). Patent Owner presents us with the Certificates of Service for both attempts. *Id.* at 2. Patent Owner contends that the Petition's filing date of January 17, 2023, falls outside the one-year anniversary of either service date, i.e., December 23, 2022, or after January 4, 2023, and is therefore untimely under 35 U.S.C. §315(b). *Id.* at 3.

In its preliminary reply, Petitioner asserts that it did not receive a complete copy of the complaint in either of the service attempts because Patent Owner delivered only the complaint (Ex. 2001) and not Exhibits A–D (Ex. 1026) that are attachments to the complaint filed with the district court.[6] Reply 2–3 (citing Ex. 1027 ¶¶ 7–15). Petitioner argues that because those service attempts did not comply with Rule 4 of the Federal Rules of Civil Procedure, they did not trigger the § 315(b) time bar. *Id.* at 2–4 (citing Fed.

[6] Petitioner also contends that the December 23, 2021, attempt was further defective because it never received anything from that attempt. Reply 4 (citing Ex. 1027 ¶¶ 5–9; Ex. 1030 ¶¶ 2–4).

R. Civ. P. 4(c)(1), 4(f), 4(h)(2), 10(c)). Petitioner instead contends that the service date according to Rule 4 is January 21, 2022—when Petitioner filed a waiver of service with the district court. *Id.* at 4–5 (citing Ex. 1025; Ex. 1032, 1). Petitioner asserts that Patent Owner tacitly agreed with Petitioner's contention that the service was defective and also agreed to be bound by a service date based on the filing of a waiver in the district court, and not the dates of Patent Owner's service attempts. *Id.* at 3–4 (citing Ex. 1032). As such, Petitioner contends that its Petition, filed on January 17, 2023, was timely under § 315(b). *Id.* at 5.

We agree with Petitioner's understanding that a defective service of a district court complaint does not trigger the time bar under § 315(b). Federal Rule of Civil Procedure 10 requires that "an exhibit to a pleading is a part of the pleading for all purposes." Fed. R. Civ. P. 10(c); *see also Rodriguez v. Fla. Dept. of Corrections*, 748 F.3d 1073, 1076–77 (11th Cir. 2014) ("Because the Civil Rules require service of all pleadings, it follows that the exhibits to the pleading must also be served, regardless of whether they were filed at the same time."); *Sixta v. Thaler*, 615 F.3d 569, 572 (5th Cir. 2010); *Ringgold v. Burgett, Inc.*, No. 2:22-cv-00836, 2022 WL 8044117, at *2 (E.D. Cal. Oct. 17, 2022). Here, Exhibits A–D to the complaint filed in the district court are part of the complaint. *See* Ex. 1026.

Patent Owner does not dispute that the service was defective in the manner alleged by Petitioner, but instead argues that its service attempt provided notice of the lawsuit to Petitioner and that was sufficient to trigger the time bar under § 315(b). Sur-reply 1–3. Patent Owner contends that the missing exhibits do not matter for the purposes of the time bar because the Board has held that "[t]he service of a pleading asserting a claim alleging infringement, including where the serving party lacks standing to sue *or the*

pleading is otherwise deficient, triggers the one-year time period for a petitioner to file a petition under 35 U.S.C. §315(b)." Sur-reply 2–3 (citing *GoPro, Inc. v. 360Heros, Inc.*, IPR2018-01754, Paper 38 at 24 (PTAB Aug. 23, 2019) (precedential)).

We find Patent Owner's reliance on *GoPro* to be misplaced. *GoPro* addresses a situation where a *pleading* is deficient (where a party lacked standing to sue) and not situations, such as here, where the *service* itself was defective. *See GoPro*, Paper 38 at 12–15. *GoPro* requires us to consider "the date on which a complaint was *served in accordance with the law*." *Id.* at 15 (emphasis added); Sur-reply 4 (quoting *GoPro*, Paper 38 at 15). In fact, *GoPro* points out that the Board has recognized that "a complaint improperly served does not trigger the § 315(b) time bar." *GoPro*, Paper 38 at 14 (citing *IpDatatel, LLC v. ICN Acquisition, LLC*, IPR2018-01823, Paper 17 at 10–18 (PTAB Apr. 17, 2019)).

In *IpDatatel*, the Board explained that "served" in § 315(b) requires compliance with Rule 4 of the Federal Rules of Civil Procedure, and that mere "notice" is not "legally effective" "service." *See IpDatatel*, Paper 17 at 13–18 (rejecting patent owner's argument as conflating "service" with "notice") (citing *Freedom Watch, Inc. v. Org. of the Petroleum Exporting Countries*, 766 F.3d 74, 81 (D.C. Cir. 2014)); *see also In-Depth Geophysical, Inc. v. ConocoPhillips Co.*, IPR2019-00850, Paper 14 at 10 (PTAB Sept. 6, 2019) (same).

Here, there is no alleged defect in Patent Owner's *pleading* filed in the district court—the complaint and its exhibits were properly filed to the court's docket well before Patent Owner attempted service. *See* Exs. 1026, 2001. Thus, "the complaint was a *proper* complaint." *GoPro*, Paper 38 at 15. The issue here is that the *entire* pleading was not served on Petitioner

before January 21, 2022—the date Petitioner filed a waiver of service with the court, and the date that the parties clearly relied on under Fed. R. Civ. P. 4(d) in the district court proceeding. *See* Ex. 1035; Ex. 1032, 2–4; *see also* Fed. R. Civ. P. 10(c) ("an exhibit to a pleading is a part of the pleading for all purposes"). Thus, it was the *service* that was defective in this case. Patent Owner does not cite any authority holding that Section 315(b) may be triggered by delivery of a complaint in a manner that does not constitute service under Rule 4.

Indeed, as Petitioner contends, Patent Owner agreed with Petitioner's assertion that filing of the waiver of service would govern the deadline for a responsive pleading in the district court. Reply 3–4 (citing Ex. 1032, 2–4). Nothing in the record before us appears to contradict Petitioner's assertions in this regard.[7] The Board has explained that "in the situation where the petitioner waives service of a summons, the one-year time period begins on the date on which such a waiver is filed." *See Motorola Mobility LLC v. Arnouse*, IPR2013-00010, Paper 20 at 6 (PTAB Jan. 30, 2013) (informative). We therefore determine that Petitioner was not "served with a complaint alleging infringement of the patent" for purposes of 35 U.S.C. § 315(b) until January 21, 2022.[8] Accordingly, the Petition was timely filed on January 17, 2023.

[7] During the correspondence between the parties, Patent Owner never disputed Petitioner's contention that Patent Owner's service attempts were defective. *See* Ex. 1032.

[8] As the Board explained in *IpDatatel*, "[h]aving one date of service operative for the district court and a different date as operative for the purposes of § 315(b) would not serve [the] notice function and would lead to confusion and needless disputes." *IpDatatel*, Paper 17 at 18.

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103 requires us to resolve the level of ordinary skill in the pertinent art at the time of the invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

Petitioner contends that a person having ordinary skill in the art "would have had at least a bachelor's degree in computer science, electrical engineering, or a related field, and at least one 1–2 years of experience in image processing and animation," and "[l]ess education could have been compensated with more experience, and vice versa." Pet. 5–6 (citing Ex. 1002 ¶¶ 23–24). Petitioner adds that one of ordinary skill in the art "would have also been familiar with existing systems for image processing and animation, and would have understood how to implement such systems." *Id.* at 6. Patent Owner does not address the level of ordinary skill in the art in its Preliminary Response. Prelim. Resp. 1–4.

Based on our review of the record before us, we determine that Petitioner's stated level of ordinary skill in the art is reasonable because it appears consistent with the evidence of record, including the asserted prior art. Accordingly, for the purposes of this Decision, we adopt Petitioner's definition.

C. Claim Construction

In *inter partes* reviews, the Board interprets claim language using the district-court-type standard, as described in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1313–14. Although extrinsic evidence, when available, may also be useful when construing claim terms under this standard, extrinsic evidence should be considered in the context of the intrinsic evidence. *See id.* at 1317–19.

Petitioner contends that all claim terms should be given their plain and ordinary meaning at this stage of the proceeding. Pet. 8 (citing Ex. 1002 ¶ 42). Patent Owner does not propose any claim construction in its Preliminary Response. Prelim. Resp. 1–4.

On the present record, we do not discern a need to construe explicitly any claim language because doing so would have no effect on our analyses below of Petitioner's asserted grounds and will not assist in resolving the present controversy between the parties. *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))).

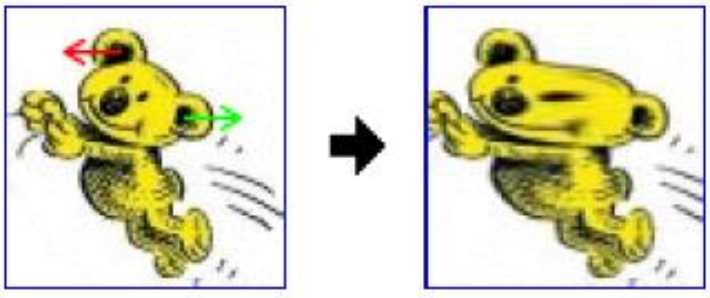
D. Asserted Obviousness Based on IMU and Okabe

Petitioner asserts that claims 1–3, 5–11, 13–16, and 18 are unpatentable based on IMU and Okabe. Pet. 55–85.

1. IMU

IMU is a collection of captures from the Wayback Machine of the ImageMagick.com website pertaining to the ImageMagick Version 6 ("IMV6") open-source image-processing software. Pet. 4 (citing Ex. 1004, 1; Ex. 1002 ¶ 44). According to Petitioner, "[t]he section's homepage (IMU-Home [Ex. 1004]) contains links to different subpages explaining how to use IMV6's various effects and capabilities, including 'Distorting Images' (IMU-Distorting [Ex. 1005]), 'Masking and Background Removal' (IMU-Masking [Ex. 1006]), 'Animation Basics' (IMU-Animating [Ex. 1007]), and 'Usage under Windows'" (IMU-Windows [Ex. 1008]).[9] *Id.* (citing Ex. 1004, 1–2; Ex. 1002 ¶ 44).

IMU describes features and capabilities of IMV6, including Scale-Rotate-Translate ("SRT") distortion (Ex. 1005, 16–18) and Shepard's distortion (*id.* at 59–62). IMU explains that Shepard's method "uses the movement of the given control points to distort the image in terms of 'local' effects." Ex. 1005, 59. IMU discloses an example of applying the distortion to move two control points on an image of a koala to stretch out its ears as shown in IMU's figure below.



Id.

[9] According to Petitioner, these five exhibits comprise a single reference. Pet. 4 n.3 (citing Ex. 1002 ¶ 44 n.6). Patent Owner does not challenge this assertion in its Preliminary Response. *See* Prelim. Resp. 1–4.

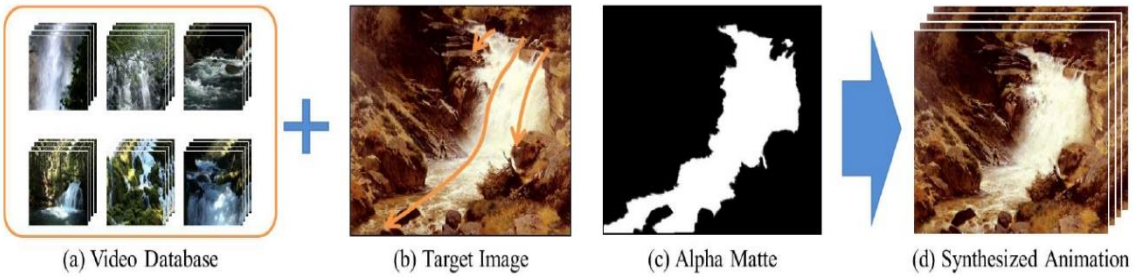
IMU explains that as shown in the figure above, "the parts of the image between the two control points were stretched out because of the control point movement," but "all the other parts of the image w[ere] left pretty much intact." *Id.* IMU states that the IMV6 software "is designed for batch processing of images," and "is not a [graphical user interface ("GUI")] image editor." Ex. 1004, 2.

2. Okabe

Okabe is a technical article describing a method and system for synthesizing fluid animation in a single image using a fluid video database. Ex. 1009, 1. Okabe's system consists of three components:

> 1) construction of a video database of fluids . . . , where each video example is cut into small pieces, 2) a best-match search for an appropriate video example piece and assignment of this to a part of the target image, and 3) synthesis of the final animation through seamless integration of all the assigned pieces and adjustment of the overall appearance.

Id. at 3. Figure 1 of Okabe is reproduced below.



Okabe explains that as shown in Figure 1,

> [Okabe] employs a database of video examples of fluids (a). The user specifies a target image (b) with a few optional suggestions about fluid motion, e.g., sketches of flow direction, shown as orange arrows. The user also provides an alpha matte of the region of interest (c). The system synthesizes an animation (d).

Id. at 2; *see also id.* at 6, Fig. 8 (discussing user-specified motion field). Okabe also discloses that "several methods are available to synthesize an

infinitely flowing fluid animation," such that the synthesized animation can permit infinite repetition. *Id.* at 8.

3. Independent Claim 1

a) Preamble [1pre]

Petitioner contends that IMU teaches the preamble of claim 1 because IMU discloses that IMV6 is operated in the command-line, and installed and run on a computer. Pet. 66 (citing Ex. 1004, 2; Ex. 1008, 3–4; Ex. 1002 ¶ 168). Petitioner further contends that Okabe teaches using a graphical user interface to specify characteristics regarding motion to synthesize animated image sequences.[10] *Id.* (citing Ex. 1009, 1; Ex. 1002 ¶¶ 168–169).

b) Limitation 1[a]

Petitioner contends that IMU teaches this limitation because IMU discloses that IMV6 enables a user to apply effects to animate an image. Pet. 66–67 (citing Ex. 1004, 3–4; Ex. 1002 ¶ 170). Petitioner further contends that Okabe teaches using a graphical user interface to specify characteristics regarding motion to synthesize animated image sequences. *Id.* at 67 (citing Ex. 1009, 1–2; Ex. 1002 ¶ 171).

c) Limitations 1[b]–1[c]

Petitioner contends that IMU discloses distortion effects such as Shepard's Distortion, and discloses that to animate an image with distortion effects in IMV6, the user places a "control point" on a pixel located at a user-specified coordinate of the image and then moves the control point to a

[10] At this stage of the proceeding, we need not decide whether the preamble of claim 1 is limiting because, even if limiting, Petitioner has established sufficiently that the preamble, as well as the limitations "one or more processors" and "one or more computer-readable media having stored thereon executable instructions" that Petitioner also identifies as part of [1pre] (Pet. x), are taught by the combination of IMU and Okabe.

new coordinate. Pet. 67–68 (citing Ex. 1004, 1; Ex. 1005, 17–20, 59; Ex. 1002 ¶ 172). Petitioner further contends that "in the IMU-Okabe Combination, IMU's placement and movement of a Shepard's Distortion control point corresponds to Okabe's user-drawn, user-viewable 'stroke[]' on an image." *Id.* at 68 (citing Ex. 1009, 3, 7; Ex. 1002 ¶ 173). Petitioner argues that "Okabe's user-drawn stroke includes a user-viewable indication of a starting point, direction, and speed across the animation, much like how a user in IMV6 indicates a control point's starting point, direction, and speed across an animation according to IMU." *Id.* at 68–69.

d) Limitations 1[d]–1[e]

Petitioner contends that "[i]n the IMU-Okabe Combination, a user defines a Shepard's Distortion control point's direction and speed across the animation of an image by drawing a user-viewable 'stroke[]' on the image." Pet. 69–70 (citing Ex. 1005, 59; Ex. 1009, 2–3, 7; Ex. 1002 ¶ 176). According to Petitioner, receiving a user-drawn, user-viewable stroke as taught by the combination meets these limitations. *Id.*

e) Limitation 1[f]

Petitioner contends that IMU teaches "animating in IMV6 using distortions (e.g., Shepard's Distortion) by placing and incrementally moving control points frame-by-frame such that each control point moves across the animation at the user's desired direction and speed." Pet. 70 (citing Ex. 1005, 17–20, 59; Ex. 1002 ¶ 177). Petitioner further contends that "in the IMU-Okabe Combination, a user specifies such a direction and speed of a Shepard's Distortion control point by drawing a corresponding user-viewable 'stroke[]' from Okabe on the image." *Id.* at 70–71 (citing Ex. 1009, 2–3, 6–7, Figs. 1, 8a; Ex. 1002 ¶ 178).

f) Limitation 1[g]

Petitioner contends that in the IMU-Okabe combination, a user applies a matte specifying a region of interest in the image that the user desires to animate and also adds a stroke that specifies the direction and speed of a Shepard's Distortion control point across the animation. Pet. 71 (citing Ex. 1006, 2; Ex. 1009, 1, 3, 7; Ex. 1002 ¶¶ 179–180). Petitioner contends that the combination would have permitted selecting any or all pixels of the image to be included in this region of interest, including pixels parallel to the stroke, within a user-defined threshold distance from the stroke, and extending from the starting point to the ending point of the stroke, by using a matte. *Id.* According to Petitioner, "Okabe's Figure 1 confirms this by depicting a matte specifying a region of interest (i.e., a to-be-animated region) in white that includes pixels parallel to each of three user-drawn strokes, within a user-defined threshold distance from the strokes (i.e., to the waterfall's edges), and extending from the starting point to the ending point of each stroke." *Id.* at 71–72 (citing Ex. 1009, 2, Fig. 1; Ex. 1022, 10–11; Ex. 1002 ¶ 180).

g) Limitation 1[h]

Petitioner asserts that the '017 patent specification states that the claimed shifting can be performed using "a warping function, such as Shepard's distortion," and that IMU explicitly teaches performing "Shepard's Distortion" and, therefore, the claimed pixel shifting. Pet. 72 (citing Ex. 1001, 8:32–34; Ex. 1005, 17–18, 59; Ex. 1002 ¶ 181). Petitioner contends that "IMV6's user shifts pixels as claimed by using Shepard's Distortion to place and incrementally move a 'control point' on an image frame-by-frame in the user's specified direction and speed." *Id.* (citing Ex. 1005, 17–20, 59). Petitioner also contends that in its proposed IMU-

Okabe combination, a user specifies a Shepard's Distortion control point's direction and speed by drawing a corresponding stroke, as shown in Okabe, on the image. *Id.* (citing Ex. 1009, 2, 3, 7; ; Ex. 1002 ¶ 182). According to Petitioner, the IMU-Okabe combination automatically generates animation frames by shifting the selected pixels in the stroke's direction using IMV6's Shepard's Distortion. *Id.* at 73 (citing Ex. 1009, 2–3; Ex. 1002 ¶ 182).

Petitioner contends that IMU teaches that allowing a user to save an animation as an infinitely looping animated GIF using IMV6's "–loop" operator, and that Okabe also teaches producing an infinitely repeating animation. *Id.* (citing Ex. 1005, 1–2, 8; Ex. 1007, 1–2; Ex. 1002 ¶ 183).

h) Limitations 1[i]–1[o]

Petitioner contends that "in the IMU-Okabe Combination, th[e] placement and movement of multiple Shepard's Distortion control points is performed by a user drawing multiple 'strokes' from Okabe on the image, each of which is user-viewable and specifies a direction and speed of a Shepard's Distortion control point." Pet. 74 (citing Ex. 1005, 17–20, 59; Ex. 1009, 2–3, 7; Ex. 1002 ¶¶ 184–185). Petitioner contends that "[t]he IMU-Okabe Combination's user also applies a matte specifying a region of interest in the image the user desires to animate, including pixels parallel to each stroke, within a user-defined threshold distance from the strokes, and extending from the starting point to the ending point of each stroke." *Id.* at 75 (citing Ex. 1006, 2; Ex. 1009, 1; Ex. 1002 ¶ 186). According to Petitioner, "the IMU-Okabe Combination automatically generates animation frames using Shepard's Distortion and permits infinite repetition of the animation by, e.g., applying IMV6's '–loop' operator." *Id.* at 75–76 (citing Ex. 1007, 1–2; Ex. 1009, 1–2; Ex. 1002 ¶ 187).

i) Motivation to Combine

Petitioner contends that a person of ordinary skill in the art "would have been motivated to combine IMV6's animation capabilities described in IMU with the simple and graphical user commands for creating an animation taught by Okabe." Pet. 61 (citing Ex. 1004, 2; Ex. 1005, 17–18; Ex. 1002 ¶¶ 158–159). According to Petitioner, IMU discloses that IMV6 is "not a GUI image editor," and to animate an image in IMV6 using, e.g., Shepard's Distortion, a user would write commands that place and incrementally move Shepard's Distortion control points within the image coordinates for each successive frame. *Id.* at 61–62 (citing Ex. 1005, 17–20, 59; Ex. 1002 ¶ 160); *see also id.* at 62 (discussing other manual operations in IMV6) (citing Ex. 1006, 2; Ex. 1005, 17–18; Ex. 1002 ¶ 161). Petitioner contends that "given this laborious, non-graphical, text-based process for creating an animation in IMV6, a [person of ordinary skill in the art] would have been motivated to modify IMV6 by enabling a user to animate an image using simpler and more intuitive graphical user commands." *Id.* (citing Ex. 1002 ¶ 162). Petitioner contends that "Okabe teaches simple and graphical user commands that a [person of ordinary skill in the art] would have found well-suited for implementing a GUI to create animations in IMV6." *Id.* at 63 (citing Ex. 1009, 2–3, 7; Ex. 1002 ¶ 164). According to Petitioner, "Okabe's simple and graphical user commands enables a user to create looping animations 'with less effort than with previous methods' and 'markedly reduces the user burden.'" *Id.* at 63–64 (citing Ex. 1009, 1–2; Ex. 1002 ¶ 164). Petitioner argues that a person of ordinary skill in the art "would have been motivated to modify IMV6 to include Okabe's simple and graphical user commands to make the animation process easier, graphical, and less time consuming." *Id.* at 64 (citing Ex. 1002 ¶ 165).

j) Preliminary Determination as to Claim 1

Patent Owner does not respond to the substance of Petitioner's contentions. Prelim. Resp. 1–4. Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions that the combination of IMU and Okabe teaches each of the limitations of claim 1. We further determine that Petitioner provides an adequate reason why one of ordinary skill in the art would have combined the teachings of IMU and Okabe in the manner asserted by Petitioner, with a reasonable expectation of success. We therefore determine Petitioner has met its burden to show a reasonable likelihood it would prevail in demonstrating that claim 1 is unpatentable over the combination of IMU and Okabe.

4. Independent Claims 8

Claim 8 recites "[a] method for automating the shifting of pixels within a digital image," and also recites other limitations that are similar to those in claim 1. Ex. 1001, 15:30–16:13. Petitioner relies on its contentions related to claim 1 to argue that claim 8 is unpatentable over the combination of IMU and Okabe. Pet. 81–82 (citing Ex. 1002 ¶¶ 197, 199). For the reasons discussed above, we find that Petitioner has met its burden to show a reasonable likelihood that claim 8 is unpatentable over the combination of IMU and Okabe.

5. Dependent Claims 2, 3, 5, 6, and 9–11

Claims 2, 3, 5, and 6 depend from claim 1, and claims 9–11 depend from claim 8. Ex. 1001, 15:1–9, 15:17–23, 16:13–25. Petitioner contends that these claims are unpatentable over the combination of IMU and Okabe.

a) Claims 2 and 10

Claim 2 recites

> The computer system of claim 1, wherein the executable instructions include instructions that are executable to configure the computer system to identify a particular portion of the digital image to mask, wherein the mask prevents pixels covered by the mask from being shifted.

Ex. 1001, 15:1–5. Claim 10 recites a similar limitation. *Id.* at 16:18–21. Petitioner contends that "the IMU-Okabe Combination's user applies a matte specifying a region of interest in the image the user desires to animate," and that the matte also specifies a region that includes pixels the user does not desire to animate. Pet. 76–77 (citing Ex. 1006, 2; Ex. 1009, 1, 2, Fig. 1; Ex. 1002 ¶ 188). Petitioner further contends that the IMU-Okabe combination teaches the user receiving and applying such a matte. *Id.* at 77. Petitioner relies on the same contentions for claim 10. Pet. 83 (citing Pet. § VI.B.5.a).

b) Claims 3 and 11

Claim 3 recites

> The computer system of claim 2, wherein receiving an indication of a particular portion of the digital image to mask comprises receiving through a user interface a selection of a particular pixel within the digital image.

Ex. 1001, 15:6–9. Claim 11 recites a similar limitation. *Id.* at 16:22–25. Petitioner contends that "[t]he IMU-Okabe Combination's user applies a matte that specifies a region of an image that the user does not desire to animate," and that "such a matte includes a black region covering pixels the user does not desire to animate." Pet. 77 (citing Ex. 1009, 2, Fig. 1; Ex. 1002 ¶ 189). Petitioner relies on the same contentions for claim 11. Pet. 83 (citing Pet. § VI.B.6).

c) Claim 5

Claim 5 recites "[t]he computer system of claim 1, wherein the first direction is different from the second direction." Ex. 1001, 15:17–18. Petitioner contends that "IMU teaches applying and incrementally moving control points, such as for Shepard's Distortion, to different coordinates on an image to generate an animation," and provides an example that moves two control points in different directions on an image of a koala. Pet. 77–78 (citing Ex. 1005, 17–20, 59; Ex. 1002 ¶ 190).

d) Claim 6

Claim 6 recites

> The computer system of claim 1, wherein the magnitude of the shifting of the first set of pixels is proportionally related to the first length and the magnitude of the shifting of the second set of pixels is proportionally related to the second length.

Ex. 1001, 15:19–22. Petitioner contends that "IMU teaches that distortions using control points (e.g., Shepard's Distortion) require users to input '2 pairs of coordinates': X_i, Y_i and I_i, J_i." Pet. 78 (citing Ex. 1005, 19, 59; Ex. 1002 ¶ 192). Petitioner further contends that "when generating animation frames using Shepard's Distortion, the magnitude of distortion from one frame to the next is directly related to the distance between the 'source' and 'destination' coordinates inputted for a corresponding control point." *Id.* at 79.

e) Claim 9

Claim 9 recites

> The method as recited in claim 8, further comprising when a pixel selected from the first set of pixels reaches the ending point, rendering and re-rendering in the loop the pixel being shifted from the first starting point to the ending point.

Ex. 1001, 16:13–17. Petitioner contends that the IMU-Okabe Combination "automatically generates animation frames using Shepard's Distortion and permits infinite repetition of the animation by, e.g., applying IMV6's '–loop' operator," such that "when a pixel selected from the first set of pixels reaches the ending point, rendering and re-rendering in the loop the pixel being shifted from the first starting point to the ending point." Pet. 82–83 (citing Ex. 1005, 59; Ex. 1007, 1–2; Ex. 1009, 1–3, 7–8; Ex. 1002 ¶¶ 205–206).

f) Preliminary Determination as to Claims 2, 3, 5, 6, and 9–11

Patent Owner does not respond to Petitioner's contentions. Prelim. Resp. 1–4. Based on our review and consideration of the current record, we determine that Petitioner has met its burden to show a reasonable likelihood it would prevail in demonstrating that claims 2, 3, 5, 6, and 9–11 are unpatentable over the combination of IMU and Okabe.

6. Independent Claim 14 and Dependent Claims 7, 13, 15, 16, and 18

Independent claim 14 recites "automatically shifting the first set of pixels along the non-linear pathway."[11] Ex. 1001, 16:64–65. Claims 7 and 13 depend from claims 1 and 8 respectively, and also recite a similar limitation. *Id*. at 15:27–29, 16:37–39. Claims 15, 16, and 18 depend from claim 14 and, thus, contain all the limitations of claim 14. *Id*. at 18:1–8, 18:16–22.

Petitioner contends that "IMU teaches that, when animating in IMV6 using distortion effects such as Shepard's Distortion, the direction and speed

[11] The '017 patent specification does not mention "non-linear" or otherwise discuss a "non-linear pathway." We apply the plain and ordinary meaning of the term.

of animation desired by the user . . . may be non-linear as specified by coordinates input by the user." Pet. 80 (citing Ex. 1005, 17–20, 59; Ex. 1002 ¶ 195). Dr. Greenspun testifies that IMU's teaching of "placing and moving an 'SRT distortion' control point on an image of a space ship to animate the launching of the space ship along a non-linear path through the sky" teaches the claimed non-linear pathway. *See* Ex. 1002 ¶ 195 (citing Ex. 1005, 17–18); *see also id.* ¶ 151. Next, Petitioner argues that the IMU-Okabe combination allows a user to specify a control point's non-linear direction and speed by drawing a non-linear stroke as taught by Okabe such that the combination teaches the claimed "non-linear pathway extending between the first starting point and the first ending point." Pet. 81 (citing Ex. 1009, 2–3, 7; Ex. 1002 ¶ 196); *see also* Pet. 64–65 (citing Ex. 1005, 17–20, 59; Ex. 1002 ¶ 166).

Okabe discloses that a user can specify a desired motion field using "sparsely drawn strokes" that generate an orientation map. Ex. 1009, 6, Fig. 8; *see also id.* at Fig. 1 (depicting "sketches of flow direction, shown as orange arrows"), 7 ("[D]esignating the orientation map requires a sparse set of user-drawn strokes."). The caption for Figure 8 states that the user-drawn strokes (shown as green arrows in Figure 8(a)) indicate that the user wants the fire shown in the image to move from bottom to top. *Id.* at 6. Similarly, the caption for Figure 1 states that the orange arrows are "optional suggestions about fluid motion." *Id.* at 2. As such, Okabe's strokes appear to merely provide a general indication of the desired direction of movement—there is no indication that they define specific pathways that pixels are shifted along. As a result, we question whether the combination teaches the claimed "automatically shifting the first set of pixels along the

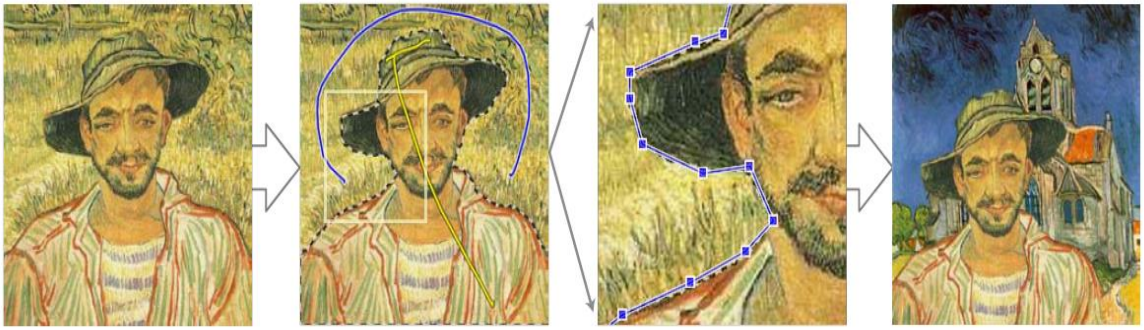
non-linear pathway." We invite the parties to further address this issue during the course of the trial.

E. Asserted Obviousness Based on IMU, Okabe, and Li

Petitioner asserts that claims 2–4, 10–12, and 15–17 are unpatentable based on IMU, Okabe, and Li. Pet. 85–93.

1. Li

Li is a technical article titled "Lazy Snapping" and describes "an interactive image cutout tool." Ex. 1010, 1. Li explains that image cutout is "the technique of removing an object in a picture or photograph from its background" by "specifying which parts of the image are 'foreground' (the part you want to cut out) and which belong to the background." *Id.* Figure 1 of Li, reproduced below, illustrates how its tool may be used.



Id. at 2. Figure 1 illustrates that

> Lazy Snapping is an interactive image cutout system, consisting of two steps: a quick object marking step and a simple boundary editing step. In [object marking step (b)], only 2 (yellow) lines are drawn to indicate the foreground, and another (blue) line to indicate the background. All these lines are far away from the true object boundary. In [boundary editing step (c)], an accurate boundary can be obtained by simply clicking and dragging a few polygon vertices in the zoomed-in view.

Id. at 1–2. Li discloses that "[t]o specify an object, a user marks a few lines on the image by dragging the mouse cursor while holding a button," and that

its user interface "does not require very precise user inputs." *Id.* at 2. "The segmentation process is triggered once the user releases the mouse button after each marking line is drawn." *Id.* "The user then inspects the segmentation result on screen and decides if more lines need to be marked." *Id.*

2. Dependent Claims 2–4, 10–12, and 15–17

Petitioner relies on Li in the combination for its disclosure of a "novel image segmentation algorithm" as allegedly teaching mask limitations of dependent claims 2–4, 10–12, and 15–17. Pet. 90–93.

a) Claims 2 and 10

Claim 2 recites

> The computer system of claim 1, wherein the executable instructions include instructions that are executable to configure the computer system to identify a particular portion of the digital image to mask, wherein the mask prevents pixels covered by the mask from being shifted.

Ex. 1001, 15:1–5. Claim 10 recites a similar limitation. *Id.* at 16:18–21. Petitioner contends that "[t]he IMU-Okabe-Li Combination allows a user to create a matte that specifies a region to animate (foreground) and a region not to animate (background)." Pet. 90 (citing Ex. 1010, 1–2; Ex. 1002 ¶ 233). Petitioner further contends Li teaches an "object marking" step of drawing marker lines indicating either the foreground or background. *Id.* at 77 (citing Ex. 1010, 2; Ex. 1002 ¶ 234). According to Petitioner, "[t]he IMU-Okabe-Li Combination then generates a boundary based on the user's marker lines and thereafter allows the user to perform Li's second 'boundary editing' step to manually refine the boundary." *Id.* at 91 (citing Ex. 1009, 7; Ex. 1010, 2; Ex. 1002 ¶ 235). Petitioner relies on the same contentions for claim 10. Pet. 93 (citing Pet. §§ VI.C.3.a, VI.C.4).

b) Claims 3 and 11

Claim 3 recites

> The computer system of claim 2, wherein receiving an indication of a particular portion of the digital image to mask comprises receiving through a user interface a selection of a particular pixel within the digital image.

Ex. 1001, 15:6–9. Claim 11 recites a similar limitation. *Id.* at 16:22–25. Petitioner contends that Li teaches that the "object marking" step of drawing marker lines comprises drawing marker lines over the particular pixels forming the foreground and background. Pet. 91 (citing Ex. 1010, 2; Ex. 1002 ¶ 236). Petitioner further contends that Li specifically discloses that "[o]nce the user marks the image, two sets of pixels intersecting with the foreground and background markers are defined as *foreground seeds* $\mathscr{F}$ and *background seeds* $\mathscr{B}$ respectively." *Id.* at 91–92 (citing Ex. 1010, 2–3, Fig. 2). Petitioner relies on the same contentions for claim 11. Pet. 93 (citing Pet. § VI.C.4).

c) Claims 4 and 12

Claim 4 recites

> The computer system of claim 2, wherein the executable instructions include instructions that are executable to configure the computer system to generate the mask by: identifying one or more edges that form a boundary around the particular pixel; and generating the mask to cover area within the boundary.

Ex. 1001, 15:11–16. Claim 12 recites a similar limitation. *Id.* at 16:26–29. Petitioner contends that in Li's "object marking" step, a user draws marker lines over the particular "pixels" or "seeds" that form the foreground and background, and that those "pixels" or "seeds" are used to detect the boundary between the foreground and background for generating the matte.

Pet. 92 (citing Ex. 1010, 2–3; Ex. 1002 ¶ 237). Petitioner relies on the same contentions for claim 12. Pet. 93 (citing Pet. § VI.C.5.a).

d) Motivation to Combine

Petitioner contends that "in the IMU-Okabe Combination, a user applies a matte that, as taught in Okabe, specifies regions that the user desires to animate (in white) and not animate (in black)." Pet. 87 (citing Ex. 1006, 2; Ex. 1009, 1–2; Ex. 1002 ¶ 227). Petitioner contends that Okabe teaches that its matte can be created "using a scribble-based image segmentation tool," specifically Li's Lazy Snapping tool, and therefore, contains an explicit teaching, suggestion, and motivation for using Li's Lazy Snapping tool to create a matte in Okabe and in the IMU-Okabe combination. *Id.* at 87–88 (citing Ex. 1009, 7, 10; Ex. 1002 ¶ 228). Moreover, Petitioner contends, Li itself teaches that its Lazy Snapping tool allows a user to easily perform image cutout by using a "novel image segmentation algorithm" to detect a boundary between the foreground and background based on "a quick object marking step" and "a simple boundary editing step" performed by the user. *Id.* at 88 (citing Ex. 1010, 1–2; Ex. 1002 ¶ 229). Given the ease of use, efficiency, and quality of results of Li's tool, Petitioner argues, a person of ordinary skill in the art would have been motivated to utilize Li's tool in the IMU-Okabe combination to create a matte to specify regions in an image to be or not to be animated. *Id.* at 88–89 (citing Ex. 1006, 2; Ex. 1009, 1; Ex. 1010, 1–2; Ex. 1002 ¶ 230).

e) Conclusion as to Claims 2–4, 10–12, and 15–17

Patent Owner does not respond to the substance of Petitioner's contentions. Prelim. Resp. 1–4. Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions that the

combination of IMU, Okabe and Li teaches each of the limitations of claims 2–4 and 10–12. We further determine that Petitioner provides an adequate reason why one of ordinary skill in the art would have combined the teachings of Li with IMU and Okabe in the manner asserted by Petitioner, with a reasonable expectation of success. We therefore determine Petitioner has met its burden to show a reasonable likelihood it would prevail in demonstrating that claims 2–4 and 10–12 are unpatentable over the combination of IMU and Okabe, and Li.

Because Petitioner does not rely on Li as teaching the "non-linear pathway" limitation of independent claim 14, the same issue discussed above with reference to the IMU-Okabe ground (*supra* § III.D.6) applies to Petitioner's challenge of dependent claims 15–17 under this ground.

F. Asserted Anticipation or Obviousness Based on AEM

Petitioner asserts that claims 1–18 are anticipated by AEM or, alternatively, are rendered obvious by AEM. Pet. 9–55. Patent Owner does not respond to the substance of Petitioner's contentions. Prelim. Resp. 1–4. Because we have determined above that the information presented in the Petition shows that there is a reasonable likelihood that Petitioner will prevail with respect to at least one of the claims challenged based on the IMU–Okabe and IMU–Okabe–Li grounds, we need not address Petitioner's additional challenges based on AEM at this stage of the proceeding. *See* 35 U.S.C. § 314(a).

IV. CONCLUSION

After considering the evidence and arguments presented in the Petition, the Preliminary Response, Preliminary Reply, and Preliminary Sur-reply, we are not persuaded by Patent Owner's arguments that the Petition is

time-barred under 35 U.S.C. § 315(b), and we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one of the challenged claims. Thus, we institute an *inter partes* review of all challenged claims on all presented challenges. *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted for claims 1–18 of the '017 patent on the unpatentability grounds asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which commences on the entry date of this decision.

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