

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4
5 ADB SAFEGATE SWEDEN AB, ADB SAFEGATE BV, and ADB

6 SAFEGATE AMERICAS, LLC,

7 Petitioner,

8 v.

9 HONEYWELL INTERNATIONAL, INC.,

10 Patent Owner.

11
12 Case PGR2023-00053

13 U.S. Patent No. 11,538,349 B2

14
15 Deposition of MARK CAMPBELL, PH.D.

16 Washington, DC

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21 Stenographically reported by: Judith E. Bellinger,

22 RPR, CRR, CSR-TX, CCR-WA, CCR-NM

1 Deposition of MARK CAMPBELL, PH.D., held at
2 the offices of:

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16 Pursuant to notice, before Judith E.
17 Bellinger, Registered Professional Reporter,
18 Certified Realtime Reporter, and Notary Public in
19 and for the District of Columbia.
20
21
22

A P P E A R A N C E S

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ALSO PRESENT:

Joshua P. Smith, Crowell & Moring, LLP (via
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C O N T E N T S

EXAMINATION OF MARK CAMPBELL, PH.D.	PAGE
By Mr. Bittman	5

E X H I B I T S

(Retained by counsel)

Exhibits:	PAGE
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1 P R O C E E D I N G S

2 MARK CAMPBELL, PH.D.,

3 Being first duly sworn, was examined
4 and testified as follows:

5 MR. BITTMAN: For the record, we're
6 here today for the case PGR2023-00053, concerning
7 U.S. Patent Number 11,538,349.

8 I'm Scott Bittman from Crowell &
9 Moring, on behalf of Patent Owner Honeywell
10 International.

11 MR. WEINSTEIN: I'm Marc Weinstein from
12 Xsensus, on behalf of Safegate, the petitioner.

13 EXAMINATION BY COUNSEL FOR THE

14 PATENT OWNER

15 BY MR. BITTMAN:

16 Q All right. Welcome, Dr. Campbell.

17 A Thanks.

18 Q Will you, please, state your full name
19 and address for the record.

20 A Mark Eric Campbell. 1 Chelseas Walk,
21 Ithaca, New York.

22 Q And where are you currently employed?

1 A Currently employed at Cornell
2 University.

3 Q Have you had your deposition taken
4 before?

5 A Once.

6 Q And what type of case was that?

7 A That was -- that was also an
8 intellectual property case.

9 Q What technology did that relate to?

10 A That was focused on a flying toy, so,
11 it was about ten years ago.

12 Q And do you recall the names of the
13 parties in that case?

14 A I actually don't.

15 Q All right. So I'm just going to go
16 over a few ground rules for today's deposition.
17 These may have been gone over with you by your
18 counsel, but just to make sure we're on the same
19 page.

20 So, today, I'll be asking you
21 questions, those questions, along with your
22 answers, will be recorded by the court reporter,

1 okay?

2 A Yes.

3 Q You need to answer my questions orally,
4 since the court reporter cannot record a nod or a
5 shake of your head.

6 Do you understand that?

7 A Yes.

8 Q And you understand that you're under
9 oath and must tell the truth today?

10 A Yes.

11 Q Please wait until I fully state my
12 question before you answer so that we do not
13 interrupt each other and so that the court
14 reporter can take down our words accurately, okay?

15 A Okay.

16 Q Your attorney may object at times, but
17 unless he instructs you not to answer, you're
18 expected to answer the question, okay?

19 A Yes.

20 Q If at any time you don't understand the
21 question, feel free to let me know. But if you go
22 ahead and start answering, I'm going to assume you

1 understood the question, okay?

2 A Yes.

3 Q We'll plan to take periodic breaks,
4 about every hour or so. But if you need a break
5 at any time, please, let me know. I may just ask
6 you to answer the pending question before we
7 break, okay?

8 A Yes.

9 Q Is there any reason you can think of
10 today why you would not be able to answer my
11 questions fully and truthfully?

12 A No.

13 Q Are you taking any medications that
14 might make it difficult for you to understand and
15 answer my questions truthfully?

16 A No.

17 Q And you understand that you are here
18 today in connection with your declaration
19 testimony related to the post-grant review
20 petition filed against Honeywell,
21 U.S. Patent Number 11,538,349, right?

22 A Yes.

1 Q And it's okay if we refer to that
2 patent as the '349 patent today?

3 A Yes.

4 Q And if we use the words "PGR," you'll
5 understand that that refers to the post-grant
6 review, right?

7 A Yes.

8 Q Okay. Who reached out to you
9 originally to work on this particular matter?

10 A My attorney, Marc Weinstein.

11 Q And do you recall when that was?

12 A That was, approximately, June of 2023.

13 Q And which ADB entity retained you to
14 work on this matter?

15 A ADP?

16 Q ADB.

17 A I'm not sure what ADB is.

18 Q Which entity -- do you recall which
19 entity retained you to work on this matter?

20 A Xsensus.

21 Q I see. So that's the counsel you're
22 referring to?

1 A Yes.

2 Q And do you know who the client, is,
3 ultimate client is?

4 A I know the ultimate client is Safegate.

5 Q I see. Okay.

6 And is it your understanding that there
7 are three petitioner entities in this matter?

8 A I'm not fully sure what a "petitioner
9 entity" is.

10 Q Companies.

11 A Oh. That, I'm unaware of.

12 (Exhibit 1003 marked for identification
13 and retained by counsel.)

14 Q I'm providing you with Exhibit 1003,
15 entitled "Declaration of Mark Campbell."

16 A Thank you.

17 Q Can you confirm that this is your
18 declaration that you've submitted for this matter?

19 A Yes, I can confirm this is my
20 declaration.

21 Q And that's your signature on page 89,
22 right?

1 A Yes, that's my signature.

2 Q Okay. And just if you look at the
3 front page, earlier I asked you about -- I said
4 "ADB," and I think you clarified that you refer to
5 them as Safegate. But when I said the "three
6 entities," those are the three companies listed
7 above the petitioner line.

8 Do you see that?

9 A I do.

10 Q And do you know which of these entities
11 ultimately retained you?

12 A I do not.

13 Q Are you aware of any of the differences
14 between those companies?

15 A I am not.

16 Q Have you changed any of your opinions
17 since your declaration was filed?

18 A I have not changed any of my opinions.

19 Q Are there any corrections or
20 clarifications you'd like to make to your
21 declaration?

22 A No changes.

1 Q Did you draft your declaration?

2 A I drafted collaboratively with my
3 attorney.

4 Q Can you explain what that means?

5 A The declaration is a combination of
6 technical aspects and law aspects. So, really, I
7 brought the technical aspects and my attorney
8 helped me understand the aspects of the law. And
9 so, we would each draft different parts of that
10 and put it together collaborative --
11 collaboratively. And then once we had a full
12 draft, I would read through and edit it to ensure,
13 because it's my document with my signature, that
14 it is a summary of my opinions.

15 Q Approximately, how much time did you
16 spend analyzing materials and preparing your
17 declaration?

18 A Approximately, four days. Four days of
19 total time. Four eight-hour days of total time.

20 Q So, 32 hours?

21 A Yes, approximately.

22 Q Did you locate the prior art you relied

1 on, or was that provided by counsel?

2 A There was a -- in terms of prior art,
3 there was a combination. So, the -- a number of
4 the prior arts I had found, I had located, either
5 through my own searching or papers that I knew.
6 Some of the patents were supplied to me by my
7 attorney, and then I also looked at other patents
8 on my own. So a combination.

9 Q So what about Berkmo?

10 A Berkmo was supplied or given to me by
11 my attorney.

12 Q What about Richman?

13 A I don't recall.

14 Q Do you know, approximately, how much
15 you've billed to ADB on this matter, so far?

16 A In terms of total dollar values?

17 Q Yes.

18 A Approximately, \$20,000.

19 Q Is this PGR the first time you've done
20 any work for Safegate?

21 A Yes.

22 Q And if I refer to "Safegate" today,

1 that will refer to, I guess, any of the petitioner
2 entities, okay?

3 A Yes.

4 Q Had you heard of Safegate before they
5 reached out to you to work on this matter?

6 A No.

7 Q Are you working on any other matters
8 for Safegate?

9 A No.

10 Q Have you reviewed any of Honeywell's
11 other patents related to tracking of aircraft?

12 A I don't recall. I know I reviewed a
13 number of patents last August, during my formation
14 of the declaration, but I cannot recall whether
15 Honeywell was a part of those.

16 Q Are you working on any other PGR
17 petitions for Safegate against Honeywell?

18 MR. WEINSTEIN: Objection.

19 Attorney-client privilege.

20 I instruct the witness not to answer.

21 It would reveal attorney-client privileges.

22 Q Have you analyzed any of Safegate's

1 commercial products?

2 A No.

3 Q Do you know how any of Safegate's
4 commercial products work?

5 A No.

6 Q And do you understand whether Berkmo is
7 owned by Safegate?

8 MR. WEINSTEIN: Objection. Form.

9 A I do not know. I know that Berkmo, and
10 that patent, indicates Safegate on it. But the
11 specifics of that relationship, I do not know.

12 Q Okay. So you don't know if Berkmo
13 describes any of Safegate's commercial products;
14 is that right?

15 A I do not know.

16 Q Do you know if Safegate would have
17 filed this PGR petition if it did not believe that
18 it infringed the '349 patent?

19 A I do not know.

20 Q What did you do to prepare for today's
21 deposition?

22 A I read over the '349 patent and Berkmo

1 and Richman, and then I read over my declaration.

2 Q Did you meet with anyone?

3 A I met with my attorney.

4 Q And when was that?

5 A Excuse me?

6 Q When was that?

7 A That was yesterday.

8 Q For, approximately, how long?

9 A For, approximately, five hours.

10 Q Okay. If you could turn to page 92 of
11 your declaration. Let me know when you get there.

12 A Yes.

13 Q That's your CV, right?

14 A Yes.

15 Q And does this CV accurately set forth
16 your educational background and your employment
17 experience?

18 A Yes, it does.

19 Q And are there any changes you would
20 like to make as you sit here today?

21 A No.

22 Q Okay. Turning back to paragraph 11 of

1 your report, you refer to two sabbaticals that you
2 had.

3 And let me know when you're there.

4 A Yes.

5 Q And is that your only industry
6 experience?

7 A During my schooling years,
8 undergraduate and graduate, I spent several
9 summers working in industry, over 30 years ago;
10 so, a little bit more industry experience.

11 Q And what type of industry was that?

12 A That was working for Lockheed Martin --
13 actually, at the time, it was Lockheed, and
14 Lawrence Livermore Lab, which is a Department of
15 Energy lab.

16 Q And did any of that relate to the
17 technology relevant to this declaration?

18 A It did not, no.

19 Q I see you refer to a 2005 sabbatical
20 working with a small autonomous airplane company,
21 right?

22 A Yes.

1 Q Can you describe what, specifically,
2 you did during that sabbatical?

3 A During that sabbatical, I had a --
4 well, prior to that sabbatical, I had a
5 collaborative research grant with the company
6 Insitu Group, where we were developing tracking
7 algorithms for their UAVs. So they had a small
8 UAV with a gimbaling camera in the nose cone, and
9 my group worked on sensor fusion algorithms and
10 estimation and tracking algorithms.

11 So the goal of the sabbatical was to
12 transition those algorithms to be working in their
13 UAVs.

14 Q And how long did that sabbatical last?

15 A That sabbatical lasted, approximately,
16 six months.

17 Q Okay. And then in 2019 to 2020, you
18 refer to a sabbatical working at Draper Labs,
19 right?

20 A Yes.

21 MR. BITTMAN: Can we go off the record
22 for a second.

1 (Off the record.)

2 BY MR. BITTMAN:

3 Q So, in 2019 to 2020, you referred to a
4 sabbatical working at Draper Labs, right?

5 A Yes.

6 Q And what, specifically, did you do in
7 that role?

8 A In that role, we were looking at
9 technology focused on -- we were focused on
10 technology for allowing autonomous vehicles, which
11 were those flying in the air, to be able to
12 localize or find their location without the use of
13 GPS.

14 Q And how long did that role last?

15 A That role lasted, approximately,
16 12 months.

17 Q Was it full-time?

18 A It was not full-time. It was,
19 approximately, 60 to 70 percent time.

20 Q Have you ever done any work for any
21 Honeywell entity?

22 A I have not.

1 (Exhibit 1001 marked for identification
2 and retained by counsel.)

3 Q I'm handing you Exhibit 1001, this
4 is --

5 MR. BITTMAN: For the record, this is
6 U.S. Patent Number 11,538,349.

7 Q Are you familiar with this document?

8 A Yes, I'm familiar with this document.

9 Q And did you -- and this is the patent
10 that I said earlier we would refer to today as the
11 "'349 patent," okay?

12 A Yes.

13 Q Did you review the '349 patent in
14 connection with preparing your declaration in this
15 case?

16 A Yes, I did.

17 Q Did you review the entire patent?

18 A Yes, I did.

19 Q Did you review the prosecution history?

20 A I did not.

21 Q Turn to paragraph 25 of your
22 declaration.

1 Let me know when you're there.

2 A I'm there.

3 Q So paragraph 25 of your declaration,
4 you state that you understand that claim terms are
5 interpreted as they would have been interpreted by
6 a person of ordinary skill in the art at the time
7 of the invention and under the specification and
8 the patent's prosecution history in the patent
9 office.

10 Do you see that?

11 A Yes, I see that.

12 Q Can you explain how you've applied that
13 understanding to the claim terms used in the '349
14 patent?

15 MR. WEINSTEIN: Objection. Form.
16 Attorney-client privilege.

17 To the extent that answering the
18 question would reveal attorney-client
19 communications, I instruct the witness not to
20 answer.

21 Otherwise, the witness may answer.

22 A Can you repeat the question because I'm

1 not sure if I fully understood it?

2 Q Sure. I'm just trying to understand
3 how you've come to your understanding of what the
4 claim terms that you've analyzed mean, for
5 purposes of your declaration.

6 A So, during this process, again, the
7 declaration is a collaborative document that I
8 worked on with my attorney, and my attorney would,
9 for instance, talk to me about what some of the
10 terms actually meant, including the definition of
11 a person of ordinary skill. And so, when I looked
12 at their claim terms, I understand that, both from
13 my perspective as an expert, but, also, from the
14 perspective of how I've defined a person of
15 ordinary skill in the art at the time of the
16 invention, which I think was August of 2020.

17 And then in the declaration, I worked
18 on a description of what a person of ordinary
19 skill -- what background a person of ordinary
20 skill would have with respect to the technology in
21 the patent.

22 Q Are there any examples of how the

1 specification has guided your understanding of the
2 terms?

3 A Can you clarify what you mean by
4 "specification"?

5 Q The patent specification, which you
6 refer to in that paragraph 25.

7 A I'm still unclear of the question,
8 sorry.

9 Q I'm just trying to understand how
10 you've -- let me start that again.

11 I'm just trying to understand the
12 meaning that you've provided to the claim terms
13 that you've analyzed, particularly in view of the
14 statement that you make in paragraph 25 of your
15 declaration, where you say that the claim terms
16 are interpreted by person skilled in the art, in
17 light of the specification.

18 So, my question is related to how the
19 specification guided your understanding of the
20 terms in the patent here?

21 MR. WEINSTEIN: Objection. Form.

22 A The -- in the specification or in the

1 patent, there are a number of technologies that
2 are described. There are a certain number of
3 technical terms, including tracking, for instance,
4 using different kinds of sensors. And so, my --
5 in my looking at the -- well, there's two aspects.
6 One is, in defining the person of ordinary skill,
7 I sort of looked at those technologies to
8 understand what level of skill would be required
9 to understand those terms and the technical
10 details inside of the specification.

11 And then, when I was looking at the
12 specific claims, in understanding the claims, I
13 would apply those through the lens of what a
14 person of ordinary skill in the art had at the
15 time of the invention.

16 Q Okay. Let's turn to claim 1 of the
17 '349 patent.

18 Let me know when you're there.

19 A Okay. Yes, I'm here.

20 Q Okay. I'd like to ask you about that
21 first step, which says "Receiving camera image
22 data of the aircraft while the aircraft is

1 approaching a ramp area for parking the aircraft
2 on an airside of the airport."

3 Do you see that?

4 A Yes, I see that.

5 Q Can you describe what your
6 understanding of this step requires, as you
7 applied it in your declaration?

8 MR. WEINSTEIN: Objection. Form.

9 A So, this -- this -- the words here
10 specifically focus on receiving camera image data.
11 So it is the process of collecting camera image
12 data and receiving it. And that camera is viewing
13 an aircraft in an approaching ramp area.

14 Q Okay. What is your understanding of
15 the meaning of "camera image data"?

16 A Camera image data is data that's
17 produced from a camera. It typically is in
18 pixels. It is the receiving of radiation from an
19 illuminated source of the environment, typically,
20 in a 2D set of pixels, two dimensions.

21 Q And how is camera image data different
22 than LiDAR or RADAR sensor data?

1 A Camera image data is focused on light,
2 whereas, the laser data is focused on, actually,
3 outputting specific energy to the environment, in
4 the form of a laser, and looking at the return of
5 that laser specifically. So, whereas, a camera
6 passively collects the radiation pattern, based on
7 the light of the environment, the LiDAR, or laser,
8 specifically, is imparting energy to the
9 environment and looking for the return.

10 A RADAR is more similar to a LiDAR in
11 that it also imparts energy on the environment,
12 but it is at a different wavelength. So it is at
13 the radio wavelength and has a slightly different
14 technology, but produces very similar types of
15 data, I should say, than the LiDAR does.

16 Q All right. Turning back to claim 1 of
17 the '349 patent, the second step, which refers to
18 receiving light detection and ranging (LiDAR) or
19 radar detection and ranging (RADAR) sensor data of
20 the aircraft while the aircraft is approaching or
21 in the ramp area.

22 Do you see that?

1 A Yes, I see that.

2 Q And can you describe what your
3 understanding of this step requires?

4 A My understanding of this step focuses
5 on either one of the two sensors, so the step
6 would be identical, either LiDAR or RADAR. So you
7 have a sensor and that sensor is, again, imparting
8 energy on the environment and returning that to
9 collect data for that particular sensor and, so,
10 that sensor data is produced based on the
11 environment and the environment, as it's described
12 here, is an aircraft in the ramp area.

13 Q Okay. Let's move down to the next
14 step, which refers to merging the camera image
15 data in the LiDAR/RADAR sensor data into a merged
16 dataset.

17 Do you see that?

18 A Yes, I see that.

19 Q Can you describe what your
20 understanding of this step requires?

21 A The data from the camera -- the camera
22 image is typically in 2D pixels; however, it could

1 be -- there are additions that could be added,
2 that allow you to get depth information, which
3 would make it somewhat similar to the other
4 sensors, LiDAR and RADAR. In here, it doesn't
5 clarify what that is, which is just the camera
6 image data. So my assumption is this is focused
7 on just the image, and then the LiDAR and RADAR
8 sensor data are already described.

9 The idea, then, is you would merge
10 that's into a single, what's called a merged
11 dataset. The specifics, however, of how to do the
12 merging are not -- are not given.

13 Q How does the specification describe
14 that merging is performed?

15 A By "specification," you're talking
16 '349 patent?

17 Q Yes.

18 A As far as I recall, the '349 patent
19 does not specifically define an algorithm or an
20 approach on how to do the merging.

21 Q Okay. Let's turn now to -- let's skip
22 over the wherein clause, and then let's turn to

1 the following step, which refers to displaying
2 messages to provide directional and speed guidance
3 to a pilot with the merged dataset.

4 Do you see that?

5 A Yes, I see that.

6 Q And can you describe your understanding
7 of what this step requires?

8 A This step is to provide direction and
9 speed information, which, collectively, could be
10 referred to as guidance on the pilot, such as
11 which direction to go and how fast to go. And
12 then the second part is with the merged dataset.

13 It's a little unclear to me what "with
14 the merged dataset" means. It could mean you're
15 displaying the dataset or it could be that the
16 dataset was used to find the directional speed
17 guidance.

18 Q Okay. For all these steps we just
19 discussed, is that the understanding you've
20 applied in your declaration?

21 A Yes.

22 Q Can you turn to claim 19. Let me know

1 when you're there.

2 A Yes.

3 Q So that claims says "The system of
4 claim 18, wherein the LiDAR/RADAR sensor data is
5 analyzed using a point cloud process to correlate
6 points in the LiDAR/RADAR sensor data to points in
7 their camera image data."

8 Do you see that?

9 A Yes, I do.

10 Q Can you describe what your
11 understanding of this step requires?

12 A The LiDAR and RADAR sensor data creates
13 point clouds, which are 3D points. The camera
14 image data, again, is a -- is a 2D set of data in
15 pixels, but could be augmented with depth
16 information to, also, create a point cloud.

17 So my understanding of claim 19 is that
18 there is a point cloud process where two sensors
19 are the point clouds, or the point clouds with the
20 pixel data are correlated, which basically means
21 understanding if they're coming from the same,
22 effectively, location. In my mind, it's a 3D

1 location.

2 Q How many data points would a tracking
3 system, such as the one claimed in the '349
4 patent, use?

5 MR. WEINSTEIN: Objection. Form.

6 A The number of data points is different
7 for the different sensors. And the '349 patent
8 does not discuss any specifics with respect to how
9 many points. I think what would be common and
10 well-known to a position -- a person of ordinary
11 skill would be that LiDAR typically produces many
12 points per second, typically, in the thousands.
13 RADAR is -- depends on the processing of the
14 sensor, which is typically much smaller, and then,
15 the camera image data is dependent on the
16 resolution of the camera, so how many pixels are
17 in different dimensions and, so, typically, those
18 are also in the thousands.

19 Q Can point clouds be difficult to work
20 with?

21 MR. WEINSTEIN: Objection. Form.

22 A Point clouds -- 3D point clouds can be

1 processed quite easily with algorithms, and they
2 have been -- there are a number of algorithms to
3 be able to work with those. The primary
4 challenge, sometimes, with point clouds is to view
5 them and understand them. Sometimes there are
6 challenges with computation, but processing the
7 point clouds and using those point clouds is a
8 very -- and the point cloud process, as they
9 describe here, is very common, certainly now, but,
10 also, in 2020, when this patent was filed.

11 (Exhibit 1004 marked for identification
12 and retained by counsel.)

13 Q So, I've just handed you
14 Exhibit Number 1004.

15 MR. BITTMAN: And for the record, this
16 is Patent Publication Number US 2022/0066025 A1,
17 assigned to Berkmo, and we've been referring to
18 this, and you've referred to this document, in
19 your declaration, as Berkmo, I believe.

20 Is that correct?

21 A Yes, that's correct.

22 Q Is it okay if we refer to it, today, as

1 "Berkmo"?

2 A Yes.

3 Q So did you review Berkmo in connection
4 with preparing your declaration in this case?

5 A Yes, I did.

6 Q And did you review the entire patent?

7 A By "entire patent," in this document,
8 yes.

9 Q Patent publication, I should say.

10 A Yes.

11 Q Turning back to your declaration,
12 paragraph 45.

13 Can you let me know when you're there.

14 A Yes. I'm there.

15 Q Paragraph 45 of your declaration, you
16 state that the main drawbacks of camera sensors
17 are the lack of depth information, except for a
18 stereo/pair of cameras or added depth estimation
19 software.

20 Do you see that?

21 A Yes.

22 Q Have you seen anything in Berkmo that

1 suggests using stereo cameras or depth estimation
2 software?

3 A I don't recall seeing any specific
4 wording in Berkmo about capturing depth with the
5 camera data.

6 Q Okay. Turn to paragraph 107 of your
7 declaration.

8 So in that paragraph, you include an
9 annotated version of Figure 3, and you state the
10 imaging system, radar system, and laser system are
11 arranged at different positions to detect an
12 approaching aircraft using different collection
13 angles.

14 Do you see that?

15 A Yes.

16 Q If two sensors are located at
17 significantly different locations, does this
18 require different processing than co-locator
19 sensors?

20 MR. WEINSTEIN: Objection. Form.

21 A Can you clarify what you mean by
22 "processing"?

1 Q Well, the process used to determine
2 where an object is.

3 MR. WEINSTEIN: Objection. Form.

4 A When you say "where," do you mean in
5 three dimensions or two dimensions?

6 Q Well, let's say the Berkmo example that
7 you include in Figure 3, specifically.

8 So, if you look at Figure 3, 110C is at
9 a different location than 110R and 110L, right?

10 A Yes.

11 Q So in that embodiment which they show
12 110C to be used to detect the aircraft together
13 with 110R and 110L, does that require different
14 processing because it's at a different location?

15 A It does not require different
16 processing.

17 Q So even though 110C is located spaced
18 apart from 110R, 110L, to determine where the
19 aircraft is, there no additional processing
20 required if, for example, 110C was located
21 together with those sensors?

22 MR. WEINSTEIN: Objection. Form.

1 A So my view of the embodiment in
2 Figure 3, with three different sensors, and how
3 it's described in Berkmo, as spatially resolving
4 each of the different sensors, is that a person of
5 ordinary skill would understand that you have the
6 different sensors at different positions, they can
7 locate different objects inside the -- their field
8 of view. They can detect and track, which is what
9 Berkmo discusses and teaches in its -- in the
10 patent. And then to bring those together, which
11 is to spatially resolve the different sensors, you
12 would do that in a 3D space, which is -- this is
13 sort of a top-down view of that.

14 So the third dimension would be the
15 height information, but I think a person of
16 ordinary skill would look at this, because you
17 have small objects and big objects, that the --
18 each of the objects are being tracked in three
19 dimensions.

20 Q Can you point me to any disclosure in
21 Berkmo where it discusses the differences of
22 processing required for the arrangement shown in

1 Figure 3, compared to the co-located arrangement
2 depicted in Figures 1 and 2.

3 MR. WEINSTEIN: Objection. Form.

4 A Berkmo uses the embodiments as
5 examples, and they're very clear that these are
6 simple examples that could be combined together.

7 So, where the spatially resolved
8 primarily focuses on the RADAR and LiDAR, Berkmo
9 also describes that the -- I think it was the
10 embodiment in Figure 2, where there was a camera,
11 uses the same processes.

12 So, my take on the embodiments is that
13 they are examples, but they are not exclusively
14 defining how to process that. So if the
15 processing talked about specially resolving sensor
16 data, that would be applicable to each of the
17 different sensors.

18 Q But Berkmo does not describe how to do
19 the spatial resolution, right?

20 MR. WEINSTEIN: Objection. Form.

21 A Berkmo does describe how to spatially
22 resolve multiple sensor data by using weighted

1 averages and things like that. So there are some
2 specifics in Berkmo about how to spatially resolve
3 multiple sensors.

4 Q So the reference to weighted averages
5 is the disclosure of how this would be done, in
6 your view?

7 MR. WEINSTEIN: Objection. Form.

8 A Can you repeat the question again,
9 please?

10 Q Yeah. I'm just trying to understand
11 what, specifically, in Berkmo it describes, with
12 respect to the spatial resolution, and you refer
13 to the weighted averages.

14 So I just wanted to confirm that that's
15 a disclosure of how the spatial resolving would be
16 done in Berkmo?

17 MR. WEINSTEIN: Objection. Form.

18 A There are more details that I actually
19 have in the declaration, which I can sort of look
20 up, in terms of those paragraphs, but those
21 keywords, in terms of spatially resolving multiple
22 sensors, and figuring out what the weights are and

1 how to combine those pixel-to-pixel matching,
2 those kinds of processes, and things like that,
3 are detailed in Berkmo, and I've summarized those
4 in my declaration, I'm just not quite exactly sure
5 where.

6 So that is the process of bringing
7 those sensors together.

8 Q Does Berkmo disclose determining the
9 aircraft's orientation?

10 MR. WEINSTEIN: Objection. Foundation.

11 A Berkmo teaches detecting and tracking
12 aircraft, as well as other objects in the ramp
13 area, and tracking, by definition, from my
14 viewpoint, as well as that of a person of ordinary
15 skill, would include orientation.

16 Q All right. So Berkmo discloses
17 determining the aircraft's orientation?

18 MR. WEINSTEIN: Objection. Foundation.

19 A Can you repeat that question again,
20 please?

21 Q Yeah. I'm just trying to understand if
22 this can be answered with a yes or no, and it

1 sounded like it was a yes, I was just trying to
2 get confirmation. I guess I'll start the question
3 again.

4 Does Berkmo disclose determining the
5 aircraft's orientation?

6 MR. WEINSTEIN: Objection. Form.

7 A I guess my answer there is, Berkmo
8 teaches detecting and tracking 3D objects in the
9 environment, and my view of the term "tracking,"
10 which I believe is -- would be the same as a
11 person of ordinary skill, would include
12 orientation. Tracking, by definition, is
13 position, velocity, direction, and orientation.
14 So orientation is a required part of tracking.

15 Q Orientation is a required part of
16 tracking?

17 A Orientation is a part -- a required
18 part of tracking for certain functions, such as
19 predicting collisions and predicting where a 3D
20 object, such as an aircraft driving on the ground,
21 is going to go in the future.

22 Q Can you turn to paragraph 121 of your

1 declaration.

2 Let me know when you're there.

3 A Okay.

4 Q So paragraph 121 you state that it
5 "would have obvious to a POSITA that the combined
6 output data includes data for determining aircraft
7 orientation," right?

8 A Yes.

9 Q So if you're stating that it would be
10 obvious, does that mean that it isn't expressly
11 disclosed?

12 MR. WEINSTEIN: Objection. Form.

13 A The word "orientation" is not expressly
14 given in Berkley -- in Berkmo; however, it is a
15 necessary part of tracking, specifically with
16 respect to tracking where an object is and where
17 it is going in the future, particularly in looking
18 at collision avoidance or guiding to a parking
19 space.

20 Q So then, are your opinions on
21 obviousness here irrelevant if it is expressly
22 disclosed?

1 MR. WEINSTEIN: Objection. Foundation.

2 A Can you repeat the question. I still
3 don't understand.

4 Q Yeah. I'm just trying to understand.

5 For most of your declaration, you state
6 what's disclosed in the reference and why it meets
7 the claims. But then for this particular issue,
8 you say it would have been -- it's disclosed, but
9 it would have also been obvious.

10 So I'm just trying to understand, you
11 know, your position and, you know, whether these
12 are just alternatives positions, why they're
13 alternatives positions, why you don't have them
14 elsewhere?

15 A The word --

16 MR. WEINSTEIN: Objection. Form.

17 A The word "orientation" is not
18 specifically in Berkmo, so I felt the need to
19 specifically talk about orientation and why I
20 believe it was a necessary part of the tracking
21 system.

22 So, the paragraphs in here that I

1 describe this specifically on how -- you know, why
2 it's a part of it, why, by definition, in
3 tracking, for a person of ordinary skill, would
4 understand that orientation would be a part of it.
5 Orientation is specifically critically important
6 for understanding collision avoidance because you
7 need to understand how the aircraft is oriented to
8 see if anything, for instance, is going to hit the
9 tail or the nose.

10 So, in order to calculate potential
11 collisions, which Berkmo talks about and teaches,
12 one -- it was necessary to have orientation in
13 order to solve those problems.

14 Q Okay. So then, just so I understand.
15 It's your belief that it would -- that it's
16 expressly disclosed in Berkmo, right?

17 A What is --

18 MR. WEINSTEIN: Objection. Form.

19 A What is "it"?

20 Q Orientation.

21 And, again, I'm just -- you have this
22 alternative position, it seems --

1 A Right.

2 Q -- so I'm just trying to get to the
3 bottom of that.

4 A I believe what I said is that Berkmo
5 does not expressly define orientation inside of
6 the patent itself. However, again, I think it's
7 necessary for tracking, and it's necessary for
8 predicting collisions.

9 Q Okay. And so it would be necessary
10 within the process of Berkmo, or it would be
11 obvious to add to what Berkmo is disclosing?

12 MR. WEINSTEIN: Objection to form.

13 A It would be necessary to do the
14 functions of Berkmo. So to calculate collisions,
15 it would be necessary to have orientation.

16 Q So, if you turn to paragraph 120.

17 Let me know when you're there.

18 A Yes.

19 Q So midway through that paragraph it
20 says "The combined output data from imaging
21 systems 110C, laser system 110L, and radar system
22 110R that provides data for tracking aircraft 10

1 would also necessarily include data that can be
2 used to determine orientation of aircraft 10,"
3 right?

4 A Yes.

5 Q But that wouldn't be true if the
6 aircraft was only rotating without moving in any
7 direction, right?

8 MR. WEINSTEIN: Objection. Foundation.

9 A Can you repeat that back to me?
10 Rotating in what?

11 Q Rotating without moving in any
12 direction.

13 MR. WEINSTEIN: Same objection.

14 A I think rotating is a speed. So, I
15 think that's -- I don't think you can rotate but,
16 then, not move. So I'm confused.

17 Q I guess just rotating in a particular
18 spot, without any forward direction.

19 MR. WEINSTEIN: Objection. Form.

20 A Okay. So when you mean "rotating," you
21 mean it's actually moving, but it's moving around
22 a point?

1 Q Yes.

2 A Okay. And so, I think I understand
3 from this scenario.

4 So can you repeat your question now
5 that I understand that scenario?

6 Q Sure. So with respect to the statement
7 in the middle of paragraph 120, where you say,
8 "The combined output data from imaging system
9 110C, laser system 110L, and radar system 110R
10 that provides data for tracking aircraft 10 would
11 also necessarily include data that can be used to
12 determine the orientation of the aircraft 10."

13 Do you see that?

14 A Yes.

15 Q So, that wouldn't be true if the
16 aircraft was only rotating without moving forward
17 in any direction, right?

18 MR. WEINSTEIN: Objection. Foundation.

19 A This sentence is true. It's the
20 combined output data, which, you know, how I wrote
21 this is 3D data of the environment, you -- could
22 be used to, as I said, include data that can be

1 used to determine orientation of the spacecraft.
2 So that data could be used to determine the
3 orientation.

4 Q Even if there was no forward movement?

5 A Correct.

6 MR. BITTMAN: I think we've been going
7 about an hour. Take a break?

8 MR. WEINSTEIN: Sure.

9 THE WITNESS: Sounds great.

10 (Recess taken from 10:09 a.m. to
11 10:20 a.m.)

12 BY MR. BITTMAN:

13 Q Welcome back, Dr. Campbell.

14 A Thank you.

15 Q If you could turn to page 75 of your
16 declaration.

17 Let me know when you're there.

18 A Okay.

19 Q So, in paragraphs 163 to 168 of your
20 declaration, you're talking about the motivation
21 to combine Berkmo and Richman, right?

22 A Yes.

1 Q So then, in paragraph 168, you state
2 that -- and I'll wait until you get there. Let me
3 know.

4 A Yes.

5 Q So paragraph 168 you state that "the
6 more common but less accurate approach for
7 aircraft tracking uses consecutive location
8 detections only in combination with the dynamics
9 model of how the object moves on the ground. This
10 approach infers each variable in tracking
11 (location, orientation, velocity, and direction),
12 based on the combination of the model prediction
13 and sensor data over time."

14 Right?

15 A Yes.

16 Q So the more common but less accurate
17 approach, that you refer to in this statement,
18 refers to the approach used in Berkmo, right?

19 MR. WEINSTEIN: Objection. Foundation.

20 A Berkmo teaches to -- about detection in
21 tracking objects and they use a Kalman filter,
22 which combines measurement data with a dynamics

1 model.

2 So, that aligns with the first sentence
3 here in 168.

4 MR. WEINSTEIN: If I just may
5 interject. The term that the witness used was
6 Kalman, K-A-L-M-A-N.

7 MR. BITTMAN: Thank you.

8 Q Okay. Just going back to paragraph
9 168. In that paragraph, you're talking about the
10 reasons to combine the 3D models from Richman into
11 Berkmo, right?

12 A In which part? 168?

13 Q Well, 163 to 168.

14 A Okay.

15 Q But including 168, yes.

16 A Yes. In those, 163 to 168, I discuss
17 the reasons to combine the two, Berkmo and
18 Richman.

19 Q Right. So then, when you say "the more
20 common but less accurate approach for aircraft
21 tracking uses consecutive location detections only
22 in combination with a dynamics model of how the

1 object moves in the ground," that's referring to
2 Berkmo's approach, right?

3 MR. WEINSTEIN: Objection. Form.

4 A At the start of 168, when I talk about
5 the more common but less accurate approach to
6 aircraft tracking, I was talking, in general, the
7 tracking problem. I was not referring,
8 specifically, to how Berkmo teaches; how they do
9 tracking, detection and tracking.

10 I was just referring to a common way
11 that tracking is done, which would be known by a
12 person of -- that knows the state of the art.

13 Q So this paragraph is unrelated to why a
14 person would incorporate Richman into Berkmo?

15 MR. WEINSTEIN: Objection. Foundation.

16 A This paragraph discusses why Richman
17 would be valuable -- why Richman could improve the
18 accuracy by including orientation information to a
19 tracking problem, and Berkmo is one example of
20 that.

21 Q So, if I understand you correctly, what
22 you're saying in this paragraph is why the --

1 relates to why the process in Richman could be
2 used to improve tracking accuracy, in general, but
3 not necessarily Berkmo's described system?

4 MR. WEINSTEIN: Objection. Foundation.

5 A So, the beginning part of this
6 paragraph talks about general tracking.

7 The second part talks about what
8 Richman can bring.

9 And then, the third part talks about
10 the fact that Richman can clearly improve the
11 accuracy of tracking in the Berkmo stand area
12 because it actually will create a measurement of
13 orientation.

14 So there's multiple things that are
15 happening in that paragraph.

16 Q So does Berkmo disclose using an
17 inferential tracking approach?

18 A Yes, Berkmo discloses an inferential
19 tracking approach.

20 Q And that is less accurate than an
21 approach that would use the 3D models taught by
22 Richman, right?

1 MR. WEINSTEIN: Objection. Foundation.

2 A Accuracy for tracking is dependent on
3 multiple factors, including the accuracy of the
4 sensors themselves. So it's a broad term to say
5 that one is more accurate than the other.

6 Q But you say, in paragraph 168, "The use
7 of 3D models and orientation information, as
8 taught by Richman, would clearly improve the
9 accuracy of aircraft tracking in Berkmo stand
10 area, as compared to the inferential approach."

11 Are you sticking by that statement?

12 A Yes, I'm sticking by that statement.

13 Q So then, I'll ask again, is Berkmo's
14 approach less accurate than an approach that would
15 use 3D models taught by Richman?

16 MR. WEINSTEIN: Objection. Foundation.

17 A Berkmo's approach to tracking with the
18 addition of Richman, such that Richman provides
19 orientation information, typically would be more
20 accurate, so long as the orientation information
21 is more accurate.

22 Q And is accuracy important for these

1 types of systems?

2 MR. WEINSTEIN: Objection. Form.

3 A Accuracy for these systems, when I
4 think of accuracy, I'm thinking tracking accuracy,
5 which would be position, velocity, direction, and
6 orientation, are important for parking the
7 aircraft, as well as collision avoidance of other
8 objects. So my answer would be, yes, accuracy is
9 important in these systems.

10 Q And why is that?

11 A Why is accuracy -- accuracy's important
12 to ensure that when you park at -- when the
13 aircraft parks at a certain location, it is close
14 to that location, if you are tracking the aircraft
15 and multiple objects to ensure that collisions
16 don't occur.

17 So accuracy -- a more accurate tracking
18 system will prove those functions.

19 Q Go to paragraph 123 of your
20 declaration. Let me know when you're there.

21 A 123, you said?

22 Q Yes.

1 A Okay. I'm here.

2 Q In the second sentence there you state
3 "It is well-known and understood by a POSITA that
4 more measurement always results in better tracking
5 accuracy."

6 Do you see that?

7 A Yes.

8 Q So wouldn't Berkmo be able to get more
9 measurements if it disclosed many sensors at each
10 location?

11 MR. WEINSTEIN: Objection. Foundation.

12 A The addition of more sensors will make
13 tracking more accurate. So, whether that is
14 Berkmo or Richman, or '349 patent, all would be
15 more accurate with additional sensors.

16 Q Is there a downside of getting too many
17 measurements?

18 A In theory, no, there's no downside.

19 Q And what do you mean when you say "in
20 theory"?

21 A When you combine measurements,
22 typically, for instance, in a Kalman filter, which

1 is in 122, if you have a good model of -- good
2 statistical model of how the -- of the errors that
3 a sensor will make, then, theoretically, it is
4 guaranteed that adding another sensor will only
5 improve the accuracy.

6 So, the only time that it won't improve
7 the accuracy is if you have some nonideal
8 conditions. So, for instance, your statistical
9 error model is incorrect. The time that -- the
10 time of the two sensor measurements are different
11 and other, sort of, real -- real-world scenarios
12 that might degrade sort of any tracking system,
13 not just Berkmo.

14 Q And you would agree that an aircraft
15 tracking, which is the type of systems described
16 in the '349 patent and in Berkmo, that uses
17 real-world scenarios, which may include
18 degradation, right?

19 MR. WEINSTEIN: Objection. Foundation.

20 A Berkmo, Richman, and '349 all focus on
21 aircraft and objects in the ramp area, and
22 tracking those objects. And so, any real-world

1 elements, such as the timing of two different
2 sensor measurements, or those kinds of aspects,
3 would be applicable to all three.

4 Q So based on your testimony earlier
5 related to increasing the number of sensors for
6 more accuracy, would a POSITA understand that
7 Berkmo's disclosed system does not obtain enough
8 measurements for accurate tracking of an aircraft?

9 MR. WEINSTEIN: Objection. Foundation.

10 A A POSITA would know that Berkmo does
11 have enough sensor data, in combination of the
12 dynamic model, to perform tracking of all objects
13 in the ramp area.

14 So you had indicated that it was not
15 accurate, but I would not use those words.

16 Q But you said it would be more accurate
17 if it uses the 3D techniques disclosed in Richman,
18 right?

19 A I said it would be more accurate. But
20 I didn't say Berkmo was not accurate.

21 Q So, in paragraph 123, towards the
22 bottom, you state that "A POSITA would have

1 understood that orientation is needed to predict
2 future movement of objects and thus potentially
3 collisions."

4 Do you see that?

5 A Say that again. Where is that one?

6 Q It's the second sentence from the
7 bottom. Where it says --

8 A Okay.

9 Q I'll just read it again, for the
10 record.

11 A Okay.

12 Q "A POSITA would have understood that
13 orientation is needed to predict future movement
14 of objects and thus potential collisions."

15 Do you see that?

16 A I see that, yes.

17 Q And then if we could shift over to
18 paragraph 127.

19 Let me know when you're there.

20 A Yes. I'm here.

21 Q Bear with me for a second.

22 A That's all right.

1 Q Let's move on to the next question, as
2 I can't read my notes for this one.

3 (Exhibit 1005 marked for identification
4 and retained by counsel.)

5 Q All right. I'm handing you
6 Exhibit 1005.

7 MR. BITTMAN: And for the record, this
8 is U.S. Patent Number 5,675,661, and this is the
9 patent that, I believe, you refer to as Richman
10 throughout your declaration; is that right?

11 A Yes.

12 Q And did you review Richman in
13 connection with preparing your declaration in this
14 case?

15 A Yes, I did.

16 Q And did you review the entire patent?

17 A I reviewed this entire document, yes.

18 Q If you turn to the front page of that
19 document, it shows that Richman was filed in 1995
20 and issued in 1997, right?

21 A Yes.

22 Q So Berkmo was filed about 25 years

1 after this patent was filed, right?

2 A Yes.

3 Q So, Richman is describing a technique
4 that is much older than what is described in
5 Berkmo, right?

6 A Yes.

7 Q But you assert that the 25-year-old
8 technology would be incorporated to clearly
9 improve the accuracy of Berkmo's system, right?

10 MR. WEINSTEIN: Objection. Foundation.

11 A Yes. I had -- in my declaration, I had
12 indicated that for reasons -- the reasons to
13 combine them is, by adding in elements of Richman
14 would improve the accuracy of Berkmo.

15 Q Did it surprise you that Berkmo
16 disclosed using an approach that was less accurate
17 than one that had been around for 25 years?

18 MR. WEINSTEIN: Objection. Form.

19 A No, it did not surprise me. The --
20 because, you know, in terms of detecting and
21 tracking, more recently, the use of templates in
22 Richman, and things like that, have been used a

1 little bit less once machine learning and deep
2 learning started to be used a little bit more. So
3 it didn't necessarily surprise me.

4 Q So what does machine learning and deep
5 learning have to do with techniques, such as that
6 disclosed in Richman, being used less?

7 MR. WEINSTEIN: Objection. Form.

8 A I just want to make sure. Can you
9 repeat your question because you added the word
10 "less" at the end and I didn't quite understand
11 what that meant.

12 Q I was trying to understand your
13 statement earlier, where you said machine learning
14 and deep learning, with that being used more than
15 templates, such as that described in Richman,
16 would be used.

17 Or, I guess, let me start that again.

18 Looks like you testified that once
19 machine learning and deep learning started to be
20 used more, then it sounded like the process of
21 Richman would be used less.

22 Is that not what you are testifying?

1 A I am testifying that. But there's more
2 context, I guess, than that.

3 You know, the use of 3D templates works
4 very well when you have a finite set of templates.
5 So, for instance, I have just -- you know, I have
6 20 different kinds of aircraft. And so, if I have
7 to decide between those 20 different kinds of
8 aircraft, using templates is actually very good to
9 be able to do that. It makes it a little bit
10 easier because you only have to pick which of the
11 20 is correct.

12 And machine learning has been doing
13 that for a number of years. I think in my
14 declaration I had some background on that, that
15 actually described that.

16 But in modern systems, particularly
17 driven by self-driving cars, machine learning and
18 deep learning is trained on training data, and it
19 can produce position and orientation from the raw
20 sensor data, directly, and it's done -- it gets
21 that, basically, from the training data itself.

22 Q So even with that technology available,

1 you believe a person of skill in the art would be
2 motivated to look to Richman?

3 A I do, because of the application space
4 of an airport where there is a countable, finite
5 number of different kinds of objects, like,
6 different aircraft. It does not work as well in,
7 let's say, self-driving cars, where you have cars
8 and trucks and pedestrians and cars with bikes on
9 the back, where each of the objects is very, very
10 different and the number of types of objects is
11 much higher.

12 I would like to also add that one of
13 the reasons why Richman is particularly good for
14 this, also, is that the '349 patent discusses
15 using 3D models and finding orientation from that.
16 So that was very similar to what Richman is doing.

17 Q Okay. Let's turn to paragraph 78 of
18 your declaration. Let me know when you're there.

19 A Okay.

20 Q So, paragraph 78 you state that it is
21 your opinion that "Claim 1 of the '349 patent
22 simply describes the abstract idea of receiving

1 image and sensor data, merging it, and displaying
2 messages with the merged data," right?

3 A Yes.

4 Q How did you come up with that abstract
5 idea?

6 MR. WEINSTEIN: Objection. Form.

7 A When I read claim 1, it uses general
8 words without the specifics of -- general words,
9 in terms of receiving the data, collecting the
10 data, receiving the data, merging it, without any
11 specific approaches on how to do that. And so, in
12 my opinion, in that of a person of ordinary skill,
13 I look at it through the lens of can I re-create
14 that? Can I create that function from those words
15 in the claim? And if the answer is no, I think of
16 it as more abstract idea because I cannot
17 re-create it.

18 Q What can't you re-create?

19 A For example, how do you merge the
20 sensor data? There's no method described on how
21 to merge the sensor data.

22 Q So the way you came up with the

1 abstract idea was you looked at the claim
2 limitations, and then you decided there was no
3 specific detail included; is that right?

4 MR. WEINSTEIN: Objection. Foundation.

5 A When I read claim 1, there was not
6 enough detail, in some aspects, specifically
7 merging, to re-create it. Other expects of it, in
8 terms of receiving an image and sensor data, are
9 fairly routine. Displaying messages is fairly
10 routine.

11 Q Okay. So, but you picked out just a
12 few words from the claims, right, to describe the
13 abstract idea?

14 MR. WEINSTEIN: Objection. Foundation.

15 A In paragraph 78, this describes just a
16 few of the words, yes.

17 Q And that's what you're saying the
18 abstract idea is, right?

19 MR. WEINSTEIN: Objection. Foundation.

20 A So in claim 1, when I was describing
21 the abstract idea, there were certainly -- I did
22 not include all the details of claim 1, I included

1 some of the main action items, which included
2 receiving, which is the beginning of several of
3 the limitations, merging, which is another one,
4 displaying message, which is actually another one.
5 Also doesn't include information about what the
6 dataset could be used for, so, the data for
7 determining position and things like that.

8 Q So aren't you just picking out the
9 verbs from the claim?

10 MR. WEINSTEIN: Objection. Foundation.

11 A I'm summarizing what I think are the
12 key actions of the claim.

13 Q Couldn't that be done for every method
14 patent claim, to say that all patent claims are
15 abstract?

16 MR. WEINSTEIN: Objection. Form.

17 A I'll go back to what I had said of why
18 I think it's an abstract idea, which is that I
19 read the claim in full, and as an expert in the
20 field, but also through the lens of a person who
21 is skilled in the art at the time, whether you
22 could re-create those functions. So the

1 functions, in my mind, are the actions.

2 And so, for instance, whether you can
3 re-create merging. There are no details about how
4 you merge, for instance, camera data in the sensor
5 data. So I just described merging in paragraph
6 78. But during my process of forming this
7 declaration, I read it in detail.

8 Q Okay. But with respect to the abstract
9 idea of receiving image and sensor data, merging
10 it, and displaying messages, does it matter that
11 there are many other words in the claims?

12 A I believe because the idea of
13 receiving -- collecting sensor data, receiving
14 sensor data, and merging it, and displaying it, are
15 four action items that are actually in claim 1.
16 That is enough to define whether that claim is
17 abstract.

18 So, for instance, I don't describe what
19 the sensor data is. I don't describe whether it's
20 LiDAR or camera. So, because there's -- you can
21 receive data from all three of those sensors
22 inside of the claim.

1 Q So is that relevant to what the
2 abstract idea is?

3 MR. WEINSTEIN: Objection. Form.

4 A I don't believe the type of sensor data
5 is relevant to whether it's abstract or not.

6 Q Turn to paragraph 96.

7 Are you there?

8 A Yes.

9 Q So in paragraph 96, you state that
10 "Independent claim 18, which is a system claim, is
11 also directed to the same abstract idea," right?

12 A Yes.

13 Q So there's no relevance in your
14 analysis that the claims call out specific
15 components with identified functionality, right?

16 MR. WEINSTEIN: Objection. Foundation.

17 A So the main addition to claim 10 is
18 that within the sensor data, understanding what
19 part of the data is associated with the aircraft.
20 I believe that functionality is required in order
21 to do tracking and detection.

22 In claim 18, the main addition is a

1 computing device with memory, which is a common
2 and routine wording that you would have to have
3 for each of these functions.

4 Q Claim 18 also specifically refers to a
5 camera image sensor, and a light detection and
6 ranging, LiDAR or radar detection and ranging,
7 RADAR sensor, right?

8 A That is correct.

9 Q And is any of that relevant to your
10 abstract idea description?

11 A The type of sensor is not -- I don't
12 think it pertains to the abstract idea. I think
13 it's abstract no matter what the sensor type is.
14 The abstract part is the functioning of that,
15 receiving of the data, the merging of the data.
16 The type of data does not matter.

17 Q Just looking, now, at claim 18, you've
18 basically picked out a few verbs of receiving,
19 determining -- I'm sorry, let me start that again.

20 With respect to claim 18, you refer to,
21 still, the receiving, merging, and displaying,
22 right, as the abstract idea?

1 MR. WEINSTEIN: Objection. Foundation.

2 A So claim -- so I basically say claim --
3 you said claim 18 or 10?

4 Q Claim 18.

5 A So claim 18 is the same as claim 1, it
6 still uses the same verbs, in terms of receiving
7 camera data, capturing camera data, and the focus
8 is on a computing device having the memory. And
9 so, basically, the claim 18 is on a general
10 computing device for that functionality.

11 Q Okay. So all the other words in this
12 claim, aside from those few verbs you picked out,
13 are not part of the abstract idea, right?

14 MR. WEINSTEIN: Objection. Foundation.

15 A So claim 18 has the same functionality
16 as claim 1, in terms of the abstract verbs. The
17 main addition is the computing device, okay?

18 So, my view of claim 18 is focused on
19 the computing device for each of these different
20 functions, and that computing device would be
21 well-understood and routine for a POSITA to
22 understand on how to operate those functions.

1 Q Go to paragraph 79.

2 Let me know when you're there.

3 A Okay. I'm there.

4 Q So in that paragraph, you say "It is my
5 understanding that under the Guidance," with a
6 capital G, "that 'mental processes' are considered
7 an abstract idea."

8 Do you see that?

9 A Yes.

10 Q And that Guidance is a document issued
11 by the patent office?

12 A Yes, I believe so.

13 Q Did you review it?

14 A I did not review that document, no.

15 Q So the understanding of exemplary
16 mental process, that you refer to in paragraph 9,
17 was provided to you by counsel?

18 A You mean paragraph 79?

19 Q Yes.

20 A My understanding of these guidance --
21 Guidance steps, in terms of step 1, step 2A, prong
22 1, prong 2, and 2B, I learned in -- about in

1 discussion with my attorney.

2 Q Did you review examples in the Guidance
3 related to what would not be considered an
4 abstract idea?

5 A I did not.

6 Q Turn back to paragraph 78.

7 So in paragraph 78, you say that the
8 abstract idea can be performed in the human mind,
9 right?

10 A Yes.

11 Q Is it your opinion that all of the
12 claims in the '349 patent can be performed in the
13 human mind?

14 A Some of the claims of '349 include a
15 computer system, so, they're actually hardware.
16 So I don't believe claims, such as those, because
17 they're hardware, would be the same as what could
18 be done with the human mind. I think with the
19 human mind, it would be more the functionality in
20 terms of, for instance, calculating or determining
21 a portion of the camera image, for instance, or
22 those types of things.

1 It's more some of the functions.

2 Q Let's go back to Berkmo Exhibit 1004.

3 A Okay.

4 Q If you could turn to the last page. If
5 you look at claim 55.

6 Let me know when you're there.

7 A Paragraph 55, you mean?

8 Q Yes.

9 A Okay.

10 Q No, I'm sorry, claim 55. This is on
11 the last page.

12 A Okay.

13 Q All right. So, looking at claim 55,
14 does claim 55 of Berkmo describe an abstract idea?

15 MR. WEINSTEIN: Objection. Form.

16 A Claim 55 has a number of elements,
17 also, and uses some of the same action words that
18 I described earlier. This is focusing a little
19 bit on determining visibility, based on the output
20 data of one or more sensors, and then comparing
21 that to a visibility threshold.

22 So, I do think some of these words are

1 abstract, but if you go back to Berkmo, for
2 instance, there is a figure that describes the
3 logic of where that is, and then there are
4 examples of how to actually determine that
5 visibility.

6 So, in my mind, so long as the detailed
7 descriptions of that, you can actually re-create
8 that in either a computing or algorithmic form,
9 so, for instance, determining visibility with
10 measurements or something like that, based on a
11 threshold. If I can do that and I can re-create
12 that, then that takes it from an abstract idea to
13 something more specific.

14 Q Okay. What you just referred to
15 appears in the specification, not in the claims,
16 right?

17 MR. WEINSTEIN: Objection. Foundation.

18 A What I just described is in the
19 specification, yes.

20 Q Okay. So do the claims, themselves,
21 refer to an abstract idea?

22 MR. WEINSTEIN: Objection. Form.

1 A So, I'm -- I'm not an expert in the
2 law, but when I think of the claims and whether
3 it's abstract, I look both at the claim, but then
4 I also look at the background material to see if I
5 can actually re-create it. So I understand
6 sometimes the claims are summaries of things that
7 have already been presented.

8 Q So how is this claim 55 any different
9 than the abstract idea that you provided to
10 claim 1 of the '349 patent?

11 MR. WEINSTEIN: Objection. Form.

12 A I think with respect to the
13 '349 patent, there are elements of claim 1 that
14 weren't in the specification, for instance, how to
15 merge the data.

16 Q Okay. So the reason why claim 1
17 recites an abstract idea is because the
18 specification does not sufficiently describe how
19 to merge the data?

20 Is that your opinion?

21 MR. WEINSTEIN: Objection. Foundation.

22 A I think if -- if the claim -- in

1 combination with the specification, if I, as a
2 technical person or a POSITA, can't re-create
3 that, then I feel like it's an abstract idea. If
4 I can re-create it, then I feel like that's
5 sufficient to have a non-abstract idea.

6 Q Okay. So then, if there is something
7 in the disclosure within the '349 patent that
8 describes, sufficiently, how to merge the data,
9 then it would be nonabstract, right?

10 MR. WEINSTEIN: Objection. Foundation.

11 A If there were specifics on how to merge
12 the data in '349, that term, then, would go from
13 an abstract to a nonabstract idea, yes.

14 Q Are there any nonconventional
15 components recited in claim 55?

16 MR. WEINSTEIN: Objection. Foundation.

17 A Can you clarify what you mean by
18 "nonconventional"?

19 Q So you use that term in paragraph 74,
20 for example, but I believe you use it elsewhere
21 throughout your declaration, as well.

22 A Okay. I think I meant unique there.

1 I think in claim 55, the beginning part
2 of the claim is primarily talking, in fairly
3 general terms, in terms of the sensors used in the
4 aircraft in the stand area, in the parking
5 position and so on, and I think the sort of
6 specific part, the nonconventional part is
7 determining the visibility. And then based on
8 that, comparing that with the threshold, detecting
9 with just a radar-based system.

10 So I think the nonconventional part or
11 the sort of the indented parts of 55, and then
12 back in the specification, there's more detail and
13 describing on how to calculate the visibility and
14 examples of what that actually is.

15 Q Okay. So then, just to make sure I
16 understand your testimony accurately. It's your
17 position that claim 55 of Berkmo is not abstract,
18 compared to claim 1 of the '349 patent, because
19 there's more of a description in the specification
20 of Berkmo.

21 Is that accurate?

22 MR. WEINSTEIN: Objection. Foundation.

1 A I think Berkmo is not abstract because
2 the nonconventional part about determining
3 visibility is described in detail in the
4 specification, and I think '349 is abstract
5 because there's certain functions, such as merging
6 the data, that aren't described in the
7 specification.

8 Q Can you turn to claim 31 of Berkmo.
9 Let me know when you're there.

10 A Okay.

11 Q Does claim 31 of Berkmo describe an
12 abstract idea?

13 MR. WEINSTEIN: Objection. Form.

14 A I think claim 31 summarizes the system
15 that Berkmo is -- describes in more detail in the
16 other claims. I think that includes radar -- a
17 display of RADAR systems and laser-based systems.
18 These are sort of common terms, conventional terms
19 and things like that.

20 The -- and then it describes a bit
21 about the functionality, in terms of detecting and
22 tracking objects of the approaching paragraph --

1 approaching aircraft, and then giving guidance
2 information.

3 So, I think a number of these functions
4 are, indeed, abstract, as they're described in
5 this paragraph.

6 Q Is there anything not abstract about
7 claim 31 of Berkmo?

8 A Specifically about claim 31?

9 Q Yes.

10 A As -- so, what I will say, again, is
11 that the -- I did not -- this idea of abstract and
12 abstract concept, I did not study Berkmo through
13 that lens. So -- and when I think of abstract, I
14 think of it as, is claim 31 abstract? I look at
15 the words in claim 31, but then I look at the
16 specifications, all right?

17 So I think to really answer that
18 question correctly, I would have to read through a
19 little more in detail to understand if, in the
20 specification, there are specific things that go
21 along with these functions.

22 So, for instance, when we went through

1 55, I remembered that the visibility was something
2 very specific and nonconventional. So I was able
3 to cite that.

4 With respect to these, I'd have to read
5 through it in more detail to give an adequate
6 answer, I think.

7 Q Okay. But sitting here now, and with
8 the focus on the claims themselves, you're not
9 able to identify anything that's not abstract,
10 correct?

11 MR. WEINSTEIN: Objection. Foundation.

12 A I'm saying I would have to go through a
13 more thorough process to be able to answer whether
14 it's abstract or not.

15 Q Do you see any nonconventional
16 components recited in claim 31?

17 A I would have to go through the
18 specification to really recall that.

19 Q And how are the requirements of
20 claim 31 of Berkmo different from claim 18 of the
21 '349 patent, with respect to the abstract idea
22 analysis?

1 MR. WEINSTEIN: Objection.

2 A Can you repeat your question again?

3 Q Yeah.

4 How are the requirements of claim 31 of
5 Berkmo different from the requirement of claim 18
6 of the '349 patent, with respect to the abstract
7 idea analysis?

8 MR. WEINSTEIN: Same objection.

9 A I think if your goal is to evaluate
10 whether something is abstract or not, you would
11 use the same process. What I'm indicating is that
12 I went through that process for '349, but I have
13 not gone through that for Berkmo.

14 So I think the process would be the
15 same. But if you want to ask me specific
16 questions about whether Berkmo is abstract or not,
17 I would need to go through that analysis first.

18 Q And the analysis you're referring to is
19 seeing if there's a disclosure in the
20 specification, right?

21 MR. WEINSTEIN: Objection. Foundation.

22 A My analysis is to -- because your

1 question is whether claim 31 is abstract or not,
2 you know, in order to answer that question about
3 whether it's abstract or not would require me to
4 do further analysis, which includes not just
5 looking at the claim, but also looking at the
6 details of the specifications.

7 Q But you said earlier you reviewed all
8 of Berkmo, right?

9 A I read all of Berkmo, yes.

10 MR. BITTMAN: I think we've been going
11 about an hour. Let's take a break.

12 (Recess taken from 11:17 a.m. to
13 11:29 a.m.)

14 BY MR. BITTMAN:

15 Q Welcome back, Dr. Campbell.

16 A Thank you.

17 Q So turning back to your declaration on
18 page 30, and you have the heading title --
19 numbered paragraph 77, where you say "The '349
20 patent claims recite the abstract idea of
21 receiving data, merging it, and displaying
22 messages with the human --"

1 Let me start that again.

2 Turning to page 30, paragraph 77, you
3 have the heading "Guidance Step 2A Prong 1, The
4 '349 claims recite the abstract idea of receiving
5 data, merging it, and displaying messages with the
6 merged data, a mental process that can be
7 performed in the human mind."

8 Do you see that?

9 A Yes.

10 Q All right. So I'm going to put a pen
11 in front of you at a 45-degree angle here. Now,
12 let's pretend that this pen is an airplane, okay?

13 Now, I'd like you to explain to me how
14 you would perform the following step in your mind,
15 okay?

16 Receiving camera image data of the
17 aircraft while the aircraft is approaching a ramp
18 area for parking the aircraft on the airside of
19 the airport.

20 Can you explain how you would do that
21 in your mind?

22 MR. WEINSTEIN: Objection. Foundation.

1 A So, what you had described was more
2 detailed than what I had listed right in here,
3 which is receiving data, merging the data, and
4 displaying messages.

5 So, in your description, you were
6 talking about airports, and those types of things.
7 So that's a little bit different than what I have
8 here in 77.

9 Q But I was just reading from the first
10 step of claim 1 of the '349 patent, right?

11 A Yes.

12 Q So, then, for what you're saying in
13 paragraph 77, are you just picking out some words
14 that can be performed with the human mind, but
15 ignoring the words that cannot be performed in the
16 human mind?

17 MR. WEINSTEIN: Objection. Foundation.

18 A I'm picking out the key -- what I think
19 are the key functions of claim 1, which is
20 receiving data, merging it. Those are the action
21 items in claim 1 -- I don't have it in front of
22 me, right there -- but those are the action items

1 associated with that and a lot of the extra
2 details, in terms of, like, what the sensor data
3 is, in terms of whether it's at the airport or
4 not. Those add some specifics, but they don't
5 really describe anything more about merging data,
6 for instance.

7 Q Okay. So how would you receive the
8 data about that pen, in your mind?

9 A In terms of the receiving data, the
10 data can be the form of numbers from the sensor,
11 so it would be a list of numbers coming from the
12 sensor. That would probably be the simplest one,
13 in terms of receiving the data. So it would just
14 be a list of numbers, as long as I understand what
15 those numbers are.

16 Q So you can receive numbers from a
17 sensor in your mind?

18 MR. WEINSTEIN: Objection. Foundation.

19 A Can you repeat the question again?

20 Q Yes. I'm just trying to understand the
21 heading which you recite in paragraph 77, that we
22 talked about earlier, where you recite the

1 abstract idea of receiving data, merging it, and
2 displaying messages with the merged data, and you
3 say that that's a mental process that can be
4 performed in the human mind.

5 So I'm just trying to understand how
6 each parts of these abstract idea can be performed
7 in the human mind.

8 So with that context, can you explain
9 how you would receive the data, with respect to
10 the pen that I've placed in front of you at a
11 45-degree angle, in your mind?

12 A So, you would have a sensor that would
13 generate the data, and that data would, you know,
14 again, I think it would -- I think of it -- it
15 would be as a list of numbers. So in order to
16 receive it, I would have to see a list of numbers
17 coming from the sensor.

18 Q And you could receive that in your
19 mind?

20 A If I was looking at the list of data in
21 terms of numbers, then I would be receiving it in
22 my mind, I think.

1 Q And you would be able to understand
2 what this data from sensors is and how to
3 interpret it?

4 A I'm just focusing on the word
5 "receiving data." So, typically, you know, if
6 the -- I'd have to know something a little bit
7 more about the data, which would include, for
8 instance, is it on a scale of zero to 255, is it
9 RGB data, those types of things.

10 It would be based on numbers, and as
11 long as I understood what those numbers mean,
12 then, yes, I would be receiving data in my mind.

13 Q Can you receive camera image data in
14 your mind.

15 A You can, yes.

16 Q And you can understand that?

17 A Yeah. Each pixel would have an RGB
18 value, from zero to 255.

19 Q All right. So the pen in front of you
20 at a 45-degree angle, can you explain -- your
21 thought process on how you're understanding that
22 data that you would be receiving?

1 MR. WEINSTEIN: Objection. Form.

2 A So, I haven't used the word
3 "understanding the data." I'm just focusing on
4 receiving the data.

5 Q Okay. So you would be able to receive
6 it in your mind, but you wouldn't be able to
7 understand it? Is that what you're saying?

8 A No, I'm just --

9 MR. WEINSTEIN: Objection. Foundation.

10 A No. I'm just focusing on the word
11 "receiving data." You asked about understanding
12 the data, but that's not what I have here.

13 Q I see what you're saying. You're
14 saying you can receive it because -- let me start
15 again.

16 Why do you believe you can receive it?
17 Can you explain that?

18 MR. WEINSTEIN: Objection. Form.

19 A I believe I can receive the data
20 because the sensor, such as the camera sensor,
21 would generate pixels. Each of those pixels would
22 be in RGB data -- RGB value, red, green, blue, and

1 that would be on a scale of zero to 255.

2 So, basically, the data coming from the
3 sensor would be numbers, and I can receive that
4 just simply by looking at a list of those numbers.

5 Q But earlier you testified there would
6 probably be thousands of data points from the
7 camera?

8 A Yes.

9 Q And you would receive all thousand of
10 the points in your mind, right?

11 A Yes.

12 Q What about receiving LiDAR or RADAR
13 sensor data? Can you do that in your mind?

14 A I believe the other sensor data would
15 be very similar, so the sensors would generate the
16 data. LiDAR would be a point in space, three
17 point in space at, also, a location number.
18 Sometimes LiDAR also has intensity. RADAR would
19 also be -- it could come as a range or bearing
20 from sensor location or could come -- could be
21 converted to an actual position, for instance, in
22 the ramp area, but it would also be a list of

1 numbers.

2 Q This may be thousands of points as
3 well?

4 A Correct.

5 Q So can you merge the camera image data
6 and the LiDAR/RADAR sensor data into a merged data
7 in your mind?

8 A I can merge it into -- I can merge it,
9 merge those data points. I would have to do the
10 spatial correlations in order to understand what
11 they're actually looking at. But I could actually
12 combine them up, once you know the location of
13 what they're looking at.

14 Q So you would be merging, in your mind,
15 thousands of points from the camera, with
16 thousands of points from the LiDAR sensor in your
17 mind, right?

18 MR. WEINSTEIN: Objection. Foundation.

19 A You would be merging sensor data from
20 each of the different sensors. It could be tens
21 of sensors, it could be more.

22 Q How long would that take?

1 A I do not know.

2 Q Five minutes?

3 A Longer than five minutes.

4 Q A day?

5 A I have no idea. It would take a long
6 time. I'll just say that I think the point of
7 this is whether you could do it in your mind, not
8 necessarily time.

9 That was my -- again, this is a legal
10 argument, so I'm just using my technical expertise
11 to understand the legal argument.

12 Q What about displaying messages with
13 merged data to provide directional and speed
14 guidance to a pilot? Can that be done in your
15 mind?

16 A The displaying -- again, the focus on
17 77 is just on displaying messages. And so, those
18 messages could be any kind of messages. They
19 could be verbal, they could be written. So you
20 would think of them in your mind and then write
21 them down.

22 Q What about the directional and speed

1 guidance? Are you able to figure out what that is
2 so that that can be displayed in your mind?

3 A So in 77, it just focuses on displaying
4 messages, no specifics of what the messages are.

5 Q And that's not relevant to the abstract
6 idea analysis?

7 MR. WEINSTEIN: Objection. Foundation.

8 A Can you repeat that question again,
9 please?

10 Q Sure. So, I asked, what about the
11 directional and speed guidance? Are you able to
12 figure out what that is so that can be displayed
13 in your mind?

14 And then you responded that paragraph
15 77 just focuses on displaying messages, no
16 specifics of what the messages are.

17 So, my question is, are the types of
18 messages to be displayed relevant to the abstract
19 idea analysis?

20 MR. WEINSTEIN: Objection. Foundation.

21 A The types of messages are -- should be
22 part of the abstract analysis ideas. So, for

1 instance, direction, speed, that's more specific.
2 The question -- there's also a question of how you
3 calculate the direction and speed. So I still
4 think direction and speed is somewhat abstract
5 because you have to figure out how you actually
6 calculate that and guide the pilot themselves.

7 Q Can that be done in the human mind
8 based on the received data and merged data?

9 A I believe that, in some cases, the
10 direction and guidance could be evaluated in the
11 human mind and displayed to the pilot, yes.

12 Q So you believe that camera image data
13 can be received in the human mind, sensor image
14 data can be received in the human mind, those can
15 both be merged, the directional and speed guidance
16 can be determined, and then that can all be
17 displayed, based on a process from the human mind?

18 MR. WEINSTEIN: Objection. Foundation.

19 A I was just -- so you're reciting each
20 of the different pieces. I was just focusing on
21 the last aspect of that, which is the displaying
22 of the messages for guidance. And I think, from

1 sensor data, there are ways of looking at the
2 numbers of the sensor data and providing guidance.
3 For instance, in some of the descriptions, there's
4 a lead-in line that tells which direction the
5 aircraft should be going. And so, that would be
6 easily seen in the data and you can use that as
7 providing guidance.

8 Q So you were focusing on the last
9 aspect.

10 But what about all of the parts of the
11 claim in the abstract idea, as you've defined it,
12 of receiving data, merging and displaying
13 messages? Can that entire abstract idea be
14 performed in the human mind?

15 MR. WEINSTEIN: Objection to form.

16 A So we walked through each of the
17 pieces, I explained that, yes, I could receive
18 some data from the sensor in my mind; I could
19 merge it with other sensor data in my mind; and I
20 can actually display messages under certain
21 conditions and certain examples.

22 Q And what conditions would those be?

1 A Well, I mean, I sort of think of this
2 in terms of embodiments, so there may be cases
3 where it would be hard, but the example that I
4 gave was that you could have camera sensor data
5 that, basically, returns information and numbers
6 about aircraft information but, also, the -- or it
7 could be LiDAR data, the illumination on the
8 ground, for instance, and how the aircraft should
9 be guided to a parking spot. So you could use
10 that as guidance information, and you could do
11 that in your mind.

12 Q So that would be just the camera sensor
13 data, though. Don't you have to also receive the
14 RADAR or LiDAR and then merge it as well?

15 MR. WEINSTEIN: Objection. Foundation.

16 A I'm just using one example or
17 embodiment to explain how I could do each of those
18 different pieces.

19 Q Can you think of one example or
20 embodiment that would use all of these pieces
21 together, in your mind?

22 MR. WEINSTEIN: Objection. Form.

1 A I think if you combine LiDAR and camera
2 data, in some ways, they can show very, very
3 similar things. So, that would be an example
4 where each of the different pieces are being used.
5 And, so, you would have -- for each position, you
6 would have RGB, which is color information; you
7 could also have its location information; and you
8 could have, for instance, intensity; and you can
9 more easily see things like, for instance, what
10 the guidance would be on the ground.

11 So, I can't claim that you can do all
12 the functionality, for all cases, because I think
13 that's sort of beyond the scope of what I can
14 actually think about. But I can think of
15 embodiments or several examples where we can do
16 each of those pieces in your mind.

17 Q With respect to the pen that's in front
18 of you at the 45-degree angle, can you walk me
19 through how you would perform claim 1 in your
20 mind?

21 A Claim 1 of 349?

22 Q Yes.

1 A And so, in my mind -- okay. So, I
2 mean, I can start to walk through this, but I'll
3 probably have some questions. So if you have two
4 sensors, one is a camera and, let's say, a LiDAR
5 sensor, and let's say they're both here, looking
6 at that pen. You would receive data, okay?

7 And so, do you want me to walk through
8 from the perspective of '349 or the mental
9 process, or what are you thinking?

10 Q Well, you say, again, in paragraph 77,
11 that the claims are reciting an abstract idea of
12 receiving data, merging, and displaying messages
13 with the human mind, a mental process that can be
14 performed in the human mind.

15 So, you know, that is with reference to
16 claim 1 of the '349 patent.

17 So, I guess, from the perspective of
18 the '349 patent, the mental process that you're
19 describing, if you could walk me through that.

20 A So, if you have your two sensors and
21 you're looking at that pen, and the camera data
22 would have different colors for the pen, a LiDAR

1 data would have different locations, whereas, the
2 ground would actually be flat. That would be the
3 data that you would receive. You would have
4 numbers reflecting 3D location and height, as well
5 as the colors information. You could merge that,
6 for instance, if the two are actually aligned, you
7 could merge it such that every 3D point also has a
8 color, so not just a simple location.

9 That is one way that you can merge it,
10 in your mind, so, effectively, it's not
11 necessarily doing a weighted average, but it's
12 just combining it, as we go through that.

13 I think we have skipped sort of the
14 next one, for the most part.

15 And then displaying the messages, I'm
16 not sure what the message would be in the form of
17 a pen here. So, I think you could understand, by
18 looking at the numbers, the direction of where
19 it's going. You'd also have to know where it
20 needs to go, in terms of, let's say, a parking
21 space or something like that. Or, for instance,
22 if there was an object in front of it, another

1 object sitting right in here or beside it, you
2 could send it a message that says stop.

3 Q Okay. But for one scan, you said it
4 may take a very long time, right?

5 MR. WEINSTEIN: Objection. Foundation.

6 A To do it as a mental process, yes.

7 Q Doesn't the system need multiple scans
8 to be able to determine directional and speed
9 guidance?

10 MR. WEINSTEIN: Objection. Foundation.

11 A Can you repeat the question?

12 Q Does the system need to take multiple
13 scans to be able to determine directional and
14 speed guidance?

15 A Yes, you have to take multiple scans,
16 especially for speed guidance.

17 Q So how long would it take for the human
18 mind to receive, merge, and determine directional
19 and speed guidance for multiple scans?

20 A I don't know how long, but it would
21 take a long time.

22 Q When dealing with sets of data from

1 different types of sensors, don't systems have to
2 deal with noise that could complicate the merger?

3 MR. WEINSTEIN: Objection. Foundation.

4 A When you combine sensor data, it is
5 best to know information about your sensor noise
6 or uncertainties of each of the sensors and makes
7 it more accurate to -- when you're combining them.

8 Q Is dealing with noise a trivial issue?

9 MR. WEINSTEIN: Objection to form.

10 A No. Dealing with noise is not a
11 trivial issue.

12 Q Could someone resolve any noise issues
13 stemming from merging multiple data sets in their
14 mind?

15 MR. WEINSTEIN: Objection. Foundation.

16 A I think when you have sensor data and
17 you have noise on top of that sensor data, it
18 creates errors and uncertainty.

19 If the noise is fairly small, with
20 respect to the actual original signal, it can be
21 resolved in the human mind.

22 If there is a lot of noise, it's more

1 difficult to resolve using -- in the human mind.

2 Q But the process to resolve noise in the
3 human mind, when you're merging thousands of data
4 points, would take a long time?

5 A It would take a long time, yes.

6 Q Let's turn back to the '349 patent. If
7 you could look at claim 19.

8 Let me know when you're there.

9 A Okay.

10 Q So that claim specifies that sensor
11 data is analyzed using a point cloud process to
12 correlate points in the LiDAR/RADAR sensor data to
13 sensor points in the camera image data.

14 Do you see that?

15 A Yes.

16 Q Is it your opinion that this claim can
17 be performed in the human mind?

18 A I think depending on the point cloud
19 data, you can approximate that in the human mind
20 and estimate it, yes.

21 Q So, again, with respect to the pen
22 that's in front of you at a 45-degree angle, can

1 you explain the process that you'd perform in your
2 mind to use a point cloud process to correlate
3 points in the LiDAR/RADAR sensor data to points in
4 the camera image data?

5 A If you had a LiDAR then -- a LiDAR and
6 a camera, and you know the locations of those
7 cameras -- or those sensors, when you're actually
8 looking, actually, at the pen, then you know sort
9 of the location of the ramp area that you're
10 actually looking at.

11 So, what you can do is you can
12 spatially resolve the same location, let's say
13 it's right in here, and so, if you want to
14 correlate the points, it can be based on a spatial
15 location such as that.

16 The other thing you could potentially
17 do is, if I know I'm looking at the pen object in
18 one, and I'm looking at the pen object in the
19 other, because in LiDAR it's a little higher, and
20 in the camera data, it is a different color, then
21 what you would do is you would look at those point
22 clouds, specifically, and that's, I think, what

1 this is referring to, and you'd look to see how
2 those actually line up, okay?

3 And so, when it looks like, you know,
4 the point cloud process, in correlating points,
5 you're looking at the shape that the point clouds
6 are actually making. So this is a relatively
7 simple shape. And so, you're looking to see, for
8 instance, if they were aligned in a different way,
9 to correlate those, you'd try to figure out what
10 the rotation is in the translation to line them
11 up, and that's what the point cloud process is
12 doing.

13 So you can actually estimate that in
14 your mind. So, I'd rotate it by 30 degrees and it
15 would be, you know, half a meter away, or
16 something.

17 Q Okay. And the point cloud, when
18 detecting an aircraft, would use, approximately,
19 how many points?

20 A For which sensor?

21 Q Well, the data points used in this
22 point cloud process. Do you have a sense of the

1 scope of the data points that would be looked at
2 in that process?

3 A I think for LiDAR and camera, you'd
4 have, again, thousands of points. For RADAR, you
5 would have fewer, so, more like tens of points.

6 Q So, then, the combination that becomes
7 a part of this point cloud. Do you have an
8 approximation of how many points that would
9 involve?

10 A It would be probably, at least,
11 thousands, yeah.

12 Q And then, do you have an estimate as to
13 how long it would take to perform step 19 in your
14 mind for a single scan?

15 A So I would correlate the sort of
16 average of the points. So, again, not necessarily
17 a point by point, which is probably what the point
18 cloud process does, but in terms of the, you know,
19 correlating the point clouds themselves, I would
20 look at the two different shapes and try to
21 estimate those.

22 Q And how long would that take for a

1 single scan, in your mind?

2 A If I had two point clouds and I was
3 looking at those point clouds, let's say, on a
4 display, I could estimate it pretty quickly in my
5 mind, you know, within a minute.

6 Q Right. But this is -- I'm talking
7 about the mental process, not on the display. I'm
8 just talking about mental process that could be
9 formed in your mind, as you've referred to it, for
10 example, in paragraph 77.

11 A I'm not sure how long that would take.

12 Q A day?

13 A Depending on the example, it could be
14 shorter than that, I think.

15 Q What if you needed to take multiple
16 scans? How long would that take?

17 A That would take a long time as well.

18 Q If you could turn to paragraph 118 in
19 your report.

20 A 118?

21 Q Yes. Let me know when you're there.

22 A Okay. I'm here.

1 Q So paragraph 118 of your declaration,
2 you state that "Berkmo describes determining a
3 spatially resolved weighted average of the
4 combined output data based on statistical weights
5 for each of imaging system 110C, laser system
6 110L, and radar system 110R," right?

7 A Yes.

8 Q What are the weights that it's using to
9 do this?

10 A Those weights would involve a number of
11 factors, which would include, as you said, the
12 noise of the different sensor, would be one, but,
13 also, sort of the visibility. So there's examples
14 given in Berkmo, for instance, for an imaging
15 system, when it's less visible, that the weight of
16 the imaging system would be less.

17 So, I think the weights are different
18 based on the sensor type, as well as what the
19 environment is looking at -- looking like at the
20 time.

21 Q Okay. In paragraph 117 of your
22 declaration, you state that Berkmo teaches imaging

1 system 110C, generates camera image data, laser
2 system 110L, and radar system 110R to generate
3 sensor data, and the output data from all three
4 systems is combined, right?

5 A Yes.

6 Q You, then, state that "The combined
7 output data in Berkmo, therefore, corresponds to a
8 merged dataset that merges the imaging, system
9 camera image data, and the laser and radar sensor
10 data," right?

11 A Yes.

12 Q And to support that argument, you cite
13 to paragraph 129 of Berkmo, and you provide a
14 quote that says "Berkmo discloses detecting and
15 tracking aircraft 10, based on combined output
16 data from said radar-based system 110R, on the one
17 hand, and from the one or more additional
18 systems," right?

19 A Yes.

20 Q And then you state that the one or more
21 additional systems include both imaging and laser
22 systems, right?

1 A Yes.

2 Q Now, in Berkmo paragraph 129, it
3 specifically states that it's referring to the
4 laser-based systems as the one or more additional
5 systems, right?

6 A I'd have to look at that. So you said
7 129 here?

8 Sorry. Can you repeat the question,
9 just to make sure I'm going to answer it
10 correctly?

11 Q In Berkmo paragraph 129, it
12 specifically states that it is referring to the
13 laser-based system as the one or more additional
14 system, right?

15 A That is correct, yes.

16 Q So, Berkmo is specifically talking
17 about merging data from the radar-based system and
18 the laser-based system in that example, right?

19 A In that embodiment, yes.

20 Q Turn to paragraph 134.

21 Let me know when you're there.

22 A Okay. I'm here.

1 Q All right. So in paragraph 134 of your
2 declaration, you describe disclosures in Berkmo
3 relating to the limitations for messages
4 containing directional and speed guidance, right?

5 A In 130 -- you're talking about this
6 specific 134?

7 Q 134 of your declaration.

8 A Oh, I'm sorry. I was at 134 over here.
9 Okay. I'm there. Sorry. Repeat that,
10 please.

11 Q In paragraph 134 of your declaration
12 you describe disclosures in Berkmo relating to
13 limitations for messages containing directional
14 and speed guidance, right?

15 A Yes. 134 describes what Berkmo teaches
16 in terms of pilot maneuver and guidance, and some
17 examples.

18 Q And then, in that last sentence in
19 paragraph 134, you cite a disclosure in Berkmo
20 that says "instruct the pilot to continue
21 approaching the stand," as an example of providing
22 directional guidance because you say that is the

1 direction towards the stand, right?

2 A Yes, that's correct.

3 Q And there's no disclosure of any
4 direction in Berkmo other than towards the stand,
5 right?

6 MR. WEINSTEIN: Objection. Foundation.

7 A If I recall, in Berkmo, there were
8 several examples that Berkmo gives. For instance,
9 maneuvering to a parking space, I think was
10 another example. So I think the way Berkmo
11 describes the guidance information is through
12 examples like that.

13 Q So that would be a disclosure of
14 towards the parking space instead of towards the
15 stand; is that right?

16 A Yes. I think the -- I think the words
17 were maneuver to the parking space. And then,
18 slow and stop at the parking space. And then
19 there's other example of, like, if a collision is
20 happening, instructing the pilot to stop. That
21 would be another example of guidance.

22 Q And in paragraph 134, middle sentence

1 there, you cite the disclosure of instructing the
2 pilot to stop the aircraft as providing an example
3 of speed guidance because you say that the speed
4 is zero, right?

5 A Reducing the speed to zero.

6 Q What do you mean "reducing the speed to
7 zero"?

8 A It says "instructing the pilot to stop
9 the aircraft."

10 And so my -- my view of that -- again,
11 I have to look at the context of the rest of the
12 sentence, but my view of that is that the aircraft
13 was already moving, so you're instructing the
14 speed to go from nonzero to zero, which is stop.

15 Q So, the speed guidance -- let me start
16 again.

17 So what is the speed guidance there?

18 A The speed guidance is to stop the
19 aircraft, which, you know, if you want to put it
20 in terms of specific speed, would be to set the
21 speed to be zero.

22 Q Is it your opinion that being stopped

1 is a speed?

2 A I do think a speed of zero is valid,
3 yes.

4 Q And there's no disclosure of any
5 guidance based on any actual speed values in
6 Berkmo, right?

7 MR. WEINSTEIN: Objection. Foundation.

8 A There's no specifics on specific
9 values. But, I do believe that when you think of
10 pilot guidance, there could be many different
11 embodiments or examples of what the speed would
12 actually be. It could be constant speed, it could
13 be slow down, or it could be stopped. So there
14 could be different kinds of speeds.

15 So I don't think you would -- that you
16 would want to use, maybe, embodiments to describe
17 them, but I don't think you would want to have
18 specifics there -- or I can understand why there
19 wouldn't be specifics there, I should say.
20 There's no specifics in '349 either.

21 Q But there's no examples in Berkmo that
22 you can identify, right?

1 MR. WEINSTEIN: Objection. Foundation.

2 A There's an example right here in 134.

3 Q That is the speed of zero, right?

4 A Yes.

5 Q But there's no disclosure of Berkmo of
6 any speed other than zero, right?

7 A I don't recall other examples of
8 nonzero speed, no.

9 Although, when you look at the
10 second -- the final example, it says "instruct the
11 pilot to continue approaching" -- "continue
12 approaching the stand," that would be a nonzero
13 speed.

14 Q What speed is that?

15 A It doesn't give it specifically, just
16 nonzero.

17 Q But it doesn't say anything about
18 speed, does it?

19 A It does not. But it says -- there's
20 enough there to know that it's nonzero. And your
21 question was, is there any examples other than
22 zero?

1 Q Okay. So then, you believe that Berkmo
2 discloses either a speed of zero or nonzero; would
3 that be fair?

4 MR. WEINSTEIN: Objection. Foundation.

5 A I believe Berkmo's guidance can be
6 general enough to include zero and nonzero
7 guidance to the pilot, in terms of speed.

8 Q But there's no disclosure in Berkmo of
9 any specific speeds other than zero or nonzero,
10 right?

11 A As I recall, that is correct.

12 Q If you could turn to paragraph 140, and
13 this concerns your analysis of claim 7.

14 Let me know when you're there.

15 A Okay. Yeah.

16 Q So paragraph 140, you state your
17 opinion that it would be obvious, even if Berkmo
18 does not expressly or inherently teach this
19 comparison, to verify the aircraft, right?

20 A Yes.

21 Q This is similar to the question I asked
22 you before, but why do you have this alternative

1 position for this claim?

2 A The description here, in terms of
3 verifying it, was -- was -- hold on one second.

4 When Berkmo -- so this is referring to
5 Berkmo 35 to 36. And in there, that is in -- when
6 describing tracking other objects -- objects other
7 than the aircraft. And I felt when writing the
8 declaration, that it was important to clarify that
9 the -- that Berkmo detects and tracks all objects,
10 including aircraft and non-aircraft, and the
11 process would be similar for each of those. You
12 would verify each of the sensor's data to actually
13 combine them. If there are, you know, potential
14 errors in the sensor data, for instance, you know,
15 shadows or those types of things, you would verify
16 those kinds of things before you actually merged
17 the data.

18 And that process would be similar no
19 matter what the tracked object actually is.

20 Q Okay. So, you agree, then, that Berkmo
21 does not expressly or inherently disclose the
22 limitations of claim 7, but, rather, you just

1 believe that it would be obvious in view of the
2 teachings of Berkmo?

3 Is that accurate?

4 MR. WEINSTEIN: Objection. Foundation.

5 A So, I want to make sure I answer.
6 You're going back to claim 7?

7 Q Yes.

8 A And claim 7 of '349?

9 Q Yes.

10 A So, I think Berkmo, the way it
11 describes it, does not describe verifying tracked
12 aircraft, similarly to verifying the tracked
13 objects. I do think the process for a POSITA
14 would be the same because you're trying to merge
15 data in order to do the tracking, detection and
16 tracking, which I think would be the same for
17 aircraft as it would for other objects.

18 Berkmo also describes other examples
19 such as, you know, using the radar sensor to
20 verify the camera sensor, with respect to
21 anomalies. I forget exactly the word that Berkmo
22 uses, but in the camera data. And so they --

1 Berkmo gives examples of the same verification
2 that is in claim 7.

3 MR. BITTMAN: Let's take a break.

4 (Recess taken from 12:15 p.m. to
5 12:22 p.m.)

6 MR. BITTMAN: Dr. Campbell, welcome
7 back.

8 I have no further questions:

9 MR. WEINSTEIN: I have no redirect.

10 MR. BITTMAN: Thank you for your time
11 today.

12 THE STENOGRAPHER: Do you need a copy
13 of the transcript?

14 MR. WEINSTEIN: No.

15 (Off the record at 12:22 p.m.)
16
17
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19
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21
22

1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

2
3 I, Judith E. Bellinger, Certified Reporter and
4 Notary Public within and for the District of
5 Columbia do hereby certify:

6 That MARK CAMPBELL, PH.D., the
7 witness whose deposition is hereinbefore set
8 forth, was duly sworn by me before the
9 commencement of such deposition and that such
10 deposition was taken before me and is a true
11 record of the testimony given by such witness.

12
13 I further certify that the adverse party,
14 SAFEGATE, was represented by counsel at the
15 deposition.

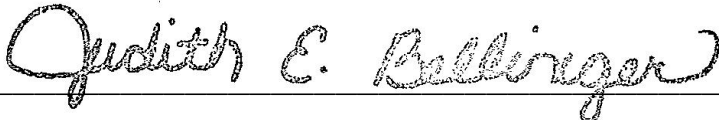
16
17 I further certify that the deposition of
18 MARK CAMPBELL, PH.D., occurred at the offices
19 of CROWLL & MORING LLP
20 on Wednesday, May 29, 2024, commencing at
21 9:11 a.m. to 12:22 a.m. EDT.

1 I further certify the inspection,
2 reading and signing of said deposition was not
3 discussed on the record.

4
5 I further certify that I am not related
6 to any of the parties to this action by blood or
7 marriage, I am not employed by or an attorney to
8 any of the parties to this action, and that I am
9 in no way interested, financially or otherwise, in
10 the outcome
11 of this matter.

12
13 IN WITNESS WHEREOF, I have hereunto set my
14 hand this 31st day of May, 2024.

15
16 My commission expires: January 1, 2027

17
18
19 A handwritten signature in cursive script, reading "Judith E. Bellinger", is written over a horizontal line.

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21 DISTRICT OF COLUMBIA

22

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