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Paper 50
Entered: August 25, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

XACTWARE SOLUTIONS, INC.,
Petitioner,

v.

EAGLE VIEW TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2016-00592
Patent 9,135,737 B2

Before BRYAN F. MOORE, STACEY G. WHITE, and GARTH D. BAER, *Administrative Patent Judges*.

BAER, *Administrative Patent Judge*.

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

NEARMAP-1010

I. INTRODUCTION

Xactware Solutions, Inc.. ("Petitioner"), filed a Second Corrected Petition requesting an *inter partes* review of claims 1, 8–10, 16, 19, 22, 25–28, 31, and 33–36 of U.S. Patent No. 9,135,737 B2 (Ex. 1001, "the '737 patent"). Paper 9 ("Pet." or "Petition"). Pursuant to 35 U.S.C. § 314(a), we determined the Petition showed a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of claims 1, 9, 10, 16, 19, 22, 25–28, 31, and 34–36, and instituted an *inter partes* review of those claims. Paper 14, 20. Patent Owner filed a Patent Owner Response (Paper 31, "PO Resp.") and Petitioner filed a Reply to Patent Owner's Response (Paper 35, "Reply"). Patent Owner also filed a Motion to Strike Petitioner's Reply (Paper 37) and a Motion to Exclude certain deposition testimony of Petitioner's Expert (Paper 41). An oral hearing was held before the Board. Paper 49.

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Having considered the record before us, we determine Petitioner has not shown by a preponderance of the evidence that claims 1, 9, 10, 16, 19, 22, 25–28, 31, and 34–36 of the '737 patent are unpatentable. *See* 35 U.S.C. § 316(e).

II. BACKGROUND

A. RELATED PROCEEDINGS

The '737 patent is also the subject of IPR2017-00363, and Xactware Solutions, Inc., is the Petitioner in that proceeding. Patents related to the '737 patent are involved in IPR2016-00582, IPR2016-00586, IPR2016-00587, IPR2016-00589, IPR2016-00590, IPR2016-00593, IPR2016-00594,

IPR2016-01775, IPR2017-00021, IPR2017-00025, IPR2017-00027, and IPR2017-00034. The ’737 patent is involved in the following district court matter: *Eagle View Technologies, Inc., v. Xactware Solutions, Inc.*, No. 2:15-cv-07025 (D.N.J.). Pet. 1–2; Paper 7, 2–3.

B. THE ’737 PATENT

The ’737 patent relates to a roof estimation system that provides a user interface configured to facilitate roof model generation based on one or more aerial images of a building roof. Ex. 1001, at (57). Figure 1 of the ’737 patent is reproduced below.

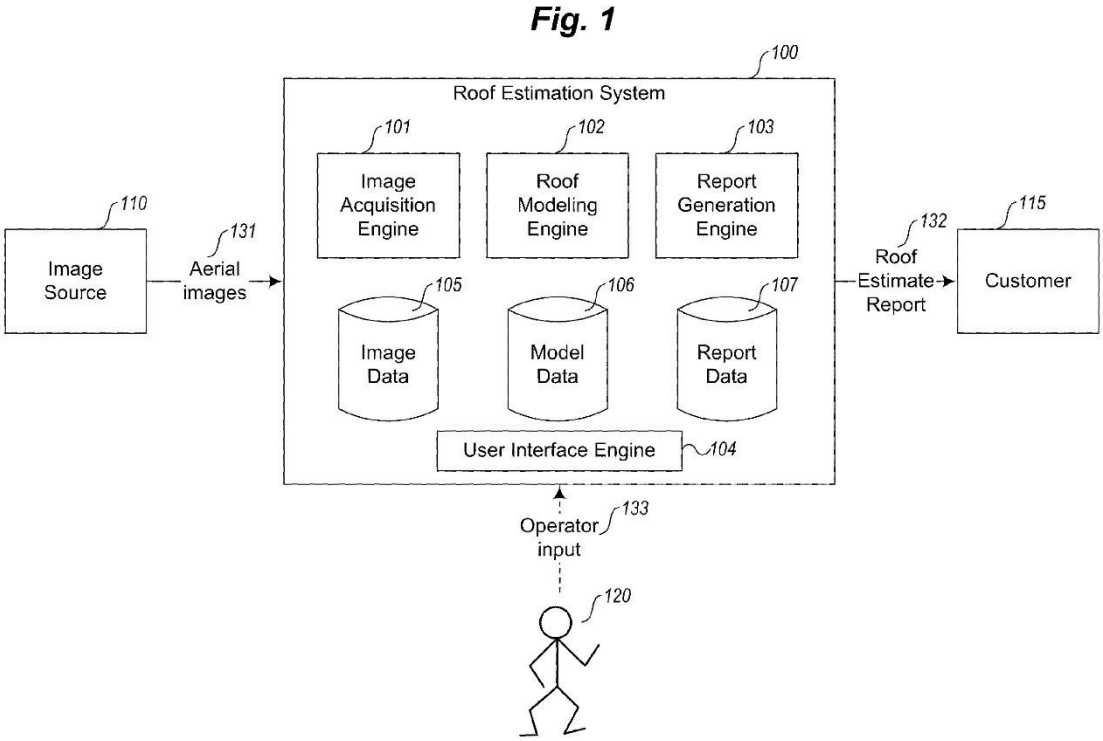

Figure 1 is a block diagram of an example Roof Estimation System (“RES”). Ex. 1001, 3:42–44. RES 100 includes image acquisition engine 101, roof modeling engine 102, report generation engine 103, image data 105, model data 106, and report data 107. *Id.* at 3:44–46. RES 100 is

communicatively coupled to image source 110, customer 115, and operator 120. *Id*. at 3:47–48. RES 100 is configured to generate roof estimate report 132 for a specified building, based on aerial images 131 of the building received from the image source 110. *Id*. at 3:52–55.

C. Illustrative Claim

Claims 1, 16, and 26 are independent. Claim 1 is illustrative and reproduced below.

> 1. A computer-implemented method in a roof estimate report system including at least one processor and a memory coupled to the at least one processor, the method comprising:
>
> displaying, by the at least one processor of the roof estimate report system, a plurality of aerial images of a roof at the same time, each of the aerial images providing a different view, taken from a different angle of the same roof;
>
> displaying, by the at least one processor of the roof estimate report system, respective line drawings representing features of the roof, the respective line drawings overlying a first and a second aerial image of the plurality of aerial images of the roof, the line drawing overlying the first aerial image of the roof having features in common with the line drawing overlying the second aerial image of the roof;
>
> in response to user input, changing, by the at least one processor of the roof estimate report system, the line drawing representing a feature of the roof that overlies the first aerial image of the roof;
>
> in response to the changing, making corresponding changes, by the at least one processor of the roof estimate report system, to the line drawing overlying the second aerial image; and
>
> generating and outputting a roof estimate report using a report generation engine, wherein the roof estimate report includes numerical values for corresponding slope, area, or lengths of edges of at least some of a plurality of planar roof sections of the roof, wherein the generated roof estimate report

> is provided for repair and/or constructing the roof structure of the building.

Ex. 1001, 23:55–24:19.

D. Instituted Grounds of Unpatentability

We instituted *inter partes* review on the following grounds of unpatentability.

Reference(s)	Basis	Challenged Claim(s)
Avrahami[1] and Applicad[2]	§ 103(a)	1, 9, 16, 19, 22, 25–28, 31, and 34–36
Avrahami, Applicad, and Perlant[3]	§ 103(a)	10

Inst. Dec. 20.

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[1] Yair Avrahami et al., *Extraction of 3D Spatial Polygons Based on the Overlapping Criterion for Roof Extraction from Aerial Images*, XXXVI, CMRT05, IAPRS (2005) (Ex. 1004, "Avrahami").

[2] Applicad Product Bulletin, Key Features of Our Roofing Software (2002) (Ex. 1005, "Applicad").

[3] Frederick P. Perlant et al., *Scene Registration in Aerial Image Analysis*, Photogrammetric Engineering and Remote Sensing, Vol. 56, No. 4, Apr. 1990 (Ex. 1006, "Perlant").

III. ANALYSIS

A. PRINCIPLES OF LAW

Petitioner bears the burden of proving unpatentability of the challenged claims, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must establish the facts supporting its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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 to a person of ordinary skill in the art at the time the invention was made. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). Obviousness is resolved based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. CLAIM CONSTRUCTION

We conclude no express claim constructions are necessary to resolve whether Petitioner has shown by a preponderance of the evidence that claims 1, 9, 10, 16, 19, 22, 25–28, 31, and 34–36 are unpatentable. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc*., 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.").

C. Asserted Prior Art

1. *Overview of Avrahami (Ex. 1004)*

Avrahami is a paper titled "Extraction of 3D Spatial Polygons Based on the Overlapping Criterion for Roof Extraction from Aerial Images." Ex. 1004, 43. It discusses semi-automatic algorithms for extracting a 3D image from an aerial image. *Id.* at Abstract. The algorithm discussed in Avrahami has the following steps: (1) the operator manually points to the center of the left space area, (2) the left space area is segmented and a bounding polygon is extracted, (3) estimated height is calculated, (4) the right space area is segmented and a bounding polygon is extracted, and (5) an iterative process is performed that matches both polygons followed by extraction of the spatial polygon. *Id.* at 43. The algorithm is semi-automatic because the first step is performed manually and the rest of the steps are performed automatically. *Id.* Figure 1 of Avrahami is reproduced below.

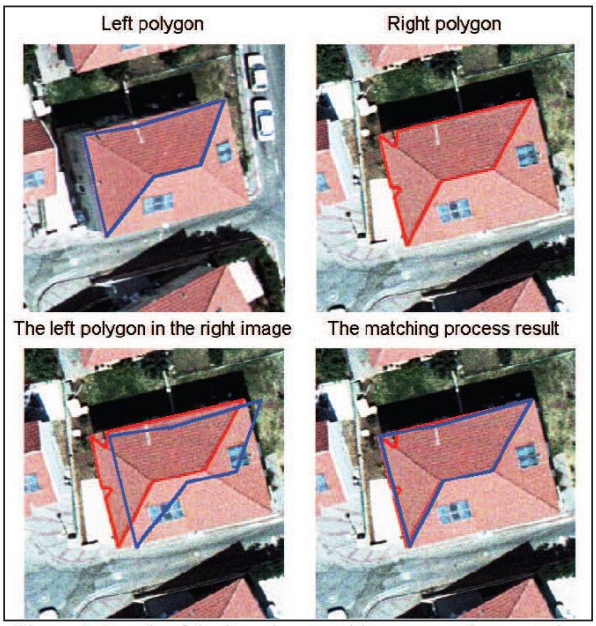

Figure 1. Result of the iterative matching process between the polygons in the right image space

Figure 1 depicts the results of Avrahami's matching process. *Id.* at 45. The top two images show the left and right polygons and the lower two

images show the process of matching the polygons from the left and right images. *Id.*

2. Applicad (Ex. 1005)

Applicad is a product bulletin for a roofing software product. Ex. 1005, 1. Relevant to this case, Applicad teaches generating a roof estimate report based on a three-dimensional model. *Id.* at 2, 39–40.

3. Perlant (Ex. 1006)

Relevant to this case, Perlant discloses a system for scene registration in aerial image analysis. *See* Ex. 1006, 481–92. In particular, Perlant teaches a system in which a marker is displayed on an aerial image to specify a point or part of the image. *See, e.g.*, *id.* at 482, FIG. 2. Based on the points selected on the aerial image, Perlant teaches registering aerial images to a reference grid. *See id.* at 482, FIG. 4.

D. OBVIOUSNESS OF CLAIMS 1, 9, 10, 16, 19, 22, 25–28, 31, AND 34–36

Petitioner asserts claims 1, 9, 10, 16, 19, 22, 25–28, 31, and 34–36 would have been obvious over the combination of Avrahami and Applicad (Pet. 37–56) and claim 10 would have been obvious over the combination of Avrahami, Applicad, and Perlant and Avrahami and Applicad Aerowest (Pet. 56–57). Petitioner provides detailed claim charts and points out where each claim limitation is described by the reference. *Id*. at 41–54, 57. According to Petitioner, Avrahami teaches a roof estimation method for displaying two aerial images. *Id.* at 43 (citing Ex. 1004, Abstract, 43, 46, Figs. 1, 3). The claimed first and second line drawings representing roof features overlaid on first and second aerial images are taught by Avrahami's discussion of the user indicating areas on the left image with seed points and the system transferring those seed points to the right image. *Id.* at 43–44

(citing Ex. 1004, 43–45). Petitioner contends that Avrahami teaches changing a line drawing through its discussion of seed points and polygons that are generated automatically on the right image based on the user's input on the left image. *Id.* at 44–46 (citing Ex. 1004, 45–46, Fig. 1). According to Petitioner, Avrahami's iterative process of matching seed points from the left to the right images teaches the recited corresponding change to the second line drawing in response to changes in the first line drawing. Avrahami describes the iterative process as a series of steps in which points are inputted manually and then detected by the system for use in the opposing image. *See* Ex. 1004, Fig. 2. This back and forth of point input and point detection serves as input for "[b]uilding the topology between the roof planes, intersecting them and reconstructing the 3D roof." *Id.*; *see* Pet. 44–46 (citing Ex. 1004, 45, Fig. 1). Petitioner relies on Applicad to teach generating a roof estimate report. Pet. 20–23 (citing Ex. 1005); *see also id.* at 46. Applicad discusses the generation of detailed quotations for roofing work and provides example reports. Ex. 1005, 40–41. Petitioner relies on Perlant to teach the additional reference grid registration limitation in dependent claim 10. Pet. 57.

Patent Owner argues that the disclosures of Avrahami, Applicad, and Perlant fail to teach multiple claim limitations, and that Petitioner failed to meet its burden to demonstrate that one of ordinary skill in the art would have combined the relevant teachings in the asserted prior art. PO Resp. 9–49. Patent Owner also asserts it has provided objective evidence of non-obviousness that outweighs any evidence presented in Petitioner's affirmative case. *Id.* at 49–71. As outlined below, while we agree with Petitioner that the asserted prior art teaches all the challenged claims'

limitations and that one skilled in the art would have reason to combine those teachings in the manner Petitioner proposes, we agree with Patent Owner that objective indicia of non-obviousness are ultimately decisive in this case.

1. Disputed Elements

a. "displaying" (claims 1, 16, and 28)

Claim 1 requires "displaying . . . a plurality of aerial images of a roof at the same time, each of the aerial images providing a different view, taken from a different angle of the same roof; displaying . . . respective line drawings representing features of the roof." Claims 16 and 28 recite similar limitations. Patent Owner contends that Petitioner has not shown that these limitations are disclosed by the asserted art. PO Resp. 9–11. The crux of Patent Owner's argument is that while "Avrahami includes illustrative Figures 1, 3, and 5 that show side-by-side images of a roof, those are included in the paper to graphically illustrate the ***internal*** operation of the Avrahami algorithm." *Id*. at 9. According to Patent Owner, "[t]he mere presence of those figures does not teach or disclose that the images in the figures should be displayed during performance of the algorithm." *Id.* Further, Patent Owner asserts that the algorithm performed in Avrahami does not require the use of a second image because it provides a first image in which the user selects seed points and then the remainder of the algorithm occurs automatically. *Id.* at 10.

Petitioner disputes this reading of Avrahami and posits that the images shown in Avrahami are not renderings of internal operations, but rather images from a MATLAB implementation of Avrahami's system. Reply 1; *see also* Ex. 1004, 46 ("In the course of research, a semi-automatic system

for performing extraction from aerial images was developed using the MATLAB® environment, in order to examine the algorithm efficiency.”). As part of its discussion of testing performed in MATLAB, Avrahami notes that “Figures 3 and 5 show the extraction of polygons in the image space in test areas 1 and 2, accordingly.” Ex. 1004, 47. Based on those disclosures, Petitioner argues that “Figures 1, 3, and 5 of Avrahami clearly show a user interface with left and right image spaces of a roof,” and “[t]he depictions of these spaces is enough to teach a POSITA to display both a right and left image space, particularly where the left space must be displayed.” Reply 2; *see also* Ex. 2017, 69:14–21 (testimony of Petitioner’s expert that the figures shown in Avrahami are images that were shown on a computer screen).

We agree with Petitioner. Avrahami describes its algorithm as providing “for semi-automatic 3D spatial *polygon extraction from a pair of colored aerial images* with a known external model solution.” Ex. 1004, 43 (emphasis added). Avrahami touts that one of the advantages of its system is that “the operator can identify *at a glance* which buildings can be mapped by this method so as to combine it with traditional manual extraction or other semi-automatic method.” *Id.* at 48 (emphasis added). Figure 1 shows a side-by-side comparison of the images in the pair. *See id.* at Fig. 1 (displaying left and right polygons going through Avrahami’s iterative matching process). Further, we credit the testimony from Petitioner’s expert, Mr. Harold Schuch, that one skilled in the art would understand Avrahami’s images to be what “you see . . . on a computer screen” as “part of the production.” Ex. 2017, 69:20–21; *see also id.* at 71:2–4 (explaining that “[t]his is an actual production image”). Therefore, we find that

Petitioner has proffered sufficient evidence that Avrahami discloses the disputed "displaying" limitation.

b. "in response to user input, changing . . . the line drawing . . . that overlies the first aerial image of the roof" (claim 1)

Independent claim 1 requires "in response to user input, changing, by the at least one processor of the roof estimate report system, the line drawing representing a feature of the roof that overlies the first aerial image of the roof." Patent Owner asserts that Avrahami does not teach this limitation because "[t]he only user interaction disclosed in Avrahami is the manual placement of a seed point on an aerial image at the outset of the algorithm, which occurs *before* any line drawings even exist, and thus cannot constitute a 'change' in the line drawing." PO Resp. 12. Patent Owner contends that once the seed point is placed, there are no further user interactions during the process and thus there is no point in time in which the line drawing is modified in response to a user input. *Id.* at 13. Patent Owner further contends that "the selection by the user of an initial 'seed *point'* in Avrahami is not a change to a *line* drawing. Rather than indicating a change in a line, the initial 'seed point' merely reflects 'manual pointing to the center' of an area on the left image." *Id.* at 16 (citing Ex. 1004, 43).

Petitioner responds by arguing that Avrahami's seed points are processed one at a time and the resulting "spatial polygons" (line drawings) are modified as the seed points are processed. Reply 3–4. Avrahami states that "[p]rior to the final stage we must ensure that each polygon in both images includes one seed point. If there are two or more pointers for a single polygon, then these pointers must be merged and consequently the areas which are represented by the pointers are also merged." Ex. 1004, 46. In other words, a polygon is generated based on a single seed point and then

modified to account for the existence of an additional seed point. We find that these disclosures would teach or at least suggest to one of ordinary skill in the art that the first line drawing is changed in response to user input. Therefore, we find that Petitioner has proffered sufficient evidence to show that one of ordinary skill in the art would have learned the disputed limitation from the cited disclosures in Avrahami.

c. "in response to the changing, making corresponding changes . . . to the line drawing overlying the second aerial image" (claims 1, 16, and 26)

Claim 1 requires "in response to the changing, making corresponding changes, by the at least one processor of the roof estimate report system, to the line drawing overlying the second aerial image." Claims 16 and 26 recite similar limitations. We interpret this language to mean that there are two line drawings that share common elements and that a user-driven change to one line drawing will cause a commensurate change to the second line drawing.

Avrahami's method uses at least two aerial images and these images have corresponding features, but may have differences attributable to things such as images taken from different camera angles. Ex. 1004, 46. The polygon overlaying the left image is created with user input ("seed points") via a flood fill operation. *Id.* at 43. The polygon overlaying the right image is created, in part, based on calculations made regarding the height of the polygon overlaid on the left image. *Id.* at 45. The seed point from the left image is transferred to the right image and the right image's polygon is calculated using the same flood fill technique that created the left image's polygon. *Id.* The homologous points between the two polygons are found by "matching" points via a process that iteratively "slides" the left polygon

over to the right image. *Id*. In particular, the points in the left polygon are assigned the estimated average height, which was calculated previously. With each iteration, these heights of points in the left polygon are updated until the conditional equation is optimized. During the iterations the left polygon "slides" in the direction of the epipolar line in the right image space. *Id.*

Patent Owner first argues that Avrahami does not teach or suggest allowing the user to change any line drawing. PO Resp. 18. This argument is a restatement of the argument addressed above and we do not find it persuasive for reasons previously discussed. *See* § III.D.1.b. Patent Owner also argues that the iterative sliding process described in Avrahami does not teach the recited change to a second line drawing because that process "does not make changes to the left polygon which are then propagated to the right polygon." *Id.* at 18–19. Instead, according to Patent Owner, "the left and right polygons . . . are created independently using a flood fill technique that is performed separately for each of the two images." *Id*. at 19.

Petitioner argues that Avrahami teaches this limitation because it "discloses that the flood fill operation in the right image is *based on* the operations in the left image." Reply 6. In particular, Petitioner explains, "[a]fter the system of Avrahami changes the first line drawing by extracting a polygon for a seed point in the left image, the system will transfer that exact seed point to the right image and change the second line drawing in the right image "**in the same way as in the left image**." Reply 6 (quoting Ex. 1004, 45 (emphasis Petitioner's)). Thus, "[t]he change to the second line drawing is based on the change in the first line drawing because the left polygon itself is the change in the first line drawing and that polygon causes

the change to the second line drawing by sliding to the right image." Reply 7–8.

As discussed above, we agree with the Petitioner's argument that the changes to the first line drawing are responsive to the placement of the seed point. As to the second line drawing, we find that this is a much closer call. While the operator's input (the seed point) is used to generate the first line drawing, the relationship between the seed point and second line drawing is more attenuated. The claim recites, in relevant part, making "corresponding changes" to the second line drawing "in response to" changing the first line drawing. In our view, it is a close call as to whether in Avrahami the change occurs in the second line drawing in response to the change in the first line drawing, or whether it is a change made in response to user input, without regard to the first line drawing. Based on the evidence presented in this case, we are persuaded that one of ordinary skill in the art probably would have learned this limitation from Avrahami. *See* Ex. 1007 ¶¶ 61–63 (Petitioner's expert describing Avrahami's algorithm); Ex. 1010, 22:12–18, 23:24–24:5 (Patent Owner's expert acknowledging "a relationship" and "a dependency" between the seed point and the second line drawing). We find, however, that Petitioner has not made a strong showing as to this element.

d. "generat[ing] and output[ting] a roof estimate report" (claims 1, 16, and 26)

Claims 1, 16, and 26 require "generat[ing] and output[ting] a roof estimate report using a report generation engine, wherein the roof estimate report includes numerical values for corresponding slope, area, or lengths of edges of at least some of a plurality of planar roof sections of the roof." Patent Owner argues that the specific limitations detailing the content of the roof estimate report are entitled to patentable weight. PO Resp. 24–29.

Patent Owner also argues that Applicad's disclosures do not include all of the elements of the roof estimate report stated in the claims. PO. Resp. 29–34.

Patent Owner asserts that the detailed and specific requirements of the roof estimate report have a functional and structural relationship to the substrate. *Id.* at 25–27. According to Patent Owner, the benefits of the claimed invention would not be fully obtained without a roof report that provides the specific values set forth in the claim. *Id.* at 26. Further, "[t]he informational content of the report and types of annotations contained in the report are inexorably linked to the method, as the method allows for those values to be accurately derived from aerial images." *Id.* at 26–27.

We do not agree. The '737 patent claims the content of information that may be provided on a piece of paper. *See, e.g.*, Ex. 1001, 8:10–12 ("FIGS. 3A-3F illustrate individual pages of an example roof estimate report generated by an example embodiment of a roof estimation system"). First, we must ascertain whether the "matter [is] claimed for what it communicates." *In re DiStefano*, 808 F.3d 845, 850 (Fed. Cir. 2015). Here, the claim recites plan views (one or more drawings) annotated with numerical values to communicate quantities such as slope, area, or lengths of edges to a human viewer. Next, we must determine "if the claimed informational content has a functional or structural relation to the substrate." *Id.* "Only if the limitation in question is determined to be printed matter does one turn to the question of whether the printed matter nevertheless should be given patentable weight. Printed matter is given such weight if the claimed informational content has a functional or structural relation to the substrate." *Id.*

We are persuaded that the drawings and numerical values are not functionally or structurally related to the substrate, whether the substrate might be computer memory, a computer display, an electronic file, or a piece of paper. *See* Manual of Patent Examining Procedure (MPEP) § 2111.05 (9th ed., Rev. 07.2015, Nov. 2015) ("[W]here the claim as a whole is directed [to] conveying a message or meaning to a human reader independent of the intended computer system, and/or the computer-readable medium merely serves as a support for information or data, no functional relationship exists."). Patent Owner asserts that "[t]here is a strong functional relationship between that method and the contents of the roof report because those contents—i.e., slope, area, and lengths of edges of the roof—are the product of the method, thus improving it by allowing it to be useful for purposes of roof estimation." PO Resp. 28.

We do not find this to be sufficient because the numbers on the page are not themselves used as part of the method. This stands in stark contrast to *In re Miller*, 418 F.2d 1392 (CCPA 1969), where the numbers printed on the measuring cup were used to carry out the intent of the claimed invention and not just to document the outcome. In *Miller*, there was "a new and unobvious functional relationship between a measuring receptacle, volumetric indicia thereon indicating volume in a certain ratio to actual volume, and a legend indicating the ratio, and in our judgment the appealed claims properly define this relationship." *Id.* at 1396. Here, we are presented with no such relationship. The roof report is merely a printed description of the method's output and it adds no functional or structural elements to the paper or computer screen on which the report appears. We are persuaded that the content of the information does not modify or

otherwise affect the underlying computer or paper, nor does it represent a new and non-obvious relationship with the substrate. Thus, the claimed content of the information is not entitled to weight in the patentability analysis. *See In re Ngai*, 367 F.3d 1336, 1338 (Fed. Cir. 2004); *Ex parte Nehls*, 88 USPQ2d 1883, 1887–90 (BPAI 2008) (precedential) (discussing non-functional descriptive material). In other words, what the content of the information, graphical or textual, may convey to the human mind does not change the functionality of the computer-implemented method and fails to distinguish over generating and displaying any graphical or textual information.

We are cognizant that the challenged claims include claims drawn to a method rather than an apparatus or a manufacture. The printed matter analysis, however, applies equally to process claims. The step of generating and outputting a roof estimate report "wherein the roof estimate report includes" particular information is similar to the "informing" step in *King Pharmaceuticals, Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274–79 (Fed. Cir. 2010). In *King Pharmaceuticals*, the subject matter of dependent claim 21, which recited "informing" the patient that the drug administered in accordance with base claim 1 had certain therapeutic effects, was subject to the rationale of "printed matter" cases even though the claims were cast as a method. The content of the "informing" was thus not given patentable weight. *See id.* Thus, we are persuaded that the detailed requirements as to the contents of the roof estimate report are not entitled to patentable weight.

e. "transmitting roof measurement information based . . . on the change of the line drawing" (claim 9)

Claim 9 requires "transmitting roof measurement information based at least in part on the change of the line drawing representing a feature of the

roof that overlies the first aerial image of the roof." In addition to reiterating its earlier "modifying" argument, Patent Owner argues Avrahami does not generate or transmit "roof measurement information." PO Resp. 36–40. We disagree.

Avrahami creates and displays a model in a local coordinate system as depicted in Figures 4 and 6 (reproduced below):

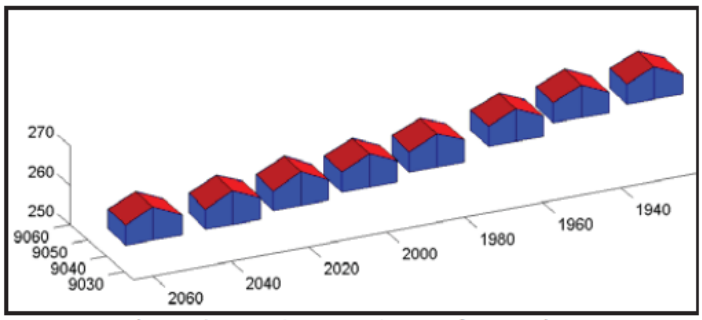

Figure 4. Test Area no. 1 - Roof extraction

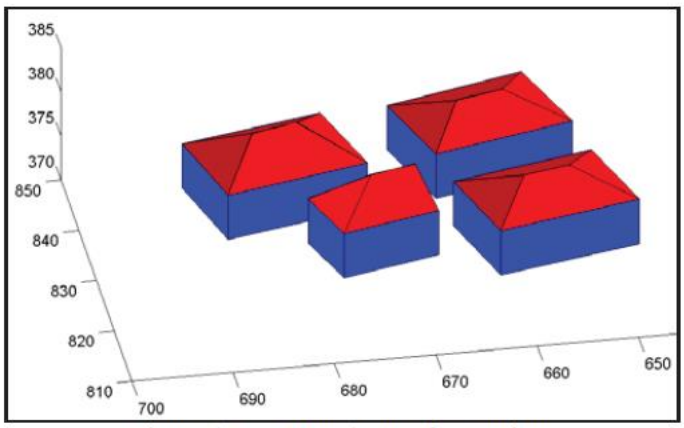

Figure 6. Test Area. 2 - Roof extraction

Figures 4 and 6 present extracted roofs in a local coordinate system. Ex. 1004, 47. We agree with Petitioner that Avrahami displays "roof measurement information" by displaying a roof in a local coordinate system, even though Avrahami does not label its measurement units. *See* Pet. 47; Reply 15–16. That is, because the claim term at issue does not require any particular units of measure, the numerical values along the axes in figures 4

and 6 convey "roof measurement information," as claimed. We also agree with Petitioner automatic extraction of the 3D roof in a local coordinate system (i.e., "query[ing] and present[ing]" spatial data, Ex. 1004, 43) is a description of *transmitting* roof measurement information, as claimed. *See* Pet. 46; Reply 16–17. The claim term at issue requires only "transmit[ting]" roof measurement information—it does not specify any particular source or destination for the transmission. The '737 patent's specification references transmission within the same system. *See* Reply 16 (citing Ex. 1001, 16:15–17, Fig. 8). Thus, it is of no moment that Avrahami does not disclose transmitting roof measurement information to a third-party system or separate computer, as Patent Owner argues. *See* PO Resp. 38–39.

f. "modifying a three dimensional model of the roof"(claim 25)

Patent Owner argues that Avrahami does not disclose "modifying a three dimensional model of the roof based at least on the modification of the line drawing overlaid on the first aerial image," as recited in claim 25. PO Resp. 40–45. Petitioner relies on the algorithm shown in Figure 2 as corresponding to modifying a three-dimensional model as claimed. Pet. 50–51.

As explained above, Avrahami's system uses an iterative method for maximal matching between the two polygons by "sliding" the left polygon in the direction of the epipolar line in the right image space until the polygons achieve a maximum overlap in the right image space. Ex. 1004, 45; Ex. 1007 ¶ 63. Figure 2 of Avrahami is reproduced below:

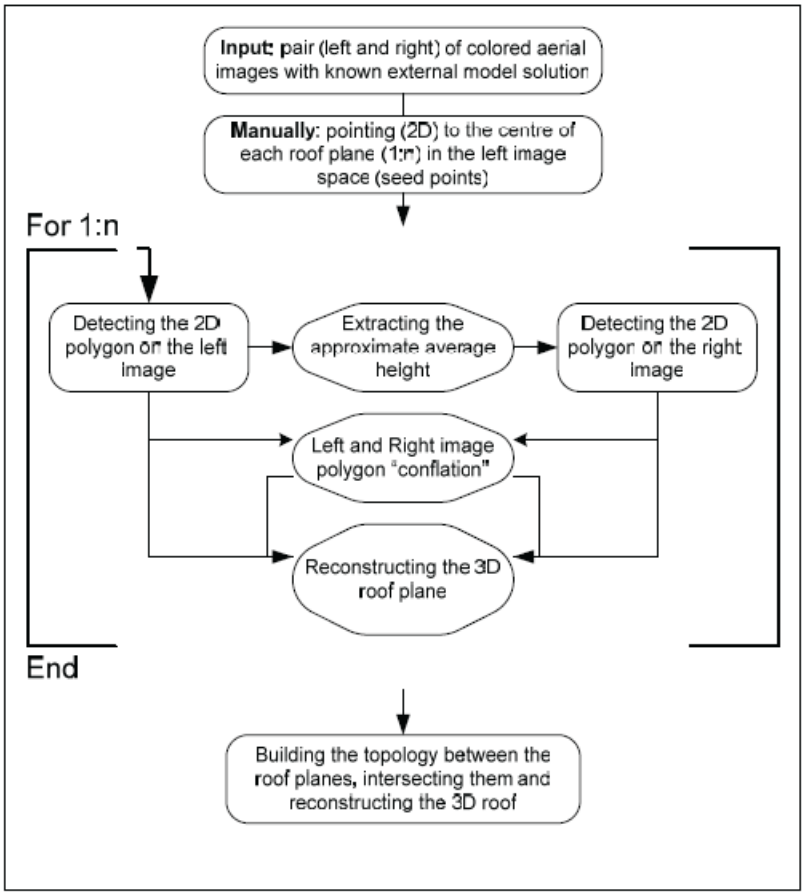

Figure 2. Flowchart of the roof extraction

Ex. 1004, 46. Figure 2 depicts a flowchart of Avrahami's roof extraction by matching right and left polygons. The algorithm consists of three main stages: manual pointing (seed points in 2D to the center area of each roof plane); performing an automatic process for extraction of the roof planes for each seed point; and building topology between the planes, with the outcome being a 3D roof. *Id*. at 46.

Patent Owner argues that Avrahami's algorithm does not modify a three-dimensional model of the roof based on the received indication of the feature of the building because Avrahami's "algorithm builds a three dimensional model of the ***roof*** only ***once***, at the very end of the process, which is never subsequently modifiable." PO Resp. 41. According to Patent

Owner, "[t]he creation of individual spatial polygons are merely intermediary steps on the path to initial creation of the model . . . before this final stage, Avrahami only creates individual spatial polygons ***that are not yet part of any model of a roof***." *Id*. at 42. We disagree.

As Petitioner explains, Patent Owner's argument is based on an incorrect assumption that modifying a three-dimensional model of the roof requires first generating a fully-assembled model and then making a modification to that fully-assembled model. Reply 17. The claim language at issue is not so limited. The '737 patent's specification explains that "[m]odifying the 3D model may include adding or updating" features on an otherwise incomplete model. Ex. 1001, 22:44–46; *see id*. at 22:52–59. Avrahami discloses creating individual roof planes, modifying those planes prior to assembly, and assembling the planes into a final three-dimensional model. *See* Ex. 1004 at 44–46. Even though, as Patent Owner asserts, Avrahami's final 3D roof model is not modified post-assembly, Avrahami teaches the limitation at issue because an *incomplete* or partial model of the roof is still a model of the roof. Thus, modifying a three-dimensional model of the roof includes modifying individual roof planes prior to assembly and sequentially adding roof planes to a three-dimensional model, as Avrahami teaches.

g. "reference grid" (Claim 10)

Patent Owner argues that the combination of Avrahami and Perlant do not render claim 10 obvious because Perlant does not teach or suggest "registering, based on the received indication of the point, the aerial image to a reference grid corresponding to a three-dimensional model" as required by claim 10. PO Resp. 45–48. Patent Owner asserts Perlant fails to teach

the disputed limitation because Perlant does not disclose a three-dimensional reference grid or a three dimensional model. *See id*. at 45.

We disagree with Patent Owner. As Petitioner explains, "[c]laim 10 only requires a 'reference grid,' not a *three-dimensional* reference grid." Reply 20. In addition, Perlant's alleged failure to disclose generating or modifying a three-dimensional roof model does not undermine Petitioner's obviousness challenge because Avrahami discloses that limitation. *See* Ex. 1004, Figs. 4, 6. Thus, we agree with Petitioner that the combination of Avrahami and Perlant teaches "registering, based on the received indication of the point, the aerial image to a reference grid corresponding to the three-dimensional model," as required by claim 10.

2. Remaining Undisputed Elements

Petitioner contends the combination of Avrahami and Applicad discloses the remaining limitations of claims 1, 9, 16, 19, 22, 25–28, 31, and 34–36, and that the combination of Avrahami, Applicad, and Perlant discloses the remaining limitations of claim 10. *See* Pet. 37–54. Patent Owner does not address the merits of Petitioner's assertions regarding the remaining limitations. *See* PO Resp. 9–49. We agree with Petitioner's assertions and adopt them as our own.

3. Rationale for Combining the Asserted Teachings in the Prior Art

a. Reason to Combine Avrahami and Applicad

Petitioner argues that "[i]t would have been obvious to a person of ordinary skill in the art to include an annotated roof report, as taught by Applicad, with the system of Avrahami for easy and effective communication of roof measurement results to a user." Pet. 56. Petitioner asserts that Applicad discloses importing a drawing from another system and

then creating a report based on that input. *Id*. at 29. According to Petitioner, Avrahami's line drawing system could be used as input for Applicad's reporting system. *Id*. at 12; *see id*. at 20–23, 46. Petitioner asserts that this combination would be within the skills of one or ordinary skill in the art. *Id.* at 54–55.

Patent Owner asserts that one skilled in the art would not combine Avrahami and Applicad as Petitioner suggests. PO. Resp. 34–36. According to Patent Owner, "Avrahami and Applicad are fundamentally incompatible because Applicad cannot import three-dimensional models" from other programs. PO. Resp. 34.

Petitioner responds that this mischaracterizes its argument because its challenge is not predicated on a physical combination of Avrahami and Applicad, but rather the predictable results that would have been achieved by using the teachings of Applicad in conjunction with a 3D CAD system. Reply 13–15. Further, Petitioner directs us to Applicad's discussion of importing drawings in a ".dxf format" and Applicad's reference to its software "sit[ting] on top of a very powerful 3 dimensional CAD package." *Id*. at 14 (quoting Ex. 1005, 3); *see* Ex. 1007 ¶ 57 ("Further, the Applicad system can also import a model generated in another computer program, in the form of a roof or wall outline in three dimensions. *See, e.g.*, Applicad, pp. 2, 4.").

We find Patent Owner's assertions that Applicad cannot be incorporated in Avrahami to be unpersuasive because the obviousness analysis is not predicated on the physical combinability of the references, but whether the claimed invention is rendered obvious by the teachings of the prior art as a whole. *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en

banc). This is true because "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . but rather whether 'a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention.'" *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (internal citations omitted). We are persuaded by Petitioner's argument that one of ordinary skill in the art would have combined the teachings of the references in order to achieve the "easy and effective communication of roof measurement results to a user." Pet. 56. Thus, the combination of the teachings of Applicad and Avrahami would have allowed one of ordinary skill in the art to achieve a predictable result. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007). Therefore, we are persuaded that Petitioner has put forth sufficient rationale to support the combination of the teachings of Applicad and Avrahami.

b. <u>*Reason to Combine Perlant*</u>

Petitioner explains that one skilled in the art would have found it obvious to combine Perlant's scene registration process with the line drawing and matching features of Avrahami because "Perlant improves this device with registration functionality and the result would be predictable." Pet. 59; *see* Pet. 32 (noting that "Perlant discloses the ability to augment 3D model generation by scene registration in aerial images" (citing Ex. 1006, 485)). In light of that explanation, we find Petitioner has articulated sufficient reasoning with some rational underpinning to support the legal conclusion that its proffered combination of references would have been obvious to one of ordinary skill in the art. *See KSR*, 550 U.S. at 418. That

is, we agree with Petitioner that claim 10 represents a combination of familiar elements according to known methods (i.e., Avrahami's line drawing and matching features, Applicad's roof estimate report, and Perlant's scene registration process), yielding only a predictable result. *See id*.

4. Secondary Considerations of Nonobviousness

Notwithstanding what the teachings of the prior art would have suggested to one skilled in the art, objective evidence of nonobviousness may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence of nonobviousness "may often be the most probative and cogent evidence in the record" and "may often establish that an invention appearing to have been obvious in light of the prior art was not." *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). To contest obviousness, in addition to the arguments outlined above, Patent Owner asserts that objective indicia of nonobviousness—commercial success and industry praise in particular—confirms that the claimed invention is nonobvious. *See* PO Resp. 49–71. We agree with Patent Owner that objective indicia of non-obviousness are decisive in this case, as explained below.

a. Nexus

To be relevant, evidence of nonobviousness must be commensurate in scope with the claimed invention. *In re Huai-Hung Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011). Thus, to be accorded substantial weight, there must be a nexus between the merits of the claimed invention and the evidence of secondary considerations. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir.

1995). "[N]exus" is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining nonobviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). There is a "presumption of a nexus" when a product is "coextensive" with a patent claim. *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 723 F.3d 1363, 1372 (Fed. Cir. 2013).

We are persuaded by Patent Owner's extensive evidence of nexus between its Render House and Twister products and the challenged claims. Patent Owner steps through each challenged claim on an element-by-element basis and directs us to images and specific passages from its Render House and Twister user guides that it argues embody the limitations of each challenged claim. PO. Resp. 52–65. Patent Owner also supports its assertion of nexus with testimony in the form of a Declaration from its expert, Dr. Chandrajit Bajaj, that includes a claim chart detailing where each limitation of the challenged claim is found in its Twister and Render House products. Ex. 2031, 41–100.[4]

The Federal Circuit has held that "if the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus." *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000). Patent Owner has put forth sufficient evidence to show that its Twister and Render House

[4] Here, we cited to page number and not paragraphs of Dr. Bajaj's report because the paragraph containing the claim charts stretches over many pages.

products embody the elements of the challenged claims and thus, we look to Petitioner to rebut this presumed nexus and acknowledge that the presumption "cannot be rebutted with mere argument; evidence must be put forth." *Id.* Petitioner argues that we should discount Patent Owner's evidence of nexus because "Dr. Bajaj formed his opinion on Twister and Render House in a WebEx presentation with Patent Owner's engineers," but did not actually use the Twister or Render House products himself. Reply 22.

Under Federal Rule of Evidence 702, an expert witness may offer opinion testimony if (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert has reliably applied the principles and methods to the facts of the case. Petitioner has not moved to exclude Dr. Bajaj's testimony as impermissible under Rule 702, but instead has argued that we should not rely on Dr. Bajaj's testimony because it is not evidence that that we can use to explain whether the sequence of screenshots provided by Patent Owner's counsel embodies the elements of the challenged claims. Reply 22–23. We do not agree with Petitioner.

Dr. Bajaj testified that he "discussed these products with engineers at Patent Owner who use the Twister and Render House products on a regular basis" and that during those discussions he "personally directed Patent Owner's engineers to operate the Twister and Render House software to confirm [his] understanding of the products' operation." Ex. 2031 ¶ 84. He also testified that "[m]y understanding of the features of the Twister and

Render House products are further confirmed based on my review of user manuals for these two products." *Id.* We find this explanation credible. Petitioner objects to the screenshots in Dr. Bajaj's declaration because they were not personally prepared by Dr. Bajaj. Reply 22–23. Dr. Bajaj, however, is testifying as to his opinion of the capabilities and features of the Twister and Render House products and these screenshots are merely visual aids to assist the Panel in understanding how Dr. Bajaj reached his conclusion. We see no impropriety in his use of images collected from other sources to document his opinions as to the operation of the products at issue. Thus, we are not persuaded by Petitioner's arguments and we find that Patent Owner has provided sufficient evidence to establish a nexus between the challenged claims and the Twister and Render House products.

b. *Commercial Success*

Patent Owner contends that its Twister and Render House products "used the patented invention to achieve tremendous commercial success by creating accurate roof estimate reports faster and at less expense than previous solutions." PO Resp. 66. Patent Owner asserts that Petitioner recognized the benefits of those products and "entered a contract with Patent Owner for its roof reports soon after the release of Patent Owner's first product." *Id.* at 67 (citing Ex. 2021 ("EagleView and Xactware announced a new technology integration that will allow Xactware customers to access EagleView's breakthrough roof measurement capabilities.")). Patent Owner also provides evidence of rapid growth of its business after the introduction of these products. *Id.* at 67 (citing Ex. 2022 (noting "three-year revenue growth of 2,406 percent")). Patent Owner directs us to statements from Scott Stephenson, President and CEO of Verisk Analytics, which is

Petitioner's parent company. *Id*. at 68–69 (citing Ex. 2023). In a call with investors, Mr. Stephenson "announced the acquisition of EagleView Technologies Corporation, or EVT, for a purchase price of $650 million. EVT is the parent company of both Pictometry International, a recognized leader in imagery, and EagleView, which is well known in the insurance industry." Ex. 2023, 3. He also touted Patent Owner's "significant intellectual property, including over 20 issued patents" and its position as a market leader, noting that:

> Eagle View division is a leading provider of reports on structures used in claims processes in the property and casualty insurance and the contractor markets. The Eagle View division does at least some business with 24 of the top 25 insurance companies, as well as with over 30,000 building contractors.

Id.

Patent Owner further provided unrebutted evidence that "approximately 96 percent of the top 25 insurance carriers rely on [Eagle View Technologies 3D aerial roof measurement reports] in their claims departments." Ex. 2020, 1; *see also* Ex. 2029, 8 (Verisk Analytics presentation noting that 24 of top 25 insurance companies and 30,000 contractors are Eagle View customers). In addition, Patent Owner's evidence shows that its products are used by "about one-fifth of the roofing contractor market, according to an estimate by market researcher IbisWorld." Ex. 2024. Patent Owner's financial reports show both that it sold a significant number of roofing reports and that its sales grew significantly between 2009 and 2015. *See* PO Resp. 67–68. We find that this information, taken together with statement from others in the industry (*see* Ex. 2029) gives us a view of Patent Owner's place in the relevant

market and persuades us that Patent Owner's Twister and Render House products experienced significant commercial success and wide-spread use in the industry.

Finally, Patent Owner offers the testimony of Chris Johnson, Vice President of Eagle View Technologies, to discuss financial reports for the years 2009–2012. Ex. 2011. In his declaration, Mr. Johnson testifies that the reports submitted into evidence all "reflect sales of reports created using the Twister and Render House products." *Id*. ¶¶ 3–6.

Petitioner asserts that "Patent Owner has failed to prove a nexus exists between the claims of the '737 patent and the purported commercial success." Reply 24. Our reviewing court has held that for evidence of commercial success to be relevant, "the patentee must establish a nexus between the evidence of commercial success and the patented invention." *Wyers v. Master Lock Co*., 616 F.3d 1231, 1246 (Fed. Cir. 2010). As noted above, however, Patent Owner has provided extensive evidence that the Twister and Render House products are coextensive with the challenged claims and that the reports sold were created using the Twister and Render House products. Thus, we are persuaded that nexus exists between the challenged claims and the commercially successful products at issue.

Petitioner also asserts that we should discount Patent Owner's evidence of commercial success because it "relates to the sale of the roof reports, not the license or sale of the Twister and Render House products themselves." Reply 24. We do not find this argument persuasive. As noted above, Patent Owner provided extensive evidence that the Twister and Render House products are coextensive with the challenged claims, and that the commercially successful reports were created using the Twister and

Render House products. A patent challenger may respond to an allegation of presumed nexus by presenting evidence that shows the proffered objective evidence was "due to extraneous factors other than the patented invention." *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1393 (Fed. Cir. 1988). Such extraneous factors include additional unclaimed features or arguably, as is the case here, features to which little or no patentable weight has be ascribed. *See, e.g., Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1378 (Fed. Cir. 2000) (applying presumption even though commercial embodiment had unclaimed mobility feature). As noted above, however, patent challenger cannot successfully rebut the presumption with argument alone—it must present evidence. *Brown & Williamson*, 229 F.3d at 1130 (citing *Demaco*, 851 F.2d at 1393). Petitioner has not done so in this case.

Patent Owner may commercialize its technology in many different ways. The choice to sell the output of the claimed method or claimed apparatus, as opposed to selling or licensing software that practices the claims does not undermine Patent Owner's commercial success in the marketplace that is attributable to its claimed invention. Patent Owner is tasked with providing evidence tying the commercial success and the claims. That commercial success may take many forms and may be the result of many different business strategies, but in the end, for our purposes, the question is whether Patent Owner has shown a sufficient nexus between the commercial success and the claims. We are persuaded that Patent Owner has provided such evidence here. As noted above, Patent Owner and its declarant have extensively analyzed the Twister and Render House products and shown that these products embody the challenged claims in order to

generate the roofing reports that it sold, and that the reports sold were created using the Twister and Render House products. Petitioner has not made any showing that the commercial success is based on something other than the contributions of the claimed invention to the generation of roofing reports. Thus, in light of extensive evidence of nexus, we are persuaded that it is proper for Patent Owner to rely upon financial information relating to the sale of reports generated by the Twister and Render House products.

c. Industry Praise

Praise from industry participants, especially competitors, is probative as to obviousness because such participants "are not likely to praise an obvious advance over the known art. Thus, if there is evidence of industry praise of the claimed invention in the record, it weighs in favor of the non-obviousness of the claimed invention." *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016). Petitioner described Patent Owner's products as "[u]sing aerial photography and patent-pending software [to] accurately calculate[] measurements for the roof's ridges, rafters, valleys, slopes and more." Ex. 2021, 1. Petitioner further noted that the "process saves contractors and roofers hours of time spent measuring and scoping a roof." *Id.*

Verisk Analytics described Patent Owner as "a leader in sophisticated imagery for uses in the property and casualty, contractor, government, and commercial spaces." Ex. 2023, 3. Verisk's CEO stated that Patent Owner is "a leading provider of reports on structures used in claims processes in the property and casualty insurance and the contractor markets." *Id.* He also noted that "[Patent Owner's] solutions provide detailed, accurate

measurements without the danger and added time of an adjustor climbing onto a roof." *Id.* at 4.

Patent Owner directs us to an article from Bloomberg in which a roofer touts the accuracy of Patent Owner's products, stating that "most insurance carriers at this point treat [Patent Owner's roofing reports] as gospel." Ex. 2024, 2. Patent Owner also directs us to an article from CNN Money in which a partner at a claim investigation company stated that "[h]aving an Eagle View report has become an industry accepted standard." Ex. 2025, 1. An article from the California Business Journal states that "Eagle View made one of the biggest breakthroughs in the history of the industry by creating a state-of-the-art software program that remotely snaps sophisticated aerial pictures of roofs and accurately measures lengths, pitches, valleys and other hard-to-see areas on roofs." Ex. 2027, 2. In that article, a roofer is quoted as saying that "Eagle View changed the industry forever with this technology." *Id*. We find Patent Owner's extensive evidence of industry praise weighs in favor of the non-obviousness of the claimed invention.

d. Conclusions on Obviousness

We have considered Petitioner's evidence and arguments about the asserted prior art's teachings and the reasons why one skilled in the art would combine them. We have also weighed the objective indicia of non-obviousness presented by Patent Owner. As noted above (*see supra* § III.D.1.c), we find certain aspects of Petitioner's obviousness allegations to be at best a close call. On the other side, we are persuaded that Patent Owner has shown strong evidence of nexus between the challenged claims and the Twister and Render House products used to produce the

commercially successful reports. We are persuaded also that Patent Owner has shown strong evidence of industry praise. "These real world indicators of whether the combination would have been obvious to the skilled artisan in this case 'tip the scales of patentability.'" *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058. Thus, upon consideration of the strength of Petitioner's obviousness allegations and the strength of Patent Owner's contentions as to secondary considerations of non-obviousness, we are persuaded that Petitioner has not met its burden to show that the challenged claims would have been obvious over the asserted prior art.

IV. PATENT OWNER'S MOTION TO EXCLUDE DEPOSITION TESTIMONY AND MOTION TO STRIKE PETITIONER'S REPLY

Patent Owner filed a Motion to Exclude the re-direct deposition testimony of Petitioner's expert (pages 117–120 of Ex. 2017). Paper 41. Because this Decision does not rely on that testimony, we deny Patent Owner's Motion as moot.

Patent Owner also filed a Motion to Strike Petitioner's Reply for "improperly include[ing] new arguments" related to claim 25's "modifying" limitation. Paper 37, 1. Upon considering Patent Owner's arguments (Paper 37, 1–3) and Petitioner's Opposition to the Motion to Strike (Paper 38, 1–3), we deny Patent Owner's Motion to Strike because we agree with Petitioner that its arguments submitted with the Reply, including the arguments addressing the "modifying" claim limitation, fall within the proper scope of a reply. *See* Paper 38, 1–3.

V. CONCLUSION

In conclusion, Petitioner has not shown by a preponderance of the evidence that claims 1, 9, 10, 16, 19, 22, 25–28, 31, and 34–36 of the ’737 patent are unpatentable under 35 U.S.C. § 103(a).

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 1, 9, 16, 19, 22, 25–28, 31, and 34–36 of the ’737 patent are unpatentable as obvious over the combination of Avrahami and Applicad; and

FURTHER ORDERED that Petitioner has not shown by a preponderance of the evidence that claim 10 of the ’737 patent is unpatentable as obvious over the combination of Avrahami, Applicad, and Perlant; and

FURTHER ORDERED that Patent Owner’s Motion to Exclude (Paper 41) is DENIED as moot; and

FURTHER ORDERED that Patent Owner’s Motion to Strike Petitioner’s Reply (Paper 37) is DENIED; and

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

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