

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ADB SAFEGATE SWEDEN AB, ADB SAFEGATE BV, and
ADB SAFEGATE AMERICAS, LLC,

Petitioner

v.

HONEYWELL INTERNATIONAL INC.,

Patent Owner

Case PGR2023-00053
Patent 11,538,349 B2

PATENT OWNER'S RESPONSE

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Patent Owner Honeywell International Inc. respectfully submits this Response to the Petition for post-grant review of U.S. Patent No. 11,538,349 (“the ’349 Patent”) filed by Petitioners ADB Safegate Sweden AB, ADB Safegate BV, and ADB Safegate Americas, LLC.

I. Introduction

The ’349 Patent is directed to an invention that detects, tracks, and guides an aircraft in or near the ramp area of an airport, *e.g.*, to perform precise docking. Ex1001 (’349 Patent) at 1:7-9, 3:4-18, 4:26-43, 5:18-28. In view of the limitations expressly set forth in the system claims (18-20), and that would be understood to be utilized in the method claims (1-17) because of the recited types of data being received and merged, and the guidance being displayed, the claimed invention utilizes: (i) a camera image sensor to capture the image data of the aircraft while it is approaching a ramp area of an aircraft, (ii) a LIDAR or RADAR sensor for capturing sensor data of the aircraft while it is approaching a ramp area of an aircraft; (iii) a computing device for receiving and merging the two different types of data, to create a merged data set including, *e.g.*, information on the aircraft’s position, orientation, speed, proximity for other objects, and data for a 3D model, and (iv) a computing device for displaying the directional and speed guidance to a pilot with the merged data set.

An embodiment showing the different types of sensors is shown in Figure 2, reproduced below, with the Lidar/Radar sensor (220 highlighted in red) and the camera image sensor (222 highlighted in blue):

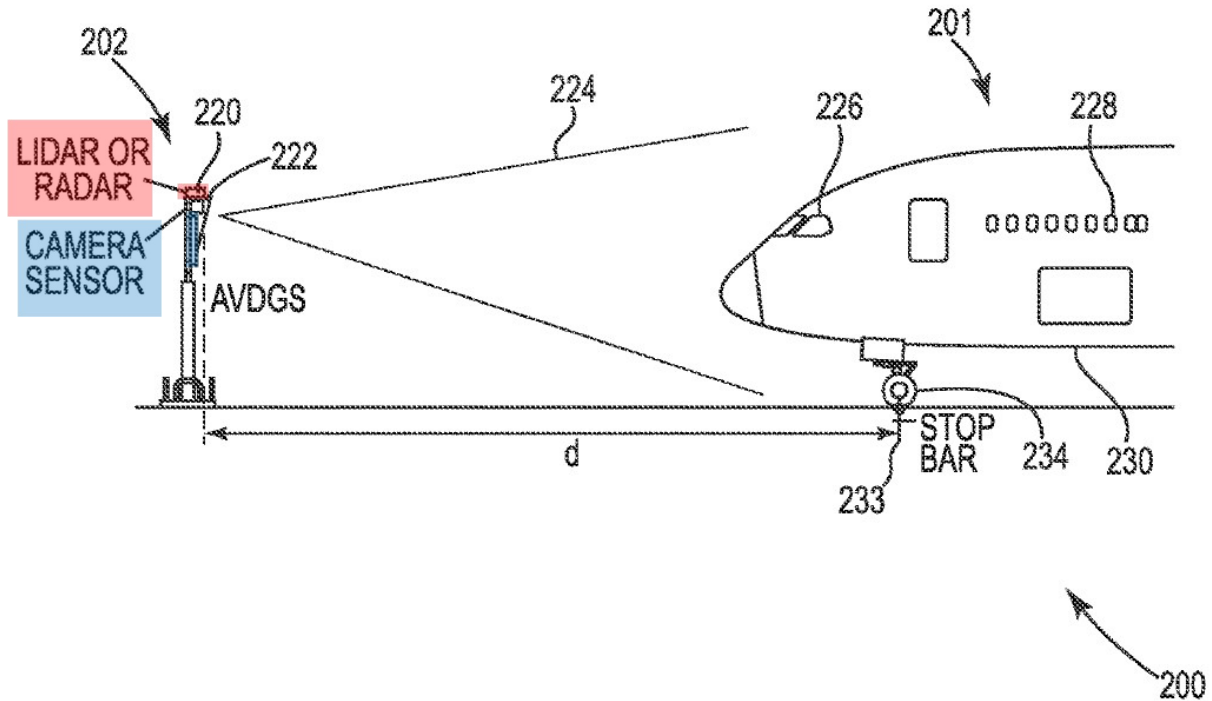


FIG. 2

Figure 5, reproduced below, shows the computing device (543 in purple), including those components as well as the display (565 shown in green):

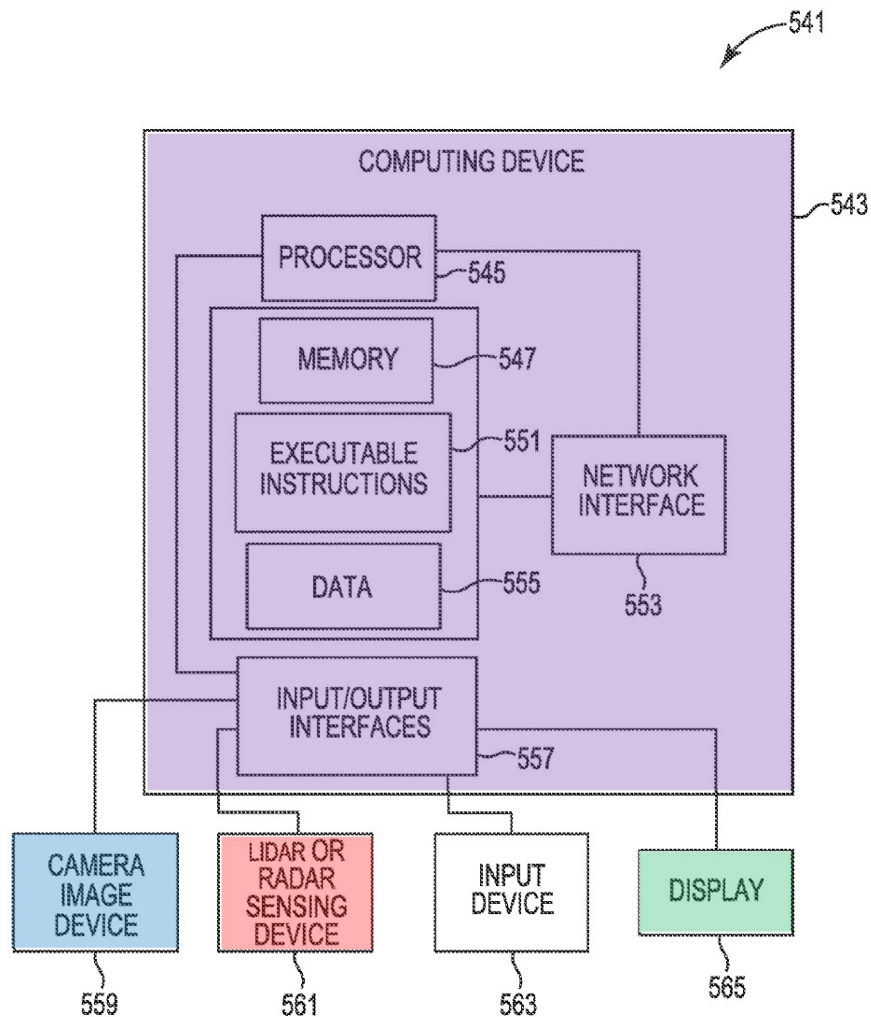


FIG. 5

Dependent claims add further technical details to the methods and system claims. For example, dependent system claim 19 specifies that the LIDAR/RADAR data is analyzed using a point cloud process to correlate points in the LIDAR/RADAR sensor data to points in the camera image data. Additionally, dependent claim 7 requires a determination that the aircraft is present in both the camera image and LIDAR/RADAR sensor data before merging the data.

The Petition includes three grounds. Ground 1 asserts that each of the claims are invalid under 35 U.S.C. § 101 for being directed to unpatentable subject matter. Ground 2 asserts that claims 1, 6-10, and 13-20 are either anticipated under 35 U.S.C. § 102 and/or obvious under 35 U.S.C. § 103 over Berkmo. Ground 3 asserts that claims 1-20 are obvious under 35 U.S.C. § 103 over Berkmo and Richman. Petitioners, however, have not met their burden of establishing the unpatentability of the challenged claims in view of any of those grounds.¹

Concerning Ground 1 related to subject matter eligibility under 35 U.S.C. § 101, the type of claims at issue here are very similar – and in fact more detailed – to those expressly found to include patentable subject matter by the Federal Circuit in *Thales Visionix Inc. v. US*, 850 F.3d 1343, 1348-49 (Fed. Cir. 2017) – a seminal case on subject matter eligibility ignored by Petitioners in the Petition. In that case, the Federal Circuit found that patent claims directed to a method of using two sensors

¹ The Board, in its Institution Decision, instituted review on all grounds of patentability set forth in the Petition. Paper 10 at 30. As the Board noted in that decision, however, Patent Owner had not yet submitted any substantive responsive arguments. Rather, Patent Owner had focused in its Preliminary Response on the failure of Petitioners to file its Petition with a correct Power of Attorney, which should have rendered the PGR ineligible view of the statutory deadline which had passed by when Petitioners corrected its filing. The Institution Decision rejected that argument, however, Patent Owner continues to maintain that the complete PGR Petition was filed after the one year statutory deadline and, thus, it is ineligible for this review. *See* 35 U.S.C. § 321(c); 37 C.F.R. § 42.206.

to calculate the orientation and position of a moving object on a moving platform was not abstract under *Alice* Step 1 and was patent eligible. The claims here similarly require two sensors to determine the orientation and position of an object (the airplane), so that the speed and directional guidance can be provided to the pilots. A side-by-side comparison of the claims at issue here to those found patentable by the Federal Circuit in that case is provided below, demonstrating how close the subject matter at issue here is to that expressly ruled on by the Federal Circuit. Thus, following that precedent, the claims here should be found patent eligible.

Moreover, to support their invalidity argument, Petitioners have merely picked out some verbs of method claim 1 to present an oversimplified “abstract” idea of “receiving, merging, and displaying data” for every claim that disregards the actual claim limitations and is untied to the full scope of the claims. *See* Ex2003 (Campbell Dep. Tr.) at 67:1-5 (“I don't believe the type of sensor data is relevant to whether it's abstract or not.”). Yet, “[t]o disregard [] express claim elements is to proceed at a high level of abstraction that is untethered from the claim language and that overgeneraliz[es] the claim.” *TecSec, Inc. v. Adobe Inc.*, 978 F.3d 1278, 1295 (Fed. Cir. 2020) (internal quotation omitted). In reality, each of the challenged claims requires capturing and receiving one type of data from a camera image sensor and another type of data from a LIDAR/Radar sensor – e.g., image data can be data

representing frames of video data or one or more still images, whereas LIDAR/RADAR data may provide data points in the form of a point cloud (Ex1001 at 6:16-45) – merging those different types of data into a merged data set including specified types of data about the aircraft's approach path, and then displaying specific types of messages including *both* speed guidance *and* directional guidance to pilot, which addresses numerous problems existing in prior art methods/systems.² Thus, while the challenged claims may “at some level embody, use, reflect, rest upon, or apply” an abstract idea, *Mayo Collaborative Svcs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012), they do not *recite* an abstract idea, and the heart of the claims is a tangible, non-abstract method (claims 1-17) and system (claims 18-20) that includes technical advances over the prior art.

With respect to Ground 2, the Petition relies only on Berkmo and argues that every limitation from the independent claims, and numerous dependent claims, are found in that reference. In doing so, Petitioners skips the claim construction step and never sets forth how the claims are being interpreted, nor does the Petition provide any proposed claim constructions. However, the arguments presented in the Petition show that the Petitioners are applying an overly broad construction for terms

² As discussed below, certain dependent claims add other non-abstract features as well.

– such as “directional and speed guidance to a pilot” – that are inconsistent with how those terms would be understood to a person of skill in the art in view of the specification. Under the correct construction, those terms are not disclosed by Berkmo. Petitioners have likewise failed to point to *any* disclosure of Berkmo “displaying messages to provide ... guidance to a pilot *with the merged data set*.” Further, the Petition also misinterprets Berkmo’s disclosure in connection with its arguments about the “merging” limitations in the independent claims. In short, the relied upon disclosure from Berkmo relates to combining radar with laser based signals, whereas the claims require *merging camera image data with* radar or laser data. There are other flaws with respect to the Petition’s challenges for dependent claims, especially claims 7 and 19, which are discussed further below as well.

Ground 3 fails for the same reason as Ground 2, as the Petition does not allege that the secondary reference, Richman, satisfies any of the elements that are lacking in Berkmo. Moreover, Petitioners’ alleged motivation to combine Berkmo with Richman is flawed at least because it fails to provide any explanation concerning *how* Berkmo would be modified to arrive at the claimed invention, it identifies a motivation of “improving accuracy” even though Petitioners’ expert also asserts that Berkmo is already accurate, and because it fails to address whether there would be any “reasonable expectation of success.”

For these reasons, and others explained in detail below, Petitioners have not met their burden of establishing the unpatentability of the challenged claims.

II. The '349 Patent

The '349 Patent is directed to a method and system for detecting, tracking, and docking aircraft in a ramp area of an airport. Ex1001 at 1:7-9.

The Background section explains that there are numerous concerns associated with maneuvering planes in ramp areas for parking, including spacing associated with aircraft of different dimensions; size constraints of parking areas; and obstacles in close proximity to an aircraft when it is being parked. Ex1001 at 1:13-21. As a result, determining an aircraft position with accuracy is critical. *Id.* at 1:21-23.

Traditionally, aircraft had been self-guided by pilots or manually guided by aircraft personnel. *Id.* at 1:24-32. Automated systems for some of these tasks – generally referred to as Docking Guidance Systems (DGS), and then Visual Docking Guidance Systems (VDGS) and Advanced Visual Docking Guidance Systems (A-VDGS) – were later introduced, however, such systems had significant limitations. *Id.* at 1:33-2:9. For example, conventional systems that used laser/LIDAR systems had issues with a curved approach of an aircraft to a ramp area, long range detection of the aircraft as it approaches, dark colored aircraft detection, and thick snow/foggy/heavy rain conditions or conditions with precipitation. *Id.* at 1:57-64. Other conventional airports used camera systems that relay information to

the pilots, however, such systems may have issues with docking accuracy due to accuracy of distance measurements, and precise celebration requirements. *Id.* at 1:65-2:9. As a result, conventional systems faced failed dockings, and suffered from insufficient precision, thereby reducing the effectiveness of the technology. *Id.* at 2:10-29.

The invention described in the '349 patent overcomes those technological challenges, and improves tracking and guidance accuracy to improve docking precision. This in turn provides many additional benefits, including the reduction of aircraft turnaround time, increasing safety of the aircraft and ground operators, and detecting obstacles prior to docking, and all such benefits may be realized at all times of the day and in all weather conditions. *Id.* at 2:61-3:18.

Figure 1, reproduced below, shows an aircraft ramp area with a number of arrangements that can be used in accordance with one or more embodiment of the claimed invention. *Id.* at 3:53-55. Figure 2, also reproduced below, provides a closer, side view perspective of one of those arrangements depicted in Figure 1. *Id.* at 5:37-46. These figures illustrate the camera image sensor (222 shown in blue) and the LIDAR / Radar sensor (220 shown in red) included together as a sensor array (102, 202 shown in purple), together with the aircraft (101, 201) located in ramp areas (100, 200). *Id.* at 3:53-61, 5:37-46. The '349 Patent specification describes that the camera sensor can provide the detection of an aircraft from longer distances,

precise docking. *Id.* at 5:20-24.



FIG. 1



FIG. 2

With reference to Figure 2, characteristics of the aircraft 201, such as shape of the fuselage 230, number, shape, position of passenger windows 228, and pilot windows 226, as well as positioning of wheels 234 to stop point 233 can be ascertained from data captured by the camera image sensor 222. *Id.* at 5:49-66. The LIDAR/Radar sensor can, for example, “gauge the distance *d* to the aircraft to determine whether the aircraft is nearing the stop point 233. *Id.* at 5:58-60.

“The camera image system provides its data as image data captured from the imaging sensor and can be data representing frames of video data or one or more still images, for example, taken in sequence.” *Id.* at 6:41-45; 8:37-49. The camera can, for example, use a camera-based pose detection algorithm that uses 3D models of aircraft and image contours to estimate six dimensions (6D) of pose (*i.e.*, *x*, *y*, *z*, roll, pitch, and yaw) of the aircraft. The LIDAR/Radar system provides its data as a plurality of LIDAR/Radar data points, referred to as a LIDAR/Radar point cloud, that are collected as the LIDAR/Radar scans over the surfaces of the aircraft. *Id.* at 6:16-20.

The disclosed method and system analyzes various features and characteristics of the aircraft and, based on the data from both data sets, the docking system will determine the position and orientation of the aircraft, its speed, and/or its distance to a stop point where the aircraft is the correct distance from the gate in the ramp area. *Id.* at 6:66-7:14. To do that, the “data from multiple systems are

collected and merged via a data fusion process [] which provides a rich data set to track and provide guidance to the aircraft, from entry into the ramp area to docking.”

Id. at 5:25-28. This data fusion can include receiving data and forming a 3D point cloud from the LIDAR/Radar sensor, calculating a transformation between the coordinates of that system and a vision coordinate system of the camera image system, and correlating points in the sensor data to points in the camera image data. *Id.* at 8:67-9:10.

The '349 Patent specification describes certain embodiments whereby an image processing system is used to create a 3D model of the aircraft that is nearing the ramp area. *Id.* at 6:46-52, 7:31-35. “[T]he docking system can compare a three dimensional virtual model to one or more aircraft reference models stored in memory of a computing device to find a match. . .to determine an aircraft type.” *Id.* at 7:37-42, *accord* 8:22-36.

The specification teaches that “the docking system can forward guidance information to be displayed by a pilot unit computing system 364 on the aircraft and ramp docking system controller 362 to assist the pilot in positioning and orienting the aircraft correctly with respect to the ramp area and any objects in the ramp area.” *Id.* at 7:56-62. A “guidance module of the central docking system can [] provide the remaining distance and the horizontal deviation with respect to the center line of the path (*e.g.*, lead-in line) that the aircraft is supposed to follow.” *Id.* at 10:8-11.

That can “provide the pilot with directions regarding how to get the aircraft to the correct location.” *Id.* at 10:12-13. “The docking system can also provide and monitor maximum speeds for approaching a gate,” and “instructions can be passed to the pilot to slow down.” *Id.* at 10:16-19. Moreover, “the determined speed, position, orientation, and/or direction can be sent to a ramp docking system controller device in the ramp docking system and then passed to the pilot unit computing device.” *Id.* at 10:19-23.

Figure 5, reproduced below, illustrates an embodiment of a system in accordance with the invention.

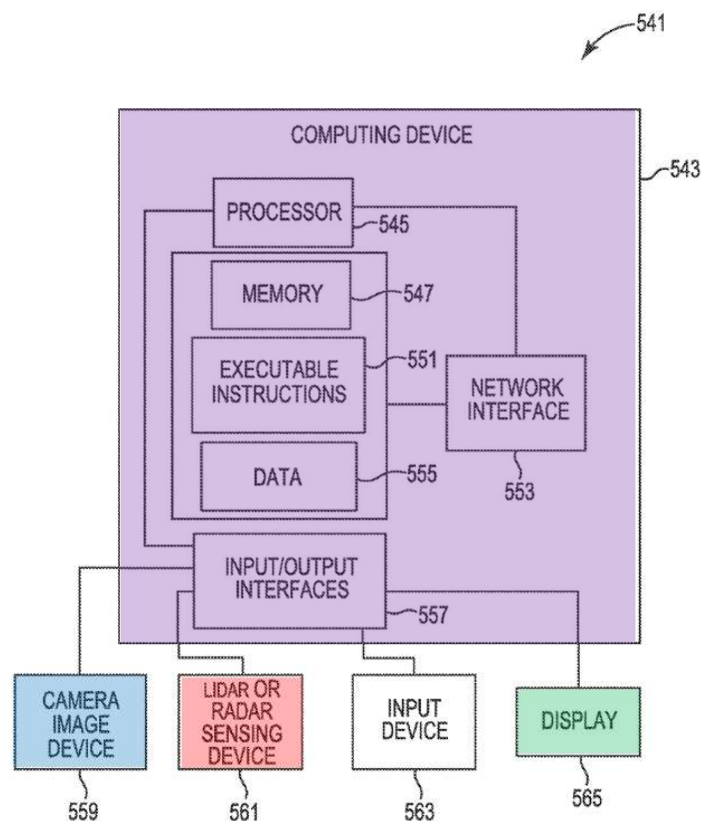


FIG. 5

The system 541 includes a computing device 543 (shown in purple) with a processor 545 and memory 547. *Id.* at 10:54-60. The system 541 can include connectivity to a camera image device 559 (shown in blue), a LIDAR/Radar sensing device 561 (shown in red), an input device 563 (e.g., a keyboard, mouse, touch screen, etc.), a display device 565 (e.g., a monitor) (shown in green) and/or one or more other input devices. *Id.* at 11:9-14. The processor 545 can provide the guidance details to display 565 (e.g., on a graphical user interface (GUI) running on the processor 545 and visible on the display 565). *Id.* at 11:19-24.

The '349 Patent has 20 claims, with three independent claims: claims 1 and 10 being method claims, and claim 18 being a system claim. Claims 2-9 depend directly or indirectly from claim 1, claims 11-17 depend directly or indirectly from claim 10, and claims 19-20 depend from claim 18.

III. Level of Ordinary Skill in the Art

To simplify the issues in this proceeding, Patent Owner does not dispute Petitioners' definition of a person of ordinary skill in the art. *See* Ex2002 (Wilson Decl.), ¶¶ 31-32.

IV. Claim Construction

Claim terms that are in dispute and for which resolution of such dispute is "necessary to resolve the controversy" must be construed. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (*citing Vivid Techs., Inc. v. Am. Sci. &*

Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999)). In a post grant review, claim terms “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action.” 37 C.F.R. § 42.200(b); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005).

“[T]he words of a claim are generally given their ordinary and customary meaning . . . [which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312-13 (citations omitted). “[T]he ordinary meaning of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321. While “the claims themselves provide substantial guidance as to the meaning of particular claim terms,” the context of the surrounding words of the claim also must be considered. *Id.* at 1314.

Petitioners did not expressly propose claim construction for any of the claimed terms. Petition at 9. The Board did not construe any terms in its Institution Decision. *See* Paper 10 at 9. Several of the claim terms, however, do require construction. In particular, Petitioners and their expert have afforded meaning to several of the claim terms that is inconsistent with how those terms are used in the claims, particularly when informed by the specification.

A. “Directional ... guidance”

Each of the independent claims recites “displaying messages to provide *directional* and speed *guidance* to a pilot.” Patent Owner respectfully submits that the term “directional ... guidance” should be construed to mean “navigational instructions, including the horizontal deviation with respect to the center line of a path.” That construction is consistent with the plain and ordinary meaning of the phrase in the context of the claims, as demonstrated through the teachings within the specification.

First, the claims require that such messages specify that the directional guidance is provided “to a pilot.” In context, the claims make clear that this guidance refers to the navigational instructions to be provided to the pilot guiding the airplane in view of the merged data derived from the received camera image data and LIDAR/RADAR data.

The specification describes that the invention can “provide the remaining distance and the horizontal deviation with respect to the center line of the path (*e.g.*, lead-in line) that the aircraft is supposed to follow.” Ex1001 at 10:8-11. The specification explains that “[t]his can provide the pilot with directions regarding how to get the aircraft to the correct location.” *Id.* at 10:12-13. The specification likewise describes that the invention allows for precise adjustment during movement of the aircraft, which may include mid-course adjustment of an aircraft’s path. *Id.* at 4:32-

37. This directional guidance is provided in view of the described issues with prior art systems, whereby airports would “face failed dockings where the aircraft is too far forward or back from the ramp, not parallel with or aligned with the lead-in line or not positioned on the lead-in line, which may cause the delays and additional adjustments by the pilot and ground crew to make the aircraft and ramp line up despite improper positioning of the aircraft.” *Id.* at 2:10-16.

A POSITA reading the challenged claims in light of the specification would understand that “directional guidance” refers to navigational instructions, including the horizontal deviation with respect to the center line of a path. *See* Ex2003 at 29:6-17 (“This step is to provide direction and speed information, which, collectively, could be referred to as guidance on the pilot, *such as which direction to go* and how fast to go.”) (emphasis added); Ex2002, ¶¶ 62-65.

Thus, the term “directional ... guidance” should be construed to mean “navigational instructions, including the horizontal deviation with respect to the center line of a path.”

As explained further in Section V.B.1.a(i) below, construction of this term is “necessary to resolve the controversy” because the Petition has applied a meaning to the phrase that lacks any “directional” requirement.

B. “Speed guidance”

Each of the independent claims recites “displaying messages to provide directional and *speed guidance* to a pilot.” Patent Owner respectfully submits that the phrase “speed guidance to a pilot” should be construed to mean “instructions concerning maximum speeds for approaching a gate.” That construction is also consistent with the plain and ordinary meaning of the term in the context of the claims, and as demonstrated through the usage within the specification.

First, the claims require that such messages specify that the speed guidance is provide “to a pilot.” Thus, the claims make clear that this guidance refers to the speed related instructions to be provided to the pilot guiding the airplane based upon the merged data that the method/system determines from the camera image data and LIDAR/Radar data.

The specification describes the speed guidance as follows: “The docking system can also provide and monitor maximum speeds for approaching a gate. These speed thresholds can be set and monitored and instructions can be passed to the pilot to slow down.” Ex1001 at 10:16-19. In other words, the speed guidance includes information concerning the maximum speed that the pilot should employ during his or her approach to the gate, which may include instructions to slow down.

A POSITA reading the challenged claims in light of the specification would understand that “speed guidance” should be construed to mean “instructions

concerning maximum speeds for approaching a gate.” Ex2003 at 29:6-17 (“This step is to provide direction and speed information, which, collectively, could be referred to as guidance on the pilot, *such as* which direction to go and *how fast to go.*”) (emphasis added); Ex2002, ¶¶ 66-69.

Thus, the term “speed guidance” should be construed to mean “instructions concerning maximum speeds for approaching a gate.”

As explained further in Section V.B.1.a(ii) below, construction of this term is “necessary to resolve the controversy” because the Petition has applied a meaning to the phrase that lacks any actual “speed” requirement.

V. The Challenged Claims Are Patentable in view of Each of the Asserted Grounds.

A. Ground 1 - The challenged claims are directed to patentable subject matter.

Section 101 provides that a patent may be obtained for “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.” 35 U.S.C. § 101. But the Supreme Court has held that the statutory definition of patent eligible subject matter includes an implicit exception for laws of nature, natural phenomena, and abstract ideas. *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014). The judicial exception is driven by a concern of pre-emption. *Id.* Laws of nature, natural phenomena, and abstract ideas are not patent eligible because they are “building blocks of human ingenuity.” *Id.* In

determining patent eligibility, courts must distinguish between patents that “claim the building blocks” and those whose claims “integrate the building blocks into something more.” *Id.* at 217. At the same time, the Supreme Court has instructed courts to “tread carefully” lest the judicial exception “swallow all of patent law.” *Id.* It is not enough that the claims “involve” a patent ineligible concept because “[a]t some level, all inventions embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.” *Id.* (quotation and alteration omitted). A patent claim does not embody an unpatentable abstract idea unless that abstractness “exhibit[s] itself so manifestly as to override the broad statutory categories of eligible subject matter.” *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 868 (Fed. Cir. 2010).

The Supreme Court has articulated a two-step framework for determining patent eligibility. *Alice*, 573 U.S. at 217-18 (citing *Mayo*, 566 U.S. at 66, 72-73, 77-79). At step one, courts must determine whether the claims are “directed to” a patent ineligible concept, such as an abstract idea. *Alice*, 573 U.S. at 217. If not, then the claims are directed to eligible subject matter. If the claims are directed to a patent ineligible concept, at step two, courts must consider the claim elements “both individually and as an ordered combination” to determine whether the claims contain “additional elements” that constitute an “inventive concept” sufficient to “transform” the concept into a patent eligible “application.” *Id.* at 217-18 (quotation

and citation omitted). These “additional elements” must involve more than performance of “well-understood, routine, conventional activities previously known to the industry.” *Id.* at 225 (quotation and citation omitted).

The Petition relies primarily on the PTO's Subject Matter Eligibility Guidance issued in January 2019, and the Institution Decision cites that guidance as well. *See* Petition at 17-18; Institution Decision (Paper 10) at 8. But the Federal Circuit has never endorsed that framework, and as the Petition acknowledges, that framework is not binding precedent. *See* Petition at 18, n2. Moreover, that Guidance is over five years old, and there have been many Federal Circuit rulings on subject matter eligibility over that time. This Patent Owner Response applies the proper analysis under the current Federal Circuit precedent. Notably, numerous cases cited herein post-date that guidance.

Under the proper analysis, the claims of the '349 Patent are not directed to “abstract ideas” and, thus, are not directed to patent ineligible subject matter per *Alice* Step 1. Moreover, even if the claims are determined to be directed to an abstract idea, the claims add additional inventive concepts that would transform the concept into patent eligible subject matter per *Alice* step 2.

1. *Alice* Step 1 – The challenged claims are not directed to an “abstract idea.”

a. Independent claims 1, 10, and 18

- (i) The challenged claims are similar to those found to be non-abstract and directed to patentable subject matter by the Federal Circuit in *Thales*.**

This case presents a scenario where the claims at issue track the type of claims that have already been reviewed and have been expressly found to be non-abstract by the Federal Circuit. The Board should follow that precedent.

While the Petition provides a lengthy discussion “for the Board’s convenience” of the MPEP’s current Section 101 guidance, it ignores the most relevant Federal Circuit authority concerning the types of claims at issue here. In *Thales*, 850 F.3d at 1348-49, the Federal Circuit found that patent claims directed to a method and system of using inertial sensors to calculate the orientation and position of a moving object on a moving platform was not abstract under *Alice* Step 1 and was patent eligible. The Court there explained that “[j]ust as claims directed to a new and useful technique for defining a database that runs on general-purpose computer equipment are patent eligible, so too are claims directed to a new and useful technique for using sensors to more efficiently track an object on a moving platform.” *Id.* at 1349 (citation omitted).

The claims at issue here – both in the method claims (1-17) and system claims (18-20) – are directed to similar subject matter, with all such claims being directed to using sensors to track a moving object. A comparison of the independent system and method claims found non-abstract in *Thales* to independent system claim 18 and independent method claim 1 (which is similar for these purposes to independent method claim 10) is reproduced below with colored highlighting being included to show similar types of limitations between the sets of claims:

Claims Found Non-Abstract by Federal Circuit in <i>Thales</i>	Challenged Independent Claims from '349 Patent
System Claims	
1. A system for tracking the motion of an object relative to a moving reference frame, comprising: a first inertial sensor mounted on the tracked object; a second inertial sensor mounted on the moving reference frame; and	18. A system for tracking an aircraft, comprising: a camera image sensor for capturing camera image data of the aircraft while the aircraft is approaching a ramp area for parking the aircraft on an airside of an airport; a computing device having memory associated therewith for receiving the camera image data from the camera image sensor; a Light Detection And Ranging (LIDAR) or RAdio Detection And Ranging (RADAR) sensor for capturing LIDAR/RADAR sensor data of the aircraft while the aircraft is approaching the ramp area;

Claims Found Non-Abstract by Federal Circuit in Thales	Challenged Independent Claims from '349 Patent
an element adapted to receive signals from said first and second inertial sensors and configured to determine an orientation of the object relative to the moving reference frame based on the signals received from the first and second inertial sensors.	the computing device for receiving the LIDAR/RADAR sensor data and merging the camera image data and the LIDAR/RADAR sensor data associated with the aircraft into a merged data set; and wherein the merged data set includes at least one of: data for determining position and orientation of the aircraft relative to the position and orientation of the ramp area, data for determining speed of the aircraft, data for determining direction of the aircraft, data for determining proximity of the aircraft to a particular object within the ramp area, and data for forming a three dimensional virtual model of at least a portion of the aircraft from the merged data; and the computing device for displaying messages to provide directional and speed guidance to a pilot with the merged data set.
Method Claims	
22. A method comprising determining an orientation of an object relative to a moving reference frame based on signals from two inertial sensors mounted respectively on the object and on the moving reference frame.	1. A method for tracking an aircraft, comprising: receiving camera image data of the aircraft while the aircraft is approaching a ramp area for parking the aircraft on an airside of an airport;

Claims Found Non-Abstract by Federal Circuit in <i>Thales</i>	Challenged Independent Claims from '349 Patent
	receiving Light Detection And Ranging (LIDAR) or Radio Detection And Ranging (RADAR) sensor data of the aircraft while the aircraft is approaching or in the ramp area; merging the camera image data and the LIDAR/RADAR-sensor data into a merged data set; and wherein the merged data set includes at least one of: data for determining position and orientation of the aircraft relative to the position and orientation of the ramp area, data for determining speed of the aircraft, data for determining direction of the aircraft, data for determining proximity of the aircraft to a particular object within the ramp area, and data for forming a three dimensional virtual model of at least a portion of the aircraft from the merged data; and displaying messages to provide directional and speed guidance to a pilot with the merged data set.

As shown, just like the claims in *Thales*, each of the independent claims in the '349 patent utilize different types of sensors to detect a moving object, receiving those signals, and then determining directional information about the object such as orientation based upon those signals. If anything, the challenged claims in the '349

Patent contain more detail than those found non-abstract in *Thales*, and even include an additional transformative step relating to the display of specific guidance information to pilots. Thus, if the claims in *Thales* were determined by the Federal Circuit to be non-abstract and directed to patentable subject matter, the same conclusion should be reached for the similar, but more detailed, claims challenged here.³

(ii) Petitioners' overgeneralized "abstract idea" is not tied to the actual claim language.

Petitioners allege that the claims at issue are directed to the abstract idea of "receiving, merging, and displaying data." Petition at 16, 24. Elsewhere, Petitioners allege that the claims are directed to "collecting, combining, analyzing, and displaying data." *Id.* at 26; *see also* 30, 46-54 (Petitioners repeatedly mischaracterizing the terms "merging"/"merged" as simply "combining"/"combined"). But these simplistic characterizations do not line up with the full scope of the invention actually claimed.

³ In *Thales*, the Federal Circuit also explained that the system did not use the sensors in a conventional manner, but instead were "directed to a new and useful technique for using sensors to more efficiently track an object." 850 F.3d at 1349. As explained in Section V.A.1.a(iii) below, the claims of the '349 Patent similarly use unconventional techniques to track aircraft including by merging *both* camera and LIDAR/RADAR sensor data, and using that merged data to provide directional and speed guidance to the pilot, which provides numerous advantages including more efficient tracking over conventional systems.

Indeed, the Federal Circuit has instructed that courts “be careful to avoid oversimplifying the claims by looking at them generally and failing to account for the specific requirements of the claims.” *CardioNet, LLC v. InfoBionic, Inc.*, 955 F.3d 1358, 1371 (Fed. Cir. 2020) (quotation omitted). As the Federal Circuit has warned, “describing the claims at such a high level of abstraction and untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule.” *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016).

As the Federal Circuit explained, “[t]he Step 1 ‘directed to’ analysis ... depends on an accurate characterization of what the claims require and of what the patent asserts to be the claimed advance.” *TecSec*, 978 F.3d at 1294. “The accuracy of those characterizations is *crucial* to the sound conduct of the inquiries into the problem being addressed and whether the line of specificity of solution has been crossed.” *Id.* (emphasis added).

The Federal Circuit has repeatedly rejected eligibility challenges similar to Petitioners’ where the alleged abstract idea was untethered to the claim language and failed to capture what the patent asserts to be the claimed advance. For example, in *TecSec*, the Federal Circuit rejected an eligibility challenge when the patent challenger’s “materially inaccurate” characterization of the claims neglected the requirements of an “object-oriented key manager” and specified uses of a “label” as well as encryption for the access management, which resulted in “a high level of

abstraction” that is “untethered from the claim language” and that “overgeneraliz[ed] the claim.” 978 F.3d at 1294-96. In another case, the Federal Circuit rejected the district court’s holding that a claim was directed to an abstract idea because the district court’s formulation of the abstract idea was a “high-level description” of aspects of the claimed technology generally, “fail[ed] to mention” key aspects of the claims and was therefore “untethered to the invention as claimed.” *Mentone Sols. LLC v. Digi Int'l Inc.*, No. 2021-1202, 2021-1203, 2021 WL 5291802, at *6 (Fed. Cir. Nov. 15, 2021).⁴

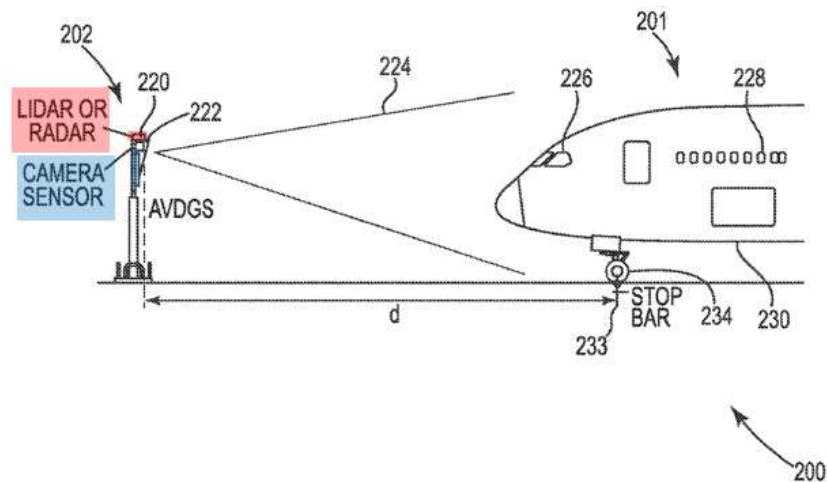
Here, Petitioners’ identified abstract ideas of “receiving, merging, and displaying data” or alternatively “collecting, combining, analyzing, and displaying data” fail to take into account the full scope of the claim requirements. *See* Ex2003 (Campbell Dep. Tr.) at 67:1-5 (“I don't believe the type of sensor data is relevant to whether it’s abstract or not.”). Instead, it simply highlights some of the verbs used in the method claims (or other verbs not used in any claim), and ignores the other

⁴ The Board has reached similar conclusions. *See, e.g., Gain Capital Holdings, Inc. v. Oanda Corp.*, CBM2020-00022, Paper 10 at 26 (PTAB Mar. 18, 2021) (“Prior Board decisions in post-grant proceedings have found § 101 arguments deficient in similar circumstances where the petitioner asserted an over-generalized abstract idea and fails to sufficiently tie that alleged idea to the language of the claims.”); *Yahoo! Inc. v. AlmondNet, Inc.*, CBM2017-00046, Paper 8 at 17 (PTAB Oct. 16, 2017) (denying institution where petitioner’s asserted abstract idea over-generalized the claims, as the petitioner failed to explain how multiple concepts recited in the claims are embodied in the petitioner’s alleged abstract idea).

limitations that are present in those method and system claims that define the true scope of the claims. *Id.* at 66:8-22 (“I believe because the idea of receiving -- collecting sensor data, receiving sensor data, and merging it, and displaying it, are four action items that are actually in claim 1. That is enough to define whether that claim is abstract.”). This technique could be used to render any claim abstract, and is exactly the type of overgeneralizing the Federal Circuit has warned against. *Enfish*, 822 F.3d at 1337.

In reality, each of the challenged independent claims include concrete specific limitations that define the scope of the claims well beyond Petitioners' identified “abstract idea.” For example, each of the independent claims utilize camera and LIDAR/Radar sensors to capture and relay different types of sensor data related to an aircraft while it is approaching the ramp.⁵ An exemplary physical embodiment is shown below:

⁵ A “camera image sensor” and a LIDAR/Radar sensor are affirmatively recited in system claim 18. Independent method claims 1 and 10 both specifically refer to “receiving camera image data ... while the aircraft is approaching a ramp area” and “receiving ... LIDAR or ... RADAR sensor data while the aircraft is approaching or in the ramp area.” Those method steps would be understood by a POSITA to utilize such sensors to be able to receive the identified types of data while the aircraft is moving toward the ramp. Ex2003 at 24:20-27:12, 98:7-16; Ex2002, ¶ 71.



As the '349 Patent specification describes, image data can be data representing frames of video data or one or more still images, whereas LIDAR/RADAR data may provide data points in the form of a point cloud. *See* Ex1001 at 6:16-45; Ex2002, ¶¶ 37, 55. The claims then require merging (on a computing device) the two different types of data – which is possible in view of the specification's teachings to use a pose detection algorithm using 3D models to obtain a point cloud whereby the image data points can be fused with the data in the LIDAR/RADAR point cloud (*see* Ex2002, ¶ 57; Ex1001 at 8:50-9:10) – to obtain a merged data set with information for determining orientation, location, speed of the plane, etc.⁶ The claims then

⁶ A “computing device” is affirmatively recited in system claim 18. Independent method claims 1 and 10 both specifically refer to “merging” such data, which would (Continued...)

require displaying messages (via the computing device) providing at least speed and directional guidance to pilots.

The verbs picked out from the independent claims that are included within Petitioners' characterization of the "abstract idea" are shown in blue below, and the concepts that are missing are highlighted within the claims in red below:

Independent claim:
18. A system for tracking an aircraft, comprising: a camera image sensor for capturing camera image data of the aircraft while the aircraft is approaching a ramp area for parking the aircraft on an airside of an airport; a computing device having memory associated therewith for receiving the camera image data from the camera image sensor; a Light Detection And Ranging (LIDAR) or Radio Detection And Ranging (RADAR) sensor for capturing LIDAR/RADAR sensor data of the aircraft while the aircraft is approaching the ramp area; the computing device for receiving the LIDAR/RADAR sensor data and merging the camera image data and the LIDAR/RADAR sensor data associated with the aircraft into a merged data set; and wherein the merged data set includes at least one of: data for determining position and orientation of the aircraft relative to the position and orientation of the ramp area, data for determining speed of the aircraft, data for determining direction of the aircraft, data for determining proximity of the aircraft to a particular object within the ramp area, and data for forming a three dimensional virtual model of at least a portion of the aircraft from the merged data; and

be understood by a POSITA to require a "computing device" in order to receive sensor data and then to merge or fuse the different types of data. Ex2002, ¶¶ 72-73. While that should be straight forward from the types of signals being received and merged, Section V.A.1.a(iv), *infra*, further explains why the challenged claims cannot be practiced by the human mind.

Independent claim:

the computing device for **displaying** messages to provide directional and speed guidance to a pilot with the merged data set.

1. A method for tracking an aircraft, comprising:

receiving camera image data of the aircraft while the aircraft is approaching a ramp area for parking the aircraft on an airside of an airport;

receiving Light Detection And Ranging (LIDAR) or Radio Detection And Ranging (RADAR) sensor data of the aircraft while the aircraft is approaching or in the ramp area;

merging the camera image data and the LIDAR/RADAR-sensor data into a merged data set; and

wherein the merged data set includes at least one of: data for determining position and orientation of the aircraft relative to the position and orientation of the ramp area, data for determining speed of the aircraft, data for determining direction of the aircraft, data for determining proximity of the aircraft to a particular object within the ramp area, and data for forming a three dimensional virtual model of at least a portion of the aircraft from the merged data; and

displaying messages to provide directional and speed guidance to a pilot with the merged data set.

10. A method for tracking an aircraft, comprising:

receiving camera image data of the aircraft while the aircraft is approaching a ramp area for parking the aircraft on an airside of an airport;

determining a portion of the camera image data associated with the aircraft:

receiving Light Detection And Ranging (LIDAR) or Radio Detection And Ranging (RADAR) sensor data of the aircraft while the aircraft is approaching the ramp area;

determining a portion of the LIDAR/RADAR sensor data associated with the aircraft:

merging the camera image data and the LIDAR/RADAR sensor data associated with the aircraft into a merged data set; and

wherein the merged data set includes at least one of: data for determining position and orientation of the aircraft relative to the position and orientation of the ramp area, data for determining speed of the aircraft, data for determining direction of the aircraft, data for determining proximity of the aircraft to a

Independent claim:

particular object within the ramp area, and data for forming a three dimensional virtual model of at least a portion of the aircraft from the merged data; and
displaying messages to provide directional and speed guidance to a pilot with the merged data set.

Petitioners' asserted "abstract idea" of "receiving, merging, and displaying data" is so generalized that it could be applied equally to a smart TV, a home alarm security system, or a thermostat. Ex2002, ¶ 74. However, while the challenged claims may "at some level embody, use, reflect, rest upon, or apply" an abstract idea, *Mayo*, 566 U.S. at 71, it does not *recite* an abstract idea, and the heart of the claims is a tangible, non-abstract method (claims 1-17) and system (claims 18-20). *See Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1259 (Fed. Cir. 2017) (finding claims directed to "an improved computer memory system, not to the abstract idea of categorical data storage"); *ADASA Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 908 (Fed. Cir. 2022) (finding claims "directed to a specific, hardware-based RFID serial number data structure designed to enable technological improvements to the commissioning process" rather than an abstract idea of "mentally assigning meaning to a sub-section of a data field").

Petitioners' oversimplified "abstract idea" fails to account for the full scope of system requirements and "overgeneralizes the claims." This strips most of the limitations from the claims, which the specification explains are at the heart of the

advancement. *See* Section V.A.1(iii), *infra*. Petitioners “[have] not shown how it could properly disregard these claim requirements in determining what the patent asserts to be the focus of the claimed advance over the prior art.” *TecSec*, 978 F.3d at 1295 (internal quotations omitted). As such, Petitioners’ overgeneralization is insufficient to show that the claims are abstract and directed to non-patentable subject matter. *See id.*

(iii) The claimed method and/or system are focused on advances over the prior art.

As part of the *Alice* Step One “directed to” analysis, the Federal Circuit also instructs courts to look at “what the patent asserts to be the ‘focus of the claimed advance over the prior art.’” *Id.* at 1292. This determination should be made based on the intrinsic record, and for patent eligibility under Step 1, the Court does not need to consult the prior art. *See CardioNet*, 955 F.3d at 1373 (“[T]he court may consult the intrinsic evidence and conclude that the claims are directed to improving the functionality of a computer or network. The court need not consult the prior art to see if, in fact, the assertions of improvement in the patent’s written description are true.”). As the Federal Circuit explained, “[t]he § 101 patent-eligibility inquiry is only a threshold test ... and we reserve for §§ 102 and 103 purposes our comparison

of the prior art and the claims to determine if the claims are, in fact, an improvement over the prior art.” *Id.* (citing *Bilski*, 561 U.S. at 602).⁷

Here, the '349 Patent specification identifies many problems with the prior art that are specifically overcome by the claimed arrangement. For example, it explains that conventional systems that use Radar/LIDAR systems had issues with a curved approach of an aircraft to a ramp area, long range detection of the aircraft as it approaches, dark colored aircraft detection, and thick snow/foggy/heavy rain conditions or conditions with precipitation. Ex1001 at 1:57-64; *see also* Ex1003 (Campbell Decl.), ¶ 68 (“The '349 Patent admits that earlier non-manual approaches have used laser/LIDAR systems or camera systems to track and dock aircraft but such systems have problems with that approach path, detection range, and weather conditions.”)⁸. It likewise explains that other conventional airport systems used

⁷ While the Section 101 analysis presented herein focuses on the specification's analysis of the improvements over the prior art, Sections V.B. and V.C. *infra* explains further differences between the challenged claims and the prior art.

⁸ Petitioners' expert, Dr. Campbell, also testifies that lidar sensors have drawbacks including “high costs, lower density of points on objects further away, lack of returns from darker objects, and slight degradation due to weather such as rain.” Ex1003, ¶ 43. He further testifies that radar sensors have drawbacks including “false returns, inaccuracy of position/range, and problems detecting non-metal objects such as aircraft made of composites.” *Id.*, ¶ 44.

(Continued...)

cameras to relay information to the pilots, however, such systems may have issues with accuracy of docking due to accuracy of distance measurements, and precise celebration requirements. Ex1001 at 1:65-2:9; *see also* Ex1003, ¶ 68 (“The ’349 Patent also admits that earlier approaches have used camera systems, but such systems have issues with distance accuracy and require precise calibration.”).⁹ As a result, conventional systems faced failed dockings, and suffered from insufficient precision. Ex1001 at 2:10-29.

The ’349 Patent claims address those problems by utilizing both image sensors and LIDAR or Radar sensors, merging the data from the received signals to determine accurate, relevant information of the aircraft path, and providing directional and speed guidance to the pilot using the resulting merged data. The ’349 Patent specification explains that, for example, the camera sensor capability can provide the detection of the aircraft from the longer distances, and the LIDAR/Radar can provide the clear guidance to the aircraft to perform the precise docking. *Id.* at 5:20-24. Merging and utilizing the two different types of data provides a rich data set for tracking and providing guidance to the aircraft. *Id.* at 5:24-28. The inventive

⁹ Dr. Campbell also testifies that camera sensors have drawbacks including “lack of depth information... and poor performance in poor lighting or environmental conditions such as night or when the weather is poor such as in rain or fog, distorting the image from the camera.” Ex1003, ¶ 45.

solution can provide for, *inter alia*, early detection of aircraft via the docking system long range capabilities, precise and/or accurate docking, obstacle detection prior to docking, and aircraft detection at all times during the day and night, in all weather conditions, in all lighting conditions, and for all aircraft types and subtypes with all colors unlike prior systems. *Id.* at 3:4-18, 4:35-37.

Thus, the claims here, read as a whole, provide for a specific solution to an existing technological problem in a particular way that improves an existing technological process, which has repeatedly been confirmed by the Federal Circuit to constitute non-abstract subject matter under *Alice* Step One. *See McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299, 1316 (Fed. Cir. 2016) (finding claims directed to an improvement to 3D animation technology eligible); *CardioNet*, 955 F.3d at 1371 (finding claims directed to an improvement to cardiac monitoring technology eligible); *SRI Int'l, Inc. v. Cisco Sys., Inc.*, 930 F.3d 1295, 1303 (Fed. Cir. 2019) (finding claims directed to an improvement in computer network technology eligible); *Thales*, 850 F.3d at 1349 (finding claims to “an improved technique for measuring movement of an object on a moving platform” eligible); *Data Engine Techs. V. Google LLC*, 906 F.3d 999, 1011 (Fed. Cir. 2018) (claims found patent eligible as a technical solution and improvement in computer spreadsheet functionality); *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880

F.3d 1356, 1363 (Fed. Cir. 2018) (claims to user interface found patent eligible as improving computer capabilities).

Similar to those cases, the claims of the '349 Patent recite technical improvements to the technology of tracking and guiding aircraft at a ramp area that results (at least) in improved docking accuracy. The recited technical solution directly results in the improvements described in the specification. As such, the claims are not “directed to” an abstract idea and are patent eligible.

(iv) The claimed method and/or system cannot practically be performed in the human mind.

Contrary to Petitioners' assertion (Petition at 19-23), the claimed method and system at issue here cannot practically be performed in the human mind and are therefore not directed to a mental process. This further supports the conclusion that the claims are not directed to patent ineligible subject matter. *See SRI Int'l*, 930 F.3d at 1304 (finding claims non-abstract after rejecting argument “that the asserted claims are so general that they encompass steps that people can go through in their minds”) (quotations omitted).

In particular, the human mind is not capable of receiving information from the specified sensors, such as LIDAR/RADAR sensor data and/or camera image data; it

is not capable of merging¹⁰ those two different types of data together; nor is it capable of determining how to precisely navigate an aircraft in view of that merged data so that it can display messages with directional and speed guidance to a pilot. Ex2002, ¶¶ 75-82. Indeed, to support their position on those claims, Petitioners rely entirely on the testimony of their expert, Dr. Campbell, in paragraphs 78-83 of his declaration. However, at his deposition, he backed away from his testimony and stated instead that “[s]ome of the claims of ’349 include a computer system, so, they’re actually hardware. So I don't believe claims, such as those, because they’re hardware, would be the same as what could be done with the human mind.” Ex2003 at 71:11-22.

Numerous Federal Circuit cases have held that similar subject matter does not qualify as the “type of human activity that § 101 is meant to exclude.” *See SRI Int'l*, 930 F.3d at 1304. For example, when reviewing claims directed to *using network monitors* to detect suspicious network activity based on analysis of network traffic data, *generating reports* of that suspicious activity, *and integrating* those reports using hierarchical monitors, the Federal Circuit held that the claims were eligible

¹⁰ The specification explains that “[t]he data from multiple systems are collected and *merged via a data fusion process* described herein which provides a rich data set to track and provide guidance to the aircraft.” Ex1001 at 5:25-28 (emphasis added); *see also* 7:31-35, 8:64-67.

because “the human mind is not equipped to detect suspicious activity by using network monitors and analyzing network packets as recited by the claims.” *Id.* Similarly, when reviewing claims directed to *calculating position* of a GPS receiver and reception time of satellite, the Federal Circuit determined that the claims were directed to eligible subject matter because “there is no evidence here that the calculations here can be performed entirely in the human mind. Here, as described, the use of a GPS receiver is essential to the operation of the claimed methods.” *See SiRF Tech., Inc. v. Int’l Trade Comm’n*, 601 F.3d 1319, 1333 (Fed. Cir. 2010). Further, when reviewing claims directed to rendering a halftone image of a digital image by comparing, pixel by pixel, the digital image against a blue noise mask, the Federal Circuit determined that “the method could not, as a practical matter, be performed entirely in a human’s mind,” and was eligible. *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1376 (Fed. Cir. 2011) (discussing *Research Corp. Techs. v. Microsoft Corp.*, 627 F.3d 859 (Fed. Cir. 2010)).

In a nearly identical manner, the ’349 Patent claims cannot practically be performed in the human mind. Just as the Court found that the “the human mind is not equipped to detect suspicious activity by using network monitors” (*SRI Int’l*, 930 F.3d at 1304), and is not capable of receiving GPS signal from GPS satellites (*SiRF Tech.*, 601 F.3d at 1333), the human mind is not, for example, capable of receiving LIDAR/RADAR sensor data from a LIDAR/RADAR sensor. Ex2002, ¶¶ 75-78.

The type of data included in the LIDAR/RADAR sensor data (i.e., point cloud data) is not of a type the human mind is capable of receiving or understanding in any meaningful way. *Id.*

Further still, just as the Court found that the human mind is not equipped to analyze network packets (*SRI Int'l*, 930 F.3d at 1304), or perform GPS location calculations involving satellite signals (*SiRF Tech.*, 601 F.3d at 1333), the human mind is not capable of merging LIDAR/RADAR data and the image data into a merged data set to determine how to precisely navigate an aircraft so that it can display messages with directional and speed guidance to a pilot. As mentioned above, the human mind cannot comprehend LIDAR/RADAR sensor data (*e.g.*, in the form of point clouds). *Ex2002*, ¶¶ 75-78. As such, it cannot perform any meaningful operations on that data or with that data, let alone merging it with an entirely different form of data (image data). *Id.*, ¶¶ 72-73, 79-80. Likewise, the human mind is unable to use the resulting “merged data set” (which includes at least aspects of the incomprehensible LIDAR/RADAR sensor data) in any meaningful way, let alone to determine message to provide to a pilot to provide “directional and speed guidance.” *Id.*, ¶¶ 79-81.

Additionally, the recited steps cannot be practically performed within the timing requirements implicated in the claims. *See, e.g.*, claim 1 (“while the aircraft is approaching a ramp area for parking the aircraft on an airside of an airport”). For

example, the POSITA understands that the “displaying messages to provide directional and speed guidance to a pilot” limitation is time sensitive and must occur quick enough to provide meaningful “directional and speed guidance” to the pilot. *See, e.g.*, Ex1001 at Title, 1:7-9, 5:25-28, 7:56-62, 10:5-15, *passim*; Ex2002, ¶ 81. Because timing is critically important in this context, in order to give the pilot timely guidance relevant to their actual current position during a docking procedure, merging or fusing data from two disparate sensors into merged sensor data, and then determining and providing directional and speed guidance to a pilot using that merged sensor data must be done exceptionally fast. A human mind, with or without the assistance of pen and paper, is not capable of practically performing these steps within the timing required by the claims (*i.e.*, while docking), let alone within a reasonable timing window to provide any meaningful guidance to the pilot, if he could even perform it at all. Ex2003 (Campbell Dep. Tr.) at 98:3-21 (“I don't know how long, but it would take a long time.”), 89:22-90:11; Ex2002, ¶¶ 81-82. As such, when reading the claims as a whole, the human mind is not capable of practically performing the recited processes, and thus the claims do not recite a mental process.

(v) Petitioners' arguments rely on Federal Circuit authority analyzing non-analogous claims.

In contrast to *Thales* – where the Federal Circuit addressed claims that are extremely similar to those at issue here (discussed above in section V.A.1.a(i)) – Petitioners rely most heavily on *Electric Power Group* to support their arguments

that the claims are “abstract.” Petition at 20-21, 32-34. However, as discussed above, Petitioners’ analogy relies on a flawed, overgeneralized abstract idea untethered from the claim language in an attempt to graft *Electric Power Group*’s holding onto the claims. The claims in *Electric Power Group* actually were directed to a process that merely gathered data about a power grid, “analyzed” that data to select which data to display about the power grid, and then displayed the selected data. The claims truly were about “selection and manipulation of information — to provide a ‘humanly comprehensible’ amount of information useful for users,” which was determined to be simply an “abstract processes of information collection and analysis.” *Electric Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355-56 (Fed. Cir. 2016). In that case, the identified “abstract idea” tracked the claim requirements, there was no technological advances found over the prior art, and the manipulation required in the claims was simple enough that it could be practiced in the human mind. As discussed in Sections V.A.1(i)-(iv) above, the challenged claims are a far cry from *Electric Power Group*.

Further, unlike *Electric Power Group*, the ’349 Patent claims actually do “require an arguably inventive set of components or methods, such as measurement devices or techniques, that would generate new data.” 830 F.3d at 1355. In particular, the recited merging step generates “a merged data set,” and the messages that are displayed to the pilot include directional and speed guidance, both of which

are new generated data. Further, unlike *Electric Power Group*, the '349 Patent claims do not merely “display[] certain results of the collection and analysis.” Instead, the claims expressly recite “displaying messages to provide directional and speed guidance to a pilot with the merged data set.” This is not the same as simply outputting analyzed data, as was the case in *Electric Power Group*.

Petitioners also cite multiple other Federal Circuit decisions – without providing any analysis of why any of those cases are similar to the claims challenged here – for the positions that collecting information, analyzing collected information, without requiring more than mental steps or mathematical algorithms, and displaying results are mental processes and thus abstract. Petition at 21-22. However, as has been shown above, the claims of the '349 Patent, when viewed as a whole in light of the specification, are not directed to an abstract idea, let alone Petitioners' overgeneralized abstract idea untethered from the actual claim language. Instead, the claims focus on improvements to the technology of tracking and guiding aircraft, and therefore are patent eligible.

b. Dependent claim 7

Dependent claim 7 recites “comparing the camera image data and the LIDAR/RADAR sensor data to identify that the aircraft is present in both the camera image data and the LIDAR/RADAR sensor data before merging the camera image

data and the LIDAR/RADAR sensor data.” This claim is not abstract and is directed to patentable subject matter for additional reasons.

As the specification explains, by ensuring that the aircraft is present in each set of data before merging, “computing resources won’t be wasted on analysis of objects that are not aircraft.” Ex1001 at 9:61-10:4. By reserving such computing resources used to merge the data for instances where the aircraft is present in both sets of data, the efficiency of the computing device is improved, thereby reducing wear on the computing device and energy usage by the computing device that would otherwise be used to process data related to objects other than aircraft. This increased efficiency represents an improvement to the function of the computer itself.

The Federal Circuit has repeatedly held that claims directed to improvements to the functioning of a computing device are not abstract and are thus patent-eligible. *See Core Wireless*, 880 F.3d at 1363 (claims that “improve[d] the efficiency of using the electronic device” found patent-eligible as an improvement to the functioning of computers); *TecSec*, 978 F.3d at 1295 (finding claims that provide “an efficient way for the sender to permit different parts of the audience to see different parts of the file” patent-eligible as an improvement in computer technology); *SRI Int’l*, 930 F.3d at 1304 (distinguishing *Electric Power Group* and finding the claims directed to improving the functionality of computers and computer networks themselves);

Enfish, 822 F.3d at 1336-39 (finding claims to a self-referential database patent-eligible as an improvement to the way computers operated); *Uniloc USA, Inc. v. LG Elec. 's USA, Inc.*, 957 F.3d 1303, 1307-08 (Fed. Cir. 2020) (finding claims directed to reducing latency experienced by communication stations patent-eligible as an improvement to computer functionality); *Packet Intelligence LLC v. NetScout Sys., Inc.*, 965 F.3d 1299, 1309-10 (Fed. Cir. 2020) (finding claims to identifying “disjointed connection flows” in a computer network patent-eligible as an improvement in computer technology).¹¹

¹¹ While Patent Owner contends that claim 7 is non-abstract under *Alice* Step 1, it also includes an “inventive concept” under *Alice* Step 2, as the Federal Circuit has also repeatedly held that improvements to computer functionality represent inventive concepts under *Alice* Step 2. See *Aatrix Software, Inc. v. Green Shades Software*, 882 F. 3d 1121, 1129-30 (Fed. Cir. 2018) (finding claims directed to improving computer efficiency to have an inventive concept); *BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1351 (Fed. Cir. 2016) (finding the claims recited an eligible “technology-based solution” and “software-based invention that improves the performance of the computer system itself”); *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1302 (Fed. Cir. 2016) (finding claims eligible when they included “a technical improvement over prior art technologies and served to improve the performance of the system itself”); *DDR Holdings, LLC v. Hotels.com L.P.*, 773 F.3d 1245 (Fed. Cir. 2014); *CosmoKey Sols. GmbH & Co. KG v. Duo Sec. LLC*, 15 F.4th 1091, 1099 (Fed. Cir. 2021); *Coop. Entm't v. Kollektive Tech.*, 50 F. 4th 127, 135-36 (Fed. Cir. 2022); *CellSpin Soft, Inc. v. FitBit, Inc.*, 927 F.3d 1306, 1317-18 (finding claims to a “two-step, two-device structure requiring a connection before data is transmitted” as unconventional and inventive).

Because the claims are directed to an improvement in the functioning of a computing device, the claims are not abstract and are thus patent-eligible.

c. Dependent claim 19

Dependent claim 19 is also not abstract and is directed to patentable subject matter for additional reasons. Claim 19 depends from independent claim 18, and recites “wherein the LIDAR/RADAR sensor data is analyzed using a point cloud process to correlate points in the LIDAR/RADAR sensor data to points in the camera image data.” The specification explains that the claimed “point cloud process” is performed to accomplish “a transformation between the coordinates of the system and a vision coordinate system of the camera image system (representative of a real world coordination system of the ramp area),” and that this transformation is part of the data fusion process. Ex1001 at 8:64-9:10. The human mind cannot perform that step. Ex2002, ¶¶ 83-84.

Claim 19 is similar to the eligible claims in *Research Corp.*, which were directed to “rendering a halftone image of a digital image by comparing, pixel by pixel, the digital image against a blue noise mask.” 627 F.3d at 868. In much the same manner, claim 19 is directed to creating correlated sensor data by correlating the points (*e.g.*, point by point) in the LIDAR/RADAR sensor data to the points in the camera image data. At a high level these are similar processes. But, whereas the “comparing” process in *Research Corp.* involves only 2D digital images, the

recited point cloud process in claim 19 is even more complex as it involves correlating 3D points in the LIDAR/RADAR sensor data (e.g., in the point cloud) to points in camera image data. Ex2002, ¶ 84.

As explained in *CyberSource*, the method in *Research Corp.* could not, as a practical matter, be performed entirely in a human's mind and was eligible. 654 F.3d at 1376. Because claim 19 is similar, and is in fact even more complex, it likewise cannot be practically performed in the human mind, and is thus not abstract.

2. *Alice* Step 2 – The combination of receiving inputs from the different types of sensors, combining such data, and displaying guidance to the pilot includes an “inventive concept.”

Because the claims are not directed to an abstract idea, the analysis ends with *Alice* Step 1. *ADASA*, 55 F.4th at 910; *Uniloc*, 957 F.3d at 1309. While the Board need not reach Step 2 to reject Petitioners' deficient §101 challenge, this aspect of Petitioners' argument is also flawed.

The claims are also eligible under *Alice* Step 2 because they contain an “inventive concept.” See *Weisner v. Google LLC*, 51 F.4th 1073, 1081 (Fed. Cir. 2022) (“Step two is a search for an inventive concept—*i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself.”) (internal quotations and alteration omitted). “[A]n inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional

pieces.” *BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350 (Fed. Cir. 2016). “Whether a particular technology is well-understood, routine, and conventional goes beyond what was simply known in the prior art. The mere fact that something is disclosed in a piece of prior art, for example, does not mean it was well-understood, routine, and conventional.” *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1369-70 (Fed. Cir. 2018) (overturning summary judgment, finding certain dependent claims arguably unconventional and inventive).

While Petitioners fail to establish that each of the claimed limitations are individually well-known, routine, and conventional, it comes nowhere close to establishing as much for the entire recited combination. *See CellSpin Soft, Inc. v. FitBit, Inc.*, 927 F.3d 1306, 1316 (Fed. Cir. 2019) (claims are patent eligible at *Alice* Step 2 when “the claimed elements—‘individually and as an ordered combination’—recite an inventive concept”).

a. Independent claims 1, 10, and 18

Unlike prior solutions, the '349 Patent claims recite a combination of using both camera image sensors and LIDAR/RADAR sensors, merging the data from both of those sensors, and using that merged data to display guidance to the pilot, which results in a combination that is not merely routine or conventional. When considered individually or in combination with the other claimed elements, the reliance on this merged data from a *camera* and *LIDAR/RADAR sensor* is itself an

inventive concept because it was not conventional and improves the technology of aircraft tracking and guidance.

In Petitioners' Step 2 analysis, when discussing the "merging" step individually ("element [1.3]"), Petitioners argue that the *process* of merging is not inventive. Petition at 32-33; Ex1003, ¶ 89. However, they ignore the identified data that is recited as being merged (image data and LIDAR/RADAR data). *Id.* While Petitioners are incorrect that the recited "merging" process is conventional, Petitioners fail to explain how merging specifically *camera image data* and *LIDAR/RADAR data* is conventional. Indeed, the '349 Patent specification explains that this is done by a data fusion process to provide a rich data set (Ex1001 at 5:25-28; *see also* 7:31-35, 8:64-67), which results in enhanced accuracy for aircraft tracking and navigation. Petitioners have cited no evidence that this is conventional. Rather, the Petition merely cites to a conclusory three-sentence declaration paragraph that simply parrots the text from the Petition without any further explanation or support. Petition at 32-33 (*citing* Ex1003, ¶ 89). Such testimony is not entitled to any weight. *See TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1358 (Fed. Cir. 2019) ("Conclusory expert testimony does not qualify as substantial evidence."). And Petitioners are left with bald attorney argument to support their assertions.

As discussed above, the '349 Patent specification explains that prior solutions did not utilize a combination of camera data and LIDAR/RADAR data when tracking and guiding aircraft. Instead, conventional systems utilized only one or the other, and faced failed dockings as a result. Ex1001 at 1:54-2:29. The '349 Patent thus introduced the unconventional concept of merging data from *both* the camera and LIDAR/RADAR into a merged data set, and then using that merged data for tracking and guiding the aircraft. Certainly, Petitioners have not presented *evidence* on this point to show that this arrangement is conventional.

Accordingly, when considered individually or in combination with the other claimed elements, the reliance on this merged data from a camera and LIDAR/RADAR sensor is itself an inventive concept as it was not conventional, and improves the technology of aircraft tracking and guidance. That determination is consistent with numerous Federal Circuit cases also finding that the claimed subject matter was not-conventional under Step 2. *See BASCOM*, 827 F.3d at 1350-52 (claims directed to a method of filtering internet content using a non-conventional arrangement of elements patent-eligible); *CellSpin*, 927 F.3d at 1317-18 (claims to a “two-step, two-device structure requiring a connection before data is transmitted” as unconventional and inventive).

Petitioners bear the burden of showing that the claim elements, individually and as an ordered combination, are no more than what was well-understood, routine,

and conventional. *BASCOM*, 827 F.3d at 1350; *Coop. Entm't. Inc. v. Kollektive Tech.*, 50 F. 4th 127, 135-36 (Fed. Cir. 2022) (finding claims eligible when challenger failed to adequately show that the claims are conventional and not inventive). Petitioners have not met their burden, in part due to their failure to properly interpret and address the actual recited claim elements. As such, Petitioners' eligibility challenge must fail.

B. Ground 2 – Claims 1, 6-10, and 13-20 are not anticipated by, or rendered obvious over, Berkmo.

Petitioners contend that each independent claim 1, 10, and 18, and dependent claims 6-9, 13-17, and 19-20, are anticipated under 35 U.S.C. § 102 by U.S. Published Application No. 2022/0066025 to Berkmo (“Berkmo”) (EX1004).¹² Petition at 38. Petitioners also contend that if any limitations “are not expressly or inherently taught by Berkmo,” then those claims would be obvious under 35 U.S.C. § 103. *Id.*

As shown below, however, Berkmo fails to disclose numerous limitations of each of the independent claims. Each of those missing limitations provides an independent basis for those claims, and each of the challenged dependent claims, to be found not anticipated. *Tf3 Ltd. v. Tre Milano, LLC*, 894 F.3d 1366, 1374 (Fed.

¹² The first page of Berkmo indicates that it is assigned to Petitioner ADB Safegate Sweden AB.

Cir. 2018) (reversing Board's invalidity finding, explaining "[a]nticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim") (*quoting Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)). Additionally, as shown below, Berkmo fails to disclose additional limitations from at least dependent claims 7 and 19, providing additional reasons why those claims are not anticipated. Moreover, Petitioners' alternative obviousness assertion – vaguely recited in case the Board finds its anticipation evidence insufficient – is insufficient to actually render the claims obvious.

1. Independent claims 1, 10, and 18

Berkmo fails to disclose multiple limitations of each of independent claims 1, 10, and 18.

First, each of the independent claims in the '349 patent recite the following requirements: "displaying messages to provide directional and speed guidance to a pilot with the merged data set." This clause specifically requires three components of those displayed messages, none of which are disclosed or suggested by Berkmo: (1) "directional guidance"; (2) "speed guidance"; *and* (3) "the merged data set." As will be explained further below, Berkmo only provides much more basic, simplistic instructions, which do not align with the claim requirements. Since Berkmo does not disclose or suggest those limitations set forth in the claims, it does not anticipate or render obvious any of the independent claims.

Second, each of the independent claims in the '349 patent recite the following limitation: “merging the camera image data and the LIDAR/RADAR-sensor data into a merged data set.” Berkmo does not disclose merging these types of data, but instead only discloses combining LIDAR data with Radar data, which is different from what the claims require. Accordingly, since *Berkmo* does not disclose or suggest those limitations, it does not anticipate or render obvious any of the independent claims for this additional reason.

Moreover, Petitioners' obviousness argument, presented for Ground 2 as an alternative fallback in case its primary arguments, fail for the same reasons.

The deficiencies with Berkmo, and Petitioners' arguments for each of these limitations, are addressed below.

a. The evidence does not establish that *Berkmo* discloses or suggests displaying the type of messages required by each of the independent claims.

Berkmo fails to disclose any of the three components of the displayed messages set forth in the independent claims: (1) “directional guidance”; (2) “speed guidance”; and (3) “the merged data set.”

(i) “Displaying messages to provide *directional ... guidance to a pilot*”

Each independent claim of the '349 Patent specifically requires displaying “messages to provide directional ... guidance to the pilot.” As discussed in Section IV.A, above, the term “directional ... guidance” should be construed to mean

“navigational instructions, including the horizontal deviation with respect to the center line of a path.”

Petitioners assert that Berkmo’s “instruct[ing] the pilot to continue approaching the stand,” is an instruction to proceed in a “direction toward stand.” Petition at 54 (*citing* Ex1004, ¶ 143, *and* Ex1003 (Campbell Decl.), ¶ 134 (“Berkmo also discloses guidance information to ‘instruct the pilot to continue approaching the stand,’ which is providing directional guidance, *i.e.*, direction toward the stand.”)).

This simplistic instruction to “continue approaching the stand” or “stop the aircraft” does not include anything about the horizontal deviation with respect to the center line of a path as required by the proper construction of the “directional guidance” discussed above. Ex2002, ¶¶ 88-89. In fact, this simple instruction has no “directional” component at all under any reasonable construction. *Id.* Rather, this amounts to nothing more than a “Stop” or “Go” instruction, like a red and green traffic light. Such a stop/go instruction (as with a red/green traffic light) provides no directional guidance – it does not tell the pilot to go straight or to proceed at a certain angle. It instead only gives the pilot *permission* to proceed, in the direction they choose, without offering any “directional guidance.” *See* Ex1004, ¶¶ 48, 50, 53, 65, 66, 143, 145, claim 42 (each discussing “*allowing*” the aircraft to approach); Ex2002, ¶ 89.

Berkmo explains that it provides this permission-based “guidance” for safety reasons. *See* Ex1004, ¶ 2 (docking “in a safe and reliable way”); ¶ 65 (“the aircraft may be ordered to stop, as safety cannot be guaranteed”). The instructions to “stop” the plane in certain situations, or to continue approaching the stand when those situations have been cleared, are intended to avoid collisions. *See id.*, ¶ 76 (bridge not present); ¶¶ 79, 135 (collision course with objects); ¶¶ 80, 136 (other objects are not predicted to leave stand area before aircraft arrives); ¶¶ 55, 143-44 (unable to determine type or model of aircraft); ¶¶ 57-63, 145 (unable to detect backscattering signals). As such, Berkmo only discloses a permission-based stop/go instruction based on whether certain safety conditions are met, and tells a pilot whether or not they are “allowed to continue approaching” based on those safety conditions. Ex2002, ¶ 89. It provides no “directional guidance,” let alone a horizontal deviation with respect to the center line of a path under the proper construction. *Id.*

Indeed, the technical capability of Berkmo's system is extremely limited in that regard as Dr. Campbell even asserts that Berkmo's system fails to accurately determine orientation of the aircraft. *See* Ex1003, ¶ 164 (“A POSITA also would have been motivated to incorporate Richman's 3D modeling, *orientation detection*, and template matching functionality in Berkmo's arrangement *because incorporating that functionality would provide multiple benefits and improvements to Berkmo's arrangement.*”). He asserts that Berkmo uses an “inferential” tracking

approach, which he believes is less accurate for tracking of an aircraft than one that directly detects orientation (such as the one described in the '349 Patent). *See* Ex2003 at 51:16-52:21; Ex1003, ¶¶ 164, 168. Particularly given the expense of each aircraft, and importance of precisely navigating the aircraft into its proper location, a POSITA would not expect for an imprecise/inaccurate sensing system to be used to provide navigational directions including horizontal deviation. Ex2002, ¶ 90.

(ii) **“Displaying messages to provide ... *speed guidance to a pilot*”**

Each independent claim of the '349 Patent also specifically requires displaying “messages to provide ... speed guidance to the pilot.” As discussed in Section IV.B, above, the term “speed guidance” should be construed to mean “instructions concerning maximum speeds for approaching a gate,” and is a separate form of guidance from the directional guidance.

To satisfy this limitation, Petitioners again point to Berkmo's permission-based instructions, including “instructing the pilot to stop the aircraft,” which Petitioners' contend refers to “speed is 0.” Petition at 54 (*citing* Ex1004, ¶ 143, *and* Ex1003 (Campbell Decl.), ¶ 134 (“For example, Berkmo discloses the guidance information includes ‘instructing the pilot to stop the aircraft,’ which is providing speed guidance, *i.e.*, speed is 0.”)).

As discussed above, this amounts to nothing more than a “Stop” or “Go” instruction. *See* Ex2003 (Campbell Dep. Tr.) at 113:8-11 (“Q: But there's no

disclosure in Berkmo of any specific speeds other than zero or nonzero, right? A: As I recall, that is correct.”); Ex2002, ¶ 92. However, an instruction to “stop the aircraft” does not include any information concerning actual maximum speeds that the aircraft should take while approaching a gate. Ex2002, ¶92. Moreover, a POSITA would understand an instruction to stop to be an instruction to cease approaching the gate, rather than speed related instructions for approaching the gate. *Id.*

Further, Petitioners rely on Berkmo’s permission-based stop/go instructions for *both* the speed guidance and the separate directional guidance. While Berkmo’s stop/go instructions do not read on either form of guidance, they certainly do not read on *both* separate forms of guidance. *Id.*, ¶ 93.

Thus, Berkmo fails to disclose displaying “messages to provide ... speed guidance to a pilot” as required by each of the independent claims.

(iii) “Displaying messages to provide ... guidance to a pilot *with* the merged data set”

Furthermore, the independent claims of the ’349 Patent specifically require that the messages provide the speed and directional guidance “*with* the merged data set.” The content of that merged data set is specifically called out in the preceding clause within each of the independent claims, which specifies that the merged data set “includes at least one of”:

- data for determining position and orientation of the aircraft relative to the position and orientation of the ramp area,
- data for determining speed of the aircraft,
- data for determining direction of the aircraft,
- data for determining proximity of the aircraft to a particular object within the ramp area, and
- data for forming a three dimensional virtual model of at least a portion of the aircraft from the merged data.

Such data must be displayed in the messages *with* the directional and speed guidance based on a plain straight forward reading of the claims. *See* Ex2003 at 29:13-17 (“It’s a little unclear to me what ‘with the merged dataset’ means. It could mean you’re displaying the dataset...”). Indeed, the ’349 Patent specifically discloses displaying such merged data with the messages. *See* Ex1001 at 10:19-23 (“For example, in some embodiments, the determined speed, position, orientation, and/or direction can be sent to a ramp docking system controller device in the ramp docking system and then passed to the pilot unit computing device”).

The Petition entirely ignores this claim limitation and fails to show where these required claim elements are disclosed within Berkmo. There is likely good reason for that: Berkmo contains no such disclosure. Ex2002, ¶¶ 95-96. Rather, as discussed above, Berkmo’s guidance to the pilot is limited to providing permission

to continue, including “instructing the pilot to stop the aircraft” and “instructing the pilot to continue approaching the stand.” *See* Ex1004 at Fig. 8; Petition at 54-55; Ex2002, ¶¶ 88-90, 92-93, 95-96. There is no teaching or suggestion within Berkmo of doing anything more than providing these simplistic stop/go instructions. Ex2002, ¶¶ 88-90, 92-93, 95-96. Thus, for this additional reason, Berkmo fails to disclose this limitation and does not anticipate any of the claims. *Id.*, ¶ 96. Moreover, Petitioners have not alleged that this limitation would be obvious over Berkmo (or any other reference).

b. The evidence does not establish that *Berkmo* discloses or suggests “merging” camera image sensor data with LIDAR/RADAR sensor data as required by each of the independent claims.

Independent claim 1 requires “merging the camera image data and the LIDAR/RADAR-sensor data into a merged data set.” Independent claims 10 and 18 include similar limitations as follows: “merging the camera image data and the LIDAR/RADAR sensor data associated with the aircraft into a merged data set.” The Petition fails to establish that Berkmo discloses these limitations.

To show that this element exists in Berkmo, the Petition includes a chop-quote from Berkmo paragraph 129, to state as follows: “Berkmo discloses detecting and tracking aircraft 10 ‘based on *combined output data* from said radar-based system 110R, on the one hand, and from the one or more additional systems’ such as imaging system 110C and laser system 110L.” Petition at 46 (emphasis in original),

quoting Ex1004, ¶ 129; Ex2002, ¶¶ 98-99. But this passage in the Petition *omits* the specific statement in that paragraph of Berkmo that the “one or more systems” to which that example refers is the “laser-based system 110L.” Ex1004, ¶ 129; *see also* Fig. 1; Ex2002, ¶¶ 99-101. Instead, the Petition misleadingly swaps in language suggesting that the disclosure is referring to both the “imaging system 110C and laser system 110L.” Petition at 46. Notably, Berkmo specifically explains why it relies on radar combined with the laser-based system in that example: “the laser-based system 110L may provide higher spatial resolution in good weather conditions, whereas the radar system may provide higher sensitivity for specific materials such as composite materials. *See* Ex1004, ¶ 129.

In other words, Berkmo discloses combining output data from the *radar-based system with the laser-based system*, whereas the *claims in the '349 Patent specifically refer to merging the camera image data with the LIDAR or RADAR data*. *See* Ex2003 at 107:11-19 (“Q: So, Berkmo is specifically talking about merging data from the radar-based system and the laser-based system in that example, right? A: In that embodiment, yes.”); Ex2002, ¶¶ 98-101.

The Petition also relies on the discussion in Berkmo in paragraph 130, which refers to using a “spatially resolved weighted average of the combined output data.” Petition at 46. However, that paragraph in Berkmo specifically refers to using “*the* combined output data,” which refers to the output data of the example from

paragraph 129, discussed above. Ex2002, ¶¶ 102-103. Petitioners also cite to paragraphs 22-25 of Berkmo (Petition at 46) apparently for referring to “weighted averages,” which also do not mention or refer to the imaging system.¹³ *Id.*, ¶ 104. Thus, these cited disclosures in Berkmo do not teach or suggest the limitations of the claims requiring “merging the *camera image data and the LIDAR/RADAR sensor data.*”

Indeed, there is no disclosure within Berkmo, or further explanation provided by Petitioners' expert, concerning how the weighted averages would be implemented for image data combined with the radar data. *Id.*, ¶ 103; *see also* ¶¶ 100-101. A POSITA would have understood that these are different types of data in Berkmo, with image data involving 2D representations and radar data involving 3D representations (*e.g.*, a point cloud). *See* Ex2003 at 33:22-34-5 (“I don't recall seeing any specific wording in Berkmo about capturing depth with the camera data.”); Ex2002, ¶¶ 103, 100-101. There is no disclosure or explanation in Berkmo concerning how those two disparate and incompatible types of data would be merged through a weighted average process. That makes sense because, as discussed above,

¹³ The Petition also includes a “*see also*” cite to paragraphs 126-127, 134, 137-139. But none of those passages refer to the imaging system, and paragraphs 126 and 139 even specifically state that the passage is specifically referring to “the laser based system 110L” – and not the imaging system. Ex2002, ¶ 105.

Berkmo's disclosure in paragraphs 129-130 is directed to the weighted averaging of the *laser* and *radar* data, which both involve 3D representations that could be averaged by such a process. *Id.*, ¶¶ 99-101, 103.

Thus, Berkmo fails to disclose the “merging” limitations of each of the independent claims.

* * *

Accordingly, for at least the reasons set forth in Section V.B.1.a(i)-(iii) – V.B.1.b, Petitioners have failed to establish that claims 1, 10 and 18 are invalid as anticipated by Berkmo. Dependent claims 2-9, 11-17, and 19-20 are also not anticipated at least because of their dependency on those independent claims.

c. There is no evidence concerning Petitioners' alternative obviousness assertions in Ground 2.

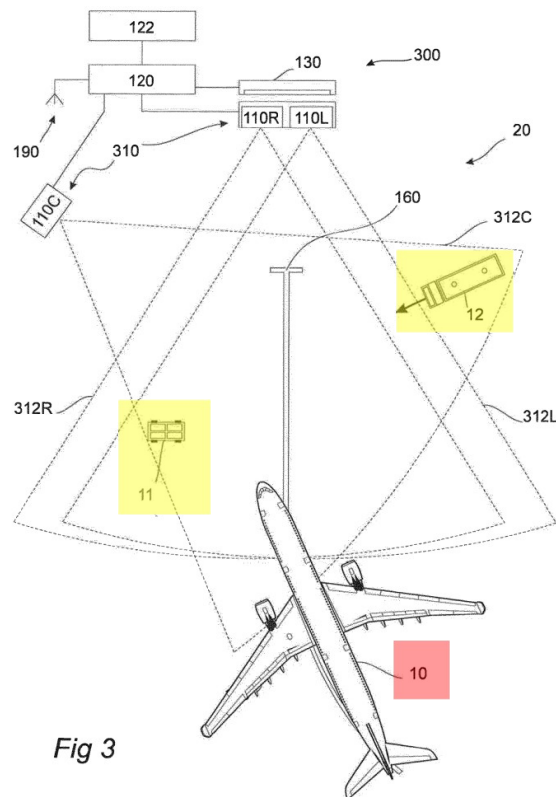
Demonstrating a lack of conviction in their arguments concerning anticipation, the Petition states that the claims would alternatively be obvious under 35 U.S.C. 103 if “any limitations of claims 1, 6-10, and 13-20 are not expressly or inherently taught by Berkmo.” Petition at 38. By presenting its obviousness contention only at such a high level of vagueness and generality, Petitioners never present any arguments or identify any evidence explaining why it would be obvious to add the above identified missing limitations. *Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1001 (Fed. Cir. 2023) (“Because IPRs are formal adjudications, the APA also requires that the parties to IPRs receive notice of arguments and evidence

and have an opportunity to be heard with respect to them.”). For example, Petitioners fail to set forth any proposed modifications that would be made to Berkmo by a person of ordinary skill in the art, or any motivation to do so, that would result in the invention claimed in the '349 Patent. *See SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1356 (Fed. Cir. 2000) (“In appropriate circumstances, a single prior art reference can render a claim obvious.... However, *there must be a showing of a suggestion or motivation to modify the teachings of that reference* to the claimed invention in order to support the obviousness conclusion.”) (emphasis added) (citations omitted); *see also Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016) (“[O]ur cases repeatedly warn that references to ‘common sense’—whether to supply a motivation to combine or a missing limitation—cannot be used as a wholesale substitute for reasoned analysis and evidentiary support, especially when dealing with a limitation missing from the prior art references specified.”). Thus, for at least the foregoing reasons, Petitioners fail to establish that these challenged claims are obvious under Ground 2.

2. Dependent claim 7

Claim 7 depends from claim 1 and further requires “comparing the camera image data and the LIDAR/RADAR sensor data to identify that the aircraft is present in both the camera image data and the LIDAR/RADAR sensor data before merging the camera image data and the LIDAR/RADAR sensor data.” To satisfy this

limitation, the Petition points to Berkmo's disclosure in paragraph 138 and presents another partial quote to make it appear to say something that it does not. In particular, the Petition fails to include the following emphasized portion of quoted sentence in Berkmo: "*The airport stand arrangement is further configured to detect and track an object of said other objects 11, 12*, based on output data from the imaging system 110C, and verify the existence of said detected and tracked objects based on output data from a further system 110L of the one or more additional systems and/or output data from the radar-based system 110R." Compare Ex1004, ¶ 138 with Petition at 56. In other words, what this passage is referring to – which can be seen when looking at the text removed from the quote by Petitioners – is comparing data for "*an object of said other objects 11, 12*" to verify the existence of those **other objects**. Ex2002, ¶ 107. Those "other objects" are shown in Figure 3 (reproduced below) as luggage dolly 11 (standing still) and food delivery truck 12 (approaching the stand).



The aircraft – which is not referred to in that passage – in contrast is consistently referred to as element 10. Thus, this passage says nothing about “comparing the camera image data and the LIDAR/RADAR sensor data to identify that the aircraft is present in both the camera image data and the LIDAR/RADAR sensor” as required by claim 7. Ex2002, ¶¶ 108-109. Petitioners’ expert, Dr. Campbell, agreed at his deposition: “So, I think Berkmo, the way it describes it, does not describe verifying tracked aircraft, similarly to verifying the tracked objects.” Ex2003 at 114:20-115:13.

There is a technical reason for this distinction. Such “other objects” are significantly smaller than large aircraft and, as Berkmo teaches, are more easily

detected using the higher spatial resolution of the imaging system. Ex1004, ¶ 36; Ex2002, ¶ 113. While Berkmo touts this small object detection as a primary advantage of the imaging system, Berkmo also explains that the imaging system has a drawback in that it may detect image artifacts such as shadows as real objects. Ex1004, ¶ 36. However, Berkmo provides a solution to this problem in that it verifies the existence of those smaller objects with the laser or radar data, to ensure they are not just image artifacts. *Id.*; *see also* Ex1003, ¶ 58.

In contrast, due to the aircraft's relative size and material construction, each sensor system can individually detect the existence of the aircraft with high certainty, making a verification step unnecessary. Ex2002, ¶ 113. Indeed, Berkmo repeatedly discusses the ability to use any sensor system on its own to detect and track the aircraft, indicating that there is no verification step being performed for aircraft. *See* Ex1004, ¶ 22 (“The airport stand arrangement may then predominately base its detection and tracking on the output data from the most accurate system”); ¶ 134 (“By way of example, detection and tracking of the aircraft may be based on output data from the laser-based system 110L, whereas the detection and tracking of other objects may be based on output data from the radar-based system 110R.”); Ex2002, ¶ 113.

As such, Berkmo fails to disclose comparing image data and LIDAR/RADAR data to identify that the *aircraft* is present in both of those data sets before merging. *Id.*, ¶ 114.

Recognizing Berkmo's failure to expressly or inherently disclose this limitation, Petitioners include a conclusory assertion of alleged obviousness of adding such verification with respect to *aircraft* detection. Petition at 57. However, this is unsupported by any evidence showing that a POSITA would have taken such action, and is, again, unsupported by the expert testimony simply parroting the conclusory position in the Petition. *Id.*; Ex1004, ¶ 140; Ex2002, ¶¶ 110-112; *see TQ Delta*, 942 F.3d at 1358 ("Conclusory expert testimony does not qualify as substantial evidence.").

Further, as discussed above, Berkmo itself explains that each sensor system on its own is capable of detecting the significantly larger aircraft, and the verification is only required for detecting the smaller other objects. Ex1004, ¶¶ 22, 36, 130, 134. Petitioners fail to adequately explain why the POSITA would ignore Berkmo's teachings, and instead would have been motivated to require the verification of the existence of larger aircraft in the sensor data, particularly before merging that data, when Berkmo teaches that doing so would be unnecessary. Ex2002, ¶ 113; *see also Arendi*, 832 F.3d at 1366-67 (conclusory statements unsupported by substantial evidence do not support obviousness of supplying a missing limitation). Instead,

Petitioners' bald obviousness allegation is a clear example of hindsight bias. *TQ Delta*, 942 F.3d at 1360 (finding conclusory statement in expert testimony is "not sufficient and is fraught with hindsight bias"); *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (the Board must avoid "hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.").

Accordingly, for at least the foregoing reasons, Petitioners have failed to establish that claim 7 is invalid as anticipated by, or obvious over, Berkmo. Ex2002, ¶ 114.

3. Dependent claim 19

Claim 19 depends on claim 18, and further requires that the "LIDAR/RADAR sensor data is analyzed using a point cloud process to correlate points in the LIDAR/RADAR sensor data to points in the camera image data." This requirement is not disclosed in Berkmo.

To argue that this limitation is satisfied, the Petition again relies on paragraphs 129 and 130 of Berkmo, stating that paragraph 129 discloses "[a]n algorithm may run a pre-processing sub-algorithm to determine *corresponding spatial regions* of the output data (*e.g., pixel-to-pixel matching*)," and relying on Berkmo's process to create the matrix of average data values in paragraph 130. Petition at 66-67, *citing* Ex1004, ¶ 129 (emphasis in original) and ¶ 130. However, as discussed above in section V.B.1.b, Berkmo expressly states that the "one or more additional systems"

discussed in those paragraphs only refers to the “laser-based system 110L.” *See* Ex1004, ¶ 129; Ex2003 at 107:11-19; Ex2002, ¶¶ 99-103, 119-120. Thus, the disclosures in paragraphs 129-130 are only referring to a pixel-to-pixel matching of data from the radar based system to the laser based system, not the LIDAR/Radar sensor data *to the points in the camera image data* as claimed. Ex2002, ¶¶ 119-120.

This makes sense, as Berkmo is not capable of performing its pre-processing sub-algorithm (Ex1004, ¶ 129) or weighted averaging process (*id.*, ¶ 130) on a combination of 3D point cloud data and 2D image data. Ex2002, ¶ 120. While Berkmo may be capable of determining corresponding spatial regions of output data using the two sets of 3D data from the laser sensor and radar sensor, it provides no description (enabling or otherwise) of being able to perform this process with two disparate and incompatible sets of data – *e.g.*, 3D laser or radar data and 2D image data. *Id.* *See Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1380 (Fed. Cir. 2021) (“the prior art, taken as a whole, must enable a skilled artisan to make and use the claimed invention” without undue experimentation); *Elan Pharms., Inc. v. Mayo Found. for Med. Educ. & Rsch.*, 346 F.3d 1051, 1054 (Fed. Cir. 2003) (“To serve as an anticipating reference, the reference must enable that which it is asserted to anticipate”).

Conversely, the '349 Patent clearly explains how the recited “point cloud process” works using image data and LIDAR/RADAR data. Ex2002, ¶¶ 116-118.

The '349 Patent explains that it converts 2D image data to 3D image data (“the point cloud, formed from the image sensor data”) by comparing the 2D image to a projection of a model of the aircraft “to create an initial aircraft 3D model,” and “registering point cloud data generated out of the 3D model.” Ex1001 at 8:37-9:10, 6:46-52, 9:18-28; Ex2002, ¶ 117. The '349 Patent then explains the “point cloud process,” where it correlates points in the LIDAR/RADAR point cloud (3D LIDAR/RADAR data) to points in the image sensor data point cloud (3D image data). Ex1001 at 8:65-9:10; Ex2002, ¶ 118. The process is expressly called a “*point cloud process*” because it involves correlation of points in two *point clouds*. *Id.*

In addition to specifying that the pixel-to-pixel matching only refers to the radar plus laser arrangement, Berkmo includes no such disclosure that would allow for matching points in a 3D point cloud from a laser or radar sensor to locations in 2D image data from a camera. Ex2002, ¶¶ 119-120. As such, the POSITA would have understood that the cited portions of paragraphs 129 and 130 are limited to laser and radar data, and that Berkmo lacks any disclosure of “a point cloud process to correlate points in the LIDAR/RADAR sensor data to *points in the camera image data*,” as required by claim 19. *Id.* Accordingly, for at least the foregoing reasons, Petitioners have failed to establish that claim 19 is invalid as anticipated by Berkmo.

C. Ground 3 – Claims 1-20 are not obvious over Berkmo in view of Richman.

Petitioners contend that each independent claim 1, 10, and 18, and dependent claims 2-9, 11-17, and 19-20, are obvious under 35 U.S.C. § 103 over Berkmo (Ex1004) in view of U.S. Patent No. 5,675,661 to Richman (“Richman”) (Ex1005). As shown below, however, Petitioners’ arguments for each of the independent claims, and the dependent claims at least through their dependency, fail for the same reasons as Ground 2. Moreover, Petitioners’ motivation to combine the two references is lacking, thus providing an independent basis for those claims not also challenged in Ground 2 – including claims 2-5 and 11-12 – to be found not invalid as well.

1. Ground 3 fails for the same reasons as Ground 2.

The Petition relies solely on Berkmo for the disclosures of each limitation of the independent claims, and only alleges that Richman discloses several possible types of data that may be optionally included within the “merged data set.” *See* Petition at 73-74 (claim 1), 78 (claim 10), and 80 (claim 18). The Petition likewise only relies on the disclosure of Berkmo for each of the limitations of claims 7 and 19. *See id.* at 78 (claim 7), and 80 (claim 19). It does not allege that Richman satisfies any of the elements identified in Section V.B that are lacking from Berkmo. *See id.* Thus, the combination of Berkmo with Richman does not render obvious any of the independent claims, nor these dependent claims, for the same reasons

identified in Section V.B *supra*. And, since the independent claims have not been shown to be obvious as set forth above, each of the dependent claims are also are not obvious for the same reasons.

2. Petitioners fail to establish a motivation to combine and a reasonable expectation of success.

Petitioners also fail to provide a credible or supported motivation to combine Berkmo with Richman. *See KSR Int'l*, 550 U.S. at 418 (requiring articulated reasoning with rationale underpinning as to why a person of ordinary skill in the art would have combined or modified the teachings of the prior art in the fashion claimed by the patent). Motivation to combine requires more than just the existence of competing alternatives. *See Virtek Vision Int'l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 888 (Fed. Cir. 2024) (“It does not suffice to simply be known. A reason for combining must exist.”). For a combination to be obvious, there must be a clear and supported reason or motivation to combine—simply using hindsight to align the pieces is insufficient. *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1353-54 (Fed. Cir. 2013) (reversing district court’s finding of obviousness because it relied improperly on unsupported statements to bridge the gap between the prior art and the claims).

Petitioners’ proffered motivation fails to provide the requisite articulated reasoning and rationale underpinning because it fails to explain *how* the POSITA would combine the references, and it is unsupported by evidence. Additionally, the

Petition fails entirely to show, or even address, any expectation of success in combining the references.

a. Petitioners fail to explain *how* to combine Berkmo and Richman.

Petitioners and their expert fail to explain *how* the POSITA would, or even could, modify Berkmo to incorporate Richman's 3D model functionalities. The Federal Circuit explains that, as a "prerequisite" to showing why a POSITA would have combined references, Petitioners must "clearly explain[], or cite[] evidence showing, *how* the combination of the two references was supposed to work." *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (vacating the Board's obviousness decision that did not disclose "a clear, evidence-supported account of the contemplated workings of the combination") (emphasis added).

Here, Petitioners contend that because Berkmo and Richman both use laser sensors, the POSITA would have been motivated to simply incorporate "Richman's 3D modeling, orientation detection, and template matching functionality...in Berkmo's laser sensor." Petition at 70; Ex1003, ¶ 163. Petitioners do not provide any detail or explanation on exactly *how* Richman's functionality would be implemented in Berkmo, let alone how it would work with Berkmo's comparatively more complicated system that utilizes more than just a laser sensor. Ex2002, ¶¶ 128-129.

Berkmo and Richman are not simple mechanical or electrical designs, where the effects of a substitution or combination are understandable without detailed explanation. They are instead both directed to complex systems utilizing a variety of different sensor technologies and computers that implement algorithms to analyze sensor data in real-time to track large and expensive aircraft. *Id.* Petitioners' one-sentence explanation of simply "incorporating [Richman's] functionality in Berkmo's laser sensor" (Petition at 70), which is then parroted by their expert (Ex1003, ¶ 163), in no way provides the requisite clear explanation or evidence showing *how* the combination of Berkmo and Richman was supposed to work. Ex2002, ¶¶ 128-129. *Personal Web*, 848 F.3d at 994.

In addition to failing to explain "how specific references could be combined," Petitioners also fail to explain "how [the] specific combination would operate or read on" the claims. *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012) (finding motivation to combine analysis insufficient because it "fails to explain why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does*") (emphasis in original).

Petitioners' proposed combination involves "incorporating [Richman's] functionality in Berkmo's *laser* sensor." Petition at 70 (emphasis added). However, Berkmo's laser sensors are used to obtain data related to the airplane, it does not

process that data to determine any tracking information concerning the aircraft – that would be done by the computer system to which the sensor passes the data. Thus, it is non-sensical for Petitioners to assert that Richman's functionalities would be used "in Berkmo's laser sensor." Certainly, Petitioners have not explained *how* Berkmo's lasers would suddenly incorporate these functionalities. Ex2002, ¶ 128.

Moreover, the proposed combination, which attempts to add Richman's functionalities described only for *laser* data signals, would require that the system use merged data from the received laser and image data in order to meet the claims. Respondents have presented no explanation concerning how the two disparate types of data in the proposed modification – laser *and* image data – could potentially be merged, or how Richman's relied on teachings (such as 3D models) could be used with that merged data set instead of with just the laser data. *Id.*, ¶ 129. Additionally, in order to meet the limitations of the independent claims for which Richman is cited (e.g., "the *merged* data set includes at least one of: data for determining position and orientation of the aircraft..., " and "data for forming a three dimensional virtual model of at least a portion of the aircraft from the *merged* data"), further modifications to Berkmo's or Richman's functionalities would be required so that they would work with *merged* data rather than only *laser* data, which further modifications are neither asserted or explained. *Id.* As such, Petitioners fail to explain "how [the] specific combination would operate or read on" the claims. *ActiveVideo*, 694 F.3d at 1327.

b. The motivation to combine is not supported by evidence.

For the motivation to combine, the Petition relies almost exclusively on their expert's declaration. Petition at 70-73. However, the expert declaration again simply parrots the conclusory positions stated in the petition and offers no further evidence supporting the petition's positions.

For example, the Petition asserts that it is "less accurate" to operate "[w]ithout 3D models," and that "[t]he use of 3D models for detection also lowers the number of missed detections due to partial sensor returns (*e.g.*, partial point clouds)," and that "it is easier to match partial shape sensor data to the 3D model as compared to detection based only on prior training data, which is less accurate." Petition, at 71. Similar assertions are included in the last sentence of the next two paragraphs. *Id.* at 72. The only support offered for these assertions regarding accuracy and ease is the expert declaration. *Id.* at 71-72 (*citing* Ex1003, ¶¶ 165, 166, 168). However, these cited paragraphs merely repeat the same arguments from the Petition (almost verbatim or simply stated another way), without adding additional arguments or evidence supporting the Petition's assertions.¹⁴ Ex2002, ¶¶ 125-127. Nevertheless,

¹⁴ Such "conclusory and unsupported" expert testimony—which "does not cite to any additional supporting evidence or provide any technical reasoning to support his (Continued...)"

even if such declaration testimony was to be credited, Dr. Campbell stated at his deposition that “I didn’t say that Berkmo was not accurate,” undercutting the whole reason to combine the references in the first place. Ex2003 at 56:20.

c. Petitioners fail to provide any allegation concerning reasonable expectation of success.

The Petition’s analysis of all challenged claims under Ground 3 is deficient because Petitioners did not even allege, much less, present any evidence that a POSITA would have had a reasonable expectation of success regarding the proposed modifications. Indeed, the Federal Circuit has made clear that a “reasonable expectation of success” is a necessary component of the “motivation to combine” analysis. *Elekta Ltd. v. ZAP Surgical Sys., Inc.*, 81 F.4th 1368, 1375 (Fed. Cir. 2023) (“[A]n obviousness determination requires finding that a person of ordinary skill in the art would have had a reasonable expectation of success”) (*citing Regents of Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018)). Further, the Federal Circuit explained that it is entirely Petitioners’ burden to establish a reasonable expectation of success. *Eli Lilly & Co. v. Teva Pharms. Int’l GmbH*, 8

statement”—should receive little weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB August 24, 2022) (precedential); *see also TQ Delta*, 942 F.3d 1358-59 (“Conclusory expert testimony does not qualify as substantial evidence” and “a conclusory assertion with no explanation is inadequate to support a finding that there would have been a motivation to combine”).

F.4th 1331, 1348-49 (Fed. Cir. 2021) (“[I]t was, at all times, [petitioner’s] burden to show . . . a reasonable expectation of success . . .”).

Thus, especially given the complexities of Berkmo’s and Richman’s respective systems, and the modifications to Berkmo’s system that would be required to add the identified functionality from Richman, it cannot be assumed or inferred that the POSITA would have had an expectation of success to arrive at the claimed invention by simply “incorporating [Richman’s] functionality in Berkmo’s laser sensor.” Petition at 70. Petitioners’ failure to present any arguments or evidence on this issue is fatal to their motivation to combine arguments.

* * *

Accordingly, for at least the foregoing reasons, Petitioners have failed to identify a sufficient motivation to combine Berkmo and Richman and, thus, to establish that any of the challenged claims are invalid obvious over Berkmo in view of Richman as alleged in Ground 3.

3. Dependent claim 5

Claim 5 is similar to claim 7, but does not expressly recite that the comparing is performed before the merging. Petitioners’ arguments for claim 5 in Ground 3 are similar to those for claim 7 in Ground 2, with the omission of the portions discussing “before merging.” *Compare* Petition at 76-77 with 56-58; *see also* Petition at 78 (asserting claim 7 is met for the same reasons as claim 5 in Ground 3). As such,

claim 5 is not rendered obvious for the same reasons discussed with respect to claim 7 in Ground 2, in section V.B.2 above.

VI. Conclusion

Petitioners have failed to establish the invalidity of the challenged claims based on any of the asserted grounds. Patent Owner therefore respectfully requests that the patentability of claims 1-20 of the '349 Patent be confirmed.

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that, according to the word count provided by the word-processing software use to prepare the document, this Patent Owner's Response contains 18,006 words, and thus is in compliance with the word count limit specified by 37 C.F.R. § 42.24(b)(1).

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CERTIFICATE OF SERVICE

I hereby certify that on June 7, 2024, I caused a true and correct copy of the foregoing materials:

- Patent Owner's Response and Exhibits 2002-2003

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