

April 30, 2026

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND
SAMSUNG ELECTRONICS AMERICA, INC.

Petitioners,

v.

MAXELL, LTD.,
Patent Owner

Case: IPR2025-01315
U.S. Patent No. 8,471,950

* * * * *

VIDEOTAPED

DEPOSITION OF: DAN SCHONFELD, Ph.D.

DATE TAKEN: April 30, 2026

TIME: 10:00 EST

PLACE: BY VIDEOCONFERENCE

REPORTED BY: MICHELLE PULIDO STUBBEN, FPR,
COURT REPORTER, NOTARY PUBLIC

* * * * *

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

A P P E A R A N C E S

MATTHEW A. STANFORD, ESQ.
Mayer Brown, LLP
1999 K Street, NW
Washington, D.C. 20006-1101
202-263-3124
mstanford@mayerbrown.com
APPEARING ON BEHALF OF MAXELL, LTD

LARISSA S. BIFANO, ESQ.
DLA PIPER, LLP (US)
33 Arch Street, 26th Floor
Boston, MA 02110-1447
617-406-6013
larissa.bifano@us.dlapiper.com
APPEARING ON BEHALF OF SAMSUNG ELECTRONICS

1	C O N T E N T S		
2	TESTIMONY OF DAN SCHONFELD, Ph.D.		
3	Direct Examination by MR. STANFORD.....		4
4	CROSS-EXAMINATION BY MS. BIFANO.....		116
5	CERTIFICATE OF REPORTER.....		119
6	CERTIFICATE OF OATH.....		120
7	ERRATA SHEET.....		121
8	WITNESS NOTIFICATION LETTER.....		122
9	EXHIBITS.....		ATTACHED
10	- - - - -		
11			
12	S T I P U L A T I O N S		
13	It is hereby agreed and so stipulated by and		
14	between the parties hereto, through their respective		
15	counsel, that the reading and signing of the transcript		
16	is expressly reserved by the Deponent.		
17			
18	- - - - -		
19	EXHIBITS		
20	NUMBER	DESCRIPTION	PAGE
21	Exhibit 1		
22		Joint claim construction and prehearing statement.....	38
23			
24			
25			

1 P R O C E E D I N G S

2 WHEREUPON,

3 DAN SCHONFELD, Ph.D.,
4 was called as a witness, and having first been duly
5 sworn, testified as follows:

6 THE WITNESS: I do.

7 DIRECT EXAMINATION

8 BY MR. STANFORD:

9 Q. Good morning.

10 A. Good morning.

11 Q. Would you please state and spell your name for
12 the record?

13 A. Sure. My name is Dan Schonfeld, D-A-N, last
14 name Schonfeld, S-C-H-O-N-F-E-L-D.

15 Q. Thank you. And where are you located right
16 now?

17 A. In Northbrook, Illinois.

18 Q. Is anyone else in the room with you?

19 A. No.

20 Q. Do you have any physical documents, printouts,
21 anything in front of you?

22 A. Yes.

23 Q. What do you have printed out?

24 A. I have the patent, my declaration, and the
25 joint claim construction by the parties.

1 Q. When you say "joint claim construction by the
2 parties," what document are you referring to?

3 A. It is titled PR4-3 Joint Claim Construction
4 and Prehearing Statement.

5 Q. Hang on. Just for the record, let me get that
6 exhibit number for the IPR.

7 That is all right. We don't have to worry
8 about it. We are likely not going to talk about it. We
9 will stick to the constructions that are included in
10 your declaration.

11 So for any of those documents, do you have any
12 markups on them or are they clean copies?

13 A. Clean copies provided to me by counsel.

14 Q. Okay. And besides your computer that we are
15 talking through right now, do you have any other
16 electronics with you?

17 A. My phone is on the side, but it is muted and
18 I'm not going to deal with it during the deposition, but
19 it is in the room.

20 Q. Would you mind just turning it off for me,
21 just to --

22 A. Turn it off?

23 Q. Yes, please.

24 A. I'll just put it in another room.

25 Q. Okay.

1 A. It is not in this room no more.

2 Q. And do you have any other applications besides
3 Zoom that's open on your computer?

4 A. Yes.

5 Q. What else do you have open?

6 A. I have, you know, Chrome, which is what I use
7 to connect to Zoom, and it has the default page in case
8 I get disconnected.

9 I have -- e-mail is not opened; it is
10 minimized. But it has the e-mail for the connection in
11 case I need it, but it is minimized. It is not
12 available and opened in front of me. I have a PDF --
13 Acrobat's PDF reader, and it has a number of electronic
14 documents open on it.

15 Q. Okay. So the way this will work is I will
16 drop documents that we are going to discuss into the
17 chat function of Zoom, and then you can download and
18 open those from there.

19 So would you mind just closing down the other
20 Adobe documents you have -- the other PDF documents you
21 have open?

22 A. Sure.

23 Q. Just so there is no confusion about which
24 document we are talking about.

25 A. Okay.

1 Q. All right. Thank you.

2 So I believe I know the answer to this, but
3 have you been deposed before?

4 A. Yes.

5 Q. About how many times?

6 A. I'm not sure the number of times, but I -- I
7 counted 80 cases in which I have been deposed. That was
8 about a year ago. So somewhere between 80 and 90 cases
9 total. Sometimes just two-hour depositions, sometimes
10 multiple depositions.

11 Q. And for those 80 or so cases, were they all
12 patent cases or did they vary to other areas?

13 A. In several different areas.

14 Q. Okay. What other areas generally?

15 A. Aside from patent, it would include copyright,
16 trade secret, antitrust, tax, some contract disputes,
17 and I can't think of anything else at the moment.

18 Q. And for all of those cases, were you serving
19 as an expert witness?

20 A. Yes.

21 Q. Well, since you have done this quite a few
22 times, I won't go through all the -- over all the basics
23 for depositions. But just as a general reminder,
24 please, let's both of us try and do our best not to talk
25 over each other so that the court reporter can get a

1 clean record. Okay?

2 A. I'll do my best.

3 Q. And if I ask a question and you either don't
4 hear it or you don't fully understand it, please ask me
5 to clarify it. Okay?

6 A. Sure. I'll ask you to clarify.

7 Q. Thank you. Because if you don't, I will just
8 assume you understood and you heard the question. Okay?

9 A. We can assume -- of course you can assume
10 whatever you like.

11 Q. Is there any reason that you can't testify
12 truthfully and accurately today?

13 A. Not that I'm aware of.

14 Q. So what did you do to prepare for today's
15 deposition?

16 A. I met counsel and read documents.

17 Q. How many times did you meet with counsel?

18 MS. BIFANO: I'm going to -- I assume you are
19 not going to ask him for privileged information,
20 but I'm just going to caution the witness that you
21 can talk about, you know, how many times we met and
22 in general, but please don't disclose any of the
23 privileged communications that we had during our
24 preparation sessions.

25 THE WITNESS: I don't recall the exact number

1 of times we met, but it was probably three or four
2 times.

3 BY MR. STANFORD:

4 Q. And you mentioned that you also reviewed
5 documents. Which documents did you review?

6 A. Mostly the documents we talked about, the
7 declaration, the patent, the joint claim construction
8 submission, the prior art references.

9 I also looked at the submission, the petition,
10 the responses, those type of documents.

11 Q. Did you meet with anyone besides counsel for
12 the petitioner here?

13 A. Could you repeat the question, please?

14 Q. Sure. Besides counsel, did you meet with
15 anyone else in preparing for today's deposition?

16 A. Oh, no.

17 Q. Anyone from Samsung?

18 A. No.

19 Q. So when did you first become aware of this
20 IPR?

21 A. I don't recall the precise date, but it was
22 probably sometime -- I don't even remember the exact
23 date, but sometime in the first half of this year.

24 Q. Okay. And this is the first time you served
25 as an expert in an IPR proceeding?

1 A. No.

2 Q. About how many times have you been an expert
3 in the IPR?

4 A. I don't know. I don't know the exact number.
5 I assume it is probably at least ten cases.

6 Q. And for those ten or so cases that you can
7 remember, were they on behalf of the patent owner or the
8 petitioner or both?

9 A. They have been on both. I don't remember the
10 exact number, but it had been on both sides.

11 Q. And before you were retained for this IPR,
12 were you aware of the patent owner and Maxell?

13 A. Could you repeat the question? Did you say
14 the patent owner and Maxell?

15 Q. Maxell, who is the patent owner.

16 A. I was aware of Maxell before, yes.

17 Q. What -- how were you aware of them? What did
18 you know about them?

19 A. I have been involved in a case where I was
20 adverse to Maxell in I think it was patent litigation
21 several years ago and maybe more than once. And so I
22 knew of them as a company that holds some patents, and
23 that was pretty much the extent of it.

24 Q. Do you recall the name of the case that you
25 were involved in for Maxell?

1 A. Off the top of my head, let me see. I don't
2 recall offhand the name of the case or the parties
3 involved, but I know Maxell was involved.

4 Q. Okay. I mentioned earlier that the way this
5 will work is I am going to put the documents into the
6 chat function and then you can download them.

7 So I'm going to add in two documents right
8 now. And let me know if they are showing up on your
9 end.

10 A. Yes, I have them available.

11 Q. So if you could just download and open both of
12 those and let me know when you have done that.

13 A. I have done that.

14 Q. Okay. So let's first look at -- so, just for
15 the record, when we discuss documents, I'm going to use
16 the exhibit numbers as they have been previously marked
17 instead of remarking new exhibits.

18 So this first document is Exhibit 1003. And
19 do you recognize this document?

20 A. I do.

21 Q. I'm sorry. I could not hear you.

22 A. Oh, I'm sorry. I said I do.

23 Q. Yes. And this is a copy of your declaration
24 that you submitted in this IPR, right?

25 A. It appears to be.

1 Q. And is that your signature there on the first
2 page?

3 A. It is.

4 Q. And just briefly, if you need to, briefly
5 scrolling through it, does this appear to be a complete
6 and accurate copy of the declaration that you submitted?

7 A. I obviously did not check carefully, but I
8 assume it is. I don't see anything offhand that looks
9 different from what I submitted.

10 I'm not sure about the .5 on the first page,
11 in the bottom left of the first page, but it appears to
12 be correct.

13 Q. And then looking at the other document, which
14 is Exhibit 1004, do you recognize this as a copy of your
15 CV that you submitted alongside your declaration?

16 A. It appears to be, yes.

17 Q. And is this CV accurate and current to the
18 best of your knowledge?

19 A. Well, the CV is always being modified slightly
20 as new things change, but it is largely the same.

21 Q. Off the top of your head, since you submitted
22 this in I believe it was August of 2025, can you think
23 of anything that has changed?

24 A. There may be a couple of service differences,
25 publication, presentations, these type of things. Not

1 anything of major substance.

2 Q. Okay. So let's talk about your CV just for a
3 couple of minutes here. So if you'll scroll to page 9.

4 A. Yes, I'm there.

5 Q. There is a Section Heading G, work experience.
6 Do you see that?

7 A. Yes, I do.

8 Q. And so, presumably, in this section, you are
9 listing all of your prior work history; is that right?

10 A. Well, yeah. Let me see. All of the -- all of
11 the prior work history that is not consulting related.
12 And I should be -- since we are in deposition, I'll be
13 more precise. Most of my prior work history. I did not
14 list doing gardening when I was 12 years old, those kind
15 of things.

16 Q. That is okay. Understood.

17 So your current employer is the University of
18 Illinois; is that right?

19 A. It is my -- well, the University of Illinois
20 Chicago is where I serve as professor emeritus and I
21 also worked in the Schonfeld Consulting Corporation.

22 Q. And so in your work at -- well, let's first
23 talk about the University of Illinois Chicago.

24 So if I'm understanding your CV correctly, you
25 are both professor emeritus and a professor with tenure.

1 And I also see it separately it is listed as -- that
2 you're a professor in two different departments.

3 One is electrical and computer engineering and
4 one is biometrical engineering.

5 Am I understanding all that correctly?

6 A. Not precisely. I don't update the word
7 "present" very carefully. I'm currently professor
8 emeritus at the University of Illinois Chicago in the
9 department of electrical and computer engineering. And
10 I have courtesy and adjunct appointments in other
11 departments, but I'm not a regular tenured professor
12 anymore.

13 Q. So excuse me for not being as well versed in
14 the academia terms. What is a courtesy appointment?

15 A. It just allows me to work with students,
16 co-supervise, teach when I choose to, those type of
17 things.

18 Q. And are you teaching any courses right now?

19 A. I am not.

20 Q. When was the last time you taught courses?

21 A. Prior to my appointment as professor emeritus,
22 so that would have been -- the last course ended on
23 May 2024.

24 Q. And when you were teaching, what types of
25 courses were you teaching?

1 A. You can find it in the same document. At the
2 very end, there is a list. And it is over 20 different
3 courses over the years. So you can -- if you want, we
4 can go through them, but it is the same document at the
5 end.

6 Q. No, that is okay.

7 And as professor emeritus, what are your --
8 what's your job responsibilities?

9 A. Basically, professor emeritus, I do what I
10 choose to do primarily, which is supervise graduate
11 students. I do some committee work that I'm interested
12 in, but I no longer have to teach.

13 Q. And are you currently supervising any graduate
14 students?

15 A. Yes.

16 Q. What field are those students in?

17 A. It is primarily one doctoral student, and she
18 is -- she works on three separate projects. And all of
19 them have in common that they are all deep learning
20 based, so deep learning in a variety of different
21 applications, both fundamental and theoretical issues
22 and applications mostly to medicine.

23 Q. And are you doing your own work in addition to
24 supervising your students' research?

25 A. If I do my own research, I usually hand it off

1 to a student to take over and do a lot of the work. So
2 the answer is I don't publish on my own anymore as a
3 single author and I have not done so from -- as a
4 professor, it is my job to make sure that I educate
5 students, so I usually -- did not do it since I was a
6 very junior faculty.

7 Q. And is the student you are supervising, is she
8 part of the multimedia communications laboratory?

9 A. She is. She is part of several different
10 labs, but her primary home is the multimedia
11 communications laboratory, yes.

12 Q. And on your CV, it lists that you are the
13 codirector of the multimedia communications laboratory,
14 is that still the case or is that outdated?

15 A. That is outdated. Sorry about that. The word
16 "present" probably should -- I should have changed it to
17 2024.

18 Q. So when you were the codirector of -- can I
19 just call it MCL? Is that okay?

20 A. Yeah, sure.

21 Q. When you were the codirector of MCL, what type
22 of fields of study was the multimedia -- what type of
23 field of study was MCL looking into?

24 A. So it looked into multimedia issues. Not only
25 communications. Communications was included, but

1 multimedia systems more broadly. And so that was
2 primarily focused on audio and video.

3 So both applications, machine learning to
4 audio and video systems, both communications and
5 processing. So pretty much anything that is covered
6 that relates to audio, video, or images was within the
7 purview.

8 On occasion, it went a little bit beyond it
9 into multimedia more broadly including things like
10 tactics, touch. Some people may have published some
11 things on taste, I did not, but the main focus was audio
12 and video and imaging.

13 Q. So give me -- just help me understand
14 generally what you were researching. Can you give me
15 maybe an example or two of what -- what specific
16 projects you were handling at MCL?

17 A. I mean, pretty much anything in my CV past
18 1990 would have been part of what I have done as a
19 codirector since 1997.

20 So it included -- it included nonlinear
21 filtering for images, signal processing. It included
22 video from an end-to-end point of view from video
23 capture acquisition, storage, retrieval, compression,
24 display, surveillance. It included audio and video
25 synchronization. It included -- so those are some of

1 the things I would put in the large umbrella of the kind
2 of things that I have done over the years in the context
3 of MCL.

4 Q. Okay. Thank you.

5 So if we move to the next page of your CV, so
6 page 11, Section H, consulting experience.

7 It indicates you have been a consultant since
8 2001; is that right?

9 A. That is correct.

10 Q. And have you been an expert witness for --
11 since 2001?

12 A. Well, I was hired as an expert witness. I did
13 not serve as an expert witness in the sense of
14 submission of a declaration report until late 2001 or
15 early 2002.

16 Q. And besides being an expert witness, did you
17 do other types of consulting?

18 A. Yes.

19 Q. Can you give us some examples?

20 A. I think some of them should at least be listed
21 here.

22 Yeah. I listed -- for example, you can see on
23 the bottom -- it is on page 12. It is on the bottom of
24 this section, PrairieComm Corporation and Chicago
25 Mercantile Exchange. Those were two engagements prior

1 to me serving as a -- as an expert witness.

2 Q. Okay. I was going to ask you about those two
3 because those were listed as prior to 2001, where it
4 said you have been a consultant since then.

5 So when you said on your CV that you have
6 been -- right under the Section H heading -- a
7 consultant and expert witness since 2001, you were
8 talking about being an expert witness, you know, in
9 legal cases; is that right?

10 A. When I say "consultant and expert witness
11 since 2001," I meant those are litigation-related cases,
12 yes.

13 Q. Okay. And so if we stay on page 12, I see
14 that you also listed a series of companies that you
15 worked on behalf of as a consultant and expert witness;
16 is that correct?

17 A. I say here "served as a consultant, yeah, and
18 "expert witness."

19 And I think for all of them, that is true.

20 Q. Okay. And Samsung is listed on there.
21 Correct?

22 A. Correct.

23 Q. And prior to this IPR proceeding, had you also
24 done work for -- had you previously done work for
25 Samsung?

1 A. Previously done work in litigation cases on
2 behalf of Samsung.

3 Q. About how many times?

4 A. I'm not sure exactly, but I was probably hired
5 in a number of cases where I did various -- varying
6 degree of work.

7 I'm not sure what the total number would be.
8 It might be -- I'm pretty sure it is more than five.
9 I'm guessing it is under ten, but I'm not 100 percent
10 sure.

11 MS. BIFANO: I'm sorry to interrupt, but is
12 Dan frozen to everyone or is it just me?

13 THE REPORTER: He is.

14 MR. STANFORD: Yes, he is frozen.

15 (Off the record.)

16 BY MR. STANFORD:

17 Q. So you said about five to ten times you have
18 been hired by Samsung to serve as an expert witness. Is
19 that about right?

20 A. I said it, but with a big caveat that I'm not
21 certain and I did not actually count.

22 So it -- I don't think it would be lower. It
23 is possible it is higher with marginal cases where I did
24 minimal work. It is possible.

25 Q. And to the best of your recollection, were

1 those all patent cases?

2 A. I cannot think of any of those involving
3 nonpatent-related issues. It is possible, but I don't
4 think it was true for any of the Samsung cases.

5 Q. Have you ever done work for Samsung besides
6 acting as an expert witness -- serving as an expert
7 witness?

8 A. No.

9 Q. Have you ever been employed by Samsung?

10 A. No.

11 Q. So let's put your CV aside and go back to your
12 declaration, which is Exhibit 1003.

13 Would you please explain your general drafting
14 process of this declaration?

15 A. It was written as a team jointly with counsel.

16 Q. Did you write the first draft?

17 A. It began as a very crude draft and was
18 continuously revised and expanded. So I wrote some
19 sections, some parts, and other -- but not all of them.
20 And it continuously evolved from a very crude draft to
21 the final draft.

22 Q. Are you able to identify any sections of your
23 declaration that you are certain you drafted entirely by
24 yourself?

25 A. I don't recall at the moment which technical

1 sections or paragraphs I drafted on my own, which ones I
2 did not, but I did draft some paragraphs and declaration
3 on my own.

4 Q. About how many hours did you spend drafting
5 the declaration?

6 A. It depends on what you mean exactly because --
7 first of all, I don't know the number of hours, but it
8 also depends. Because I mentioned at the beginning,
9 they were very crude drafts and -- or I wrote
10 preliminary opinions, and then they were -- it was
11 revised in an iterative fashion over a long time.

12 But, overall, for the '950 patent only -- I
13 don't know the exact number, I would imagine it is
14 probably -- I'm guessing at least 100 hours, but I'm not
15 certain.

16 Q. All right. So let's talk about some of your
17 opinions in your declaration. So let's go to page 14.
18 And at the top of that page is a section where you
19 provide your opinions on the person of ordinary skill in
20 the art. Do you see that?

21 A. I do.

22 Q. And in paragraph 35, you state that, in your
23 opinion, that definition is a person with a bachelor's
24 degree in computer science, electrical engineering,
25 computer engineering, or a comparable field of study

1 plus approximately two to three years of professional
2 experience with image processing, video processing, or
3 other relevant industry experience. Do you see that?

4 A. Yeah, I do.

5 Q. And do you still agree with that?

6 A. I'm not sure if your answer was cut off, but I
7 do agree with the statement in paragraph 35 of my
8 declaration.

9 Q. And what is the basis for this definition of a
10 person of ordinary skill in the art?

11 A. I don't think I articulated it in my
12 declaration, but this is based on my understanding of
13 the factors that are important in considering for a
14 person of ordinary skill in the art such as the type of
15 problems in the field, the rapidity with which the
16 technology in the field changes, the type of education
17 and the background of people working in the field,
18 the -- those type of considerations and also my own
19 familiarity with people who do work in the field and
20 solve these type of problems.

21 Q. Your definition here says that a person of
22 ordinary skill could have a Bachelor's degree, and then
23 you list a few examples. Then you also say that there
24 could be also a comparable field of study.

25 What are some examples of what a comparable

1 field of study could be?

2 A. Sometimes a degree does not say electrical
3 engineering or computer engineering. Sometimes it may
4 say -- for example, my degree states -- my undergraduate
5 degree states electrical engineering and computer
6 science. That would be a comparable field of study.

7 Electrical and computer engineering would
8 definitely be a comparable field of study. So sometimes
9 people just give a slightly different name to the same
10 topic.

11 Q. In your opinion, an undergraduate degree in
12 one of these fields alone would not be enough work
13 experience or I believe you call it professional
14 experience would also be required; is that correct?

15 A. That is correct.

16 Q. So, for example, students that you may have
17 taught or supervised, undergraduate students, would not
18 have had the requisite level of skill for the '950
19 patent; is that correct?

20 A. Unless they had, let's say, either
21 professional experience or a Master's degree in a
22 different topic like computer science and they study
23 electrical engineering, then they would have qualified.

24 Q. Let's go ahead and take a look at the '950
25 patent. I'm dropping that into the chat now.

1 And for the record, that is Exhibit 1001.

2 Let me know once you have it.

3 A. Yeah, I have it.

4 Q. Okay. And we have been doing this a little
5 bit already, but if I just refer to US patent number
6 8,471,950 as the '950 or the '950 patent, will you know
7 what I mean?

8 A. I will. And I apologize, but I think I did it
9 myself in the previous response, so...

10 Q. No, no. That is okay. It is much easier than
11 listing out an entire patent number.

12 So what is your understanding of what the '950
13 patent is describing?

14 A. So I addressed it in paragraph 30 of my
15 declaration.

16 The '950 patent addresses the problem that
17 when high-luminance portions exist in focusing lens
18 position detection regions, conventional systems may
19 need to repeatedly change regions and confirm the
20 absence of high-luminance portions, which can be
21 inefficient. The patented solution analyzed the image,
22 detects problematic pixels (bright spots) and excludes
23 them from the evaluation for controlling the intensity
24 of the input signal via the processing unit.

25 I think it is a fairly good high-level

1 description, a higher level of abstraction. The patent
2 itself describes the field of the invention and
3 specifically mentioned that it is concerned with the
4 automatic control system in an apparatus such as video
5 camera, digital still camera. But that is a very
6 high-level description. My description in paragraph 30
7 is a bit more detailed.

8 Q. And paragraph 30 you say, again, that the
9 patent solution analyzes an image and detects
10 problematic pixels and then in parentheses "bright
11 spots."

12 What do you mean by that?

13 A. What do I mean by which part?

14 Q. By detecting problematic pixels and in
15 parentheses "bright spots."

16 A. So I think -- I go on to explain it in the
17 next page of my declaration on page 12. I show
18 Figure -- especially Figure 4 from the specification.
19 And as I state in paragraph 31, The '950 patent solution
20 involves detecting future change positions such as
21 high-luminance areas like spotlights and excluding these
22 portions from the evaluated value extraction regions
23 used for automatic control functions like signal
24 intensity control.

25 And I also noticed that, for example, in

1 column 2 of the patent on line 48, it refers to the fact
2 that in Figure 2 -- and skipping to line 49, it talks
3 about the spotlight e.g. in a case of a picture signal
4 in which the point light source is reflected in a dark
5 space. So this is an example of what I refer to as a
6 problematic pixel.

7 Q. So is it fair to say that your understanding
8 of what a problematic pixel is, is that the device,
9 we'll call it, is identifying pixels within, you know,
10 say an image capture field. Identifying pixels and
11 determining that they have -- that they are associated
12 with, for example, a point light source, a bright light
13 source. And then performing processing to manage the
14 detection of those -- or determining what to do with
15 those problematic pixels, as you labeled them.

16 Is that a fair characterization of your
17 understanding of the '950 patent?

18 A. So I think you begin the question by saying my
19 understanding of the word problematic spotlights and
20 then ended the statement with my understanding of the
21 '950 patent.

22 I would characterize what you just said as an
23 example of what the '950 teaches as a possible
24 embodiment to address the issues that it attempts to
25 solve. I'm not sure that it was a definition in any

1 way.

2 Q. I'm sorry. I didn't mean to imply that it was
3 a definition. I'm just trying to generally discuss what
4 the '950 patent is about.

5 So the '950 patent then, in your
6 understanding, is looking at individual pixels and
7 determining whether or not, for example, they are
8 problematic because they are associated with a point
9 light source; is that correct?

10 A. I would disagree.

11 MS. BIFANO: Objection; form.

12 THE WITNESS: So, as I said, I will disagree
13 with that statement.

14 BY MR. STANFORD:

15 Q. Why?

16 A. Because I think you said in your statement
17 that it has to be limited to individual pixels. I think
18 that the claims do require that you identify pixels, but
19 the decisions do not have to be limited to be done on an
20 individual pixel basis.

21 Q. Let's look at the claims, then. So let's
22 switch over to the patent and scroll down to column 8.
23 So Claim 1 starts on line 34, I believe, of column 8.
24 Do you see that?

25 A. Yes, I do.

1 Q. Let's walk through Claim 1.

2 On line 34, we start with, A signal processor
3 comprising. And below that are a list of units and
4 claim elements; is that right?

5 A. I see a signal processor comprising and I see
6 the different elements below that.

7 Q. In your experience, what is a signal
8 processor?

9 A. So a signal processor is a -- in general, in
10 the field, it is a processor for processing signal.

11 Q. The first line of Claim 1 says, A signal
12 processor comprising.

13 And then the first element below that is a
14 feature detection unit, which detects a position where
15 features of each pixel of an input picture signal have
16 changed. Do you see that?

17 A. I do.

18 Q. What is your understanding of this claim
19 element?

20 A. So I don't know exactly what you mean by that,
21 but I can just describe it.

22 There is by -- as I understand it, the parties
23 have agreed on what a feature detection unit is and what
24 its function and what its structure is. And the -- that
25 agreement refers to the function in which I believe, off

1 the top of my head, is -- well, let me just open it.

2 Let me put what I put in my report, which is a
3 little different from what the agreed construction is.

4 Q. And, I'm sorry, just to -- just to be clear,
5 when you are referring to the agreed construction, you
6 are referring to the agreed construction from the
7 district court case, not from this IPR proceeding; is
8 that correct?

9 A. Well, it is the agreed construction from the
10 district court case, but I do not know whether that
11 implies that it has relevance to the analysis or not for
12 the purpose of the IPR.

13 So I don't want to say that it is part of the
14 IPR, but I definitely don't want to say that it is not
15 part of the IPR.

16 Q. Okay. So let's look at the definition that
17 you wrote in your declaration. I believe that starts on
18 paragraph 51 and 52 of your declaration; is that right?

19 A. That is correct.

20 Q. And do you stand by this proposed declaration
21 in paragraph 51 and 52?

22 A. Again, my understanding, this is a matter of
23 law, to construe the terms. My understanding is there
24 is an agreed construction. I'm not aware that it was
25 adopted necessarily by the court. It may have been.

1 And I'm not sure if it will be adopted by the board or
2 not. And so my analysis is both under my own proposed
3 understanding and the very similar understanding that
4 was reached in the agreed construction. But there is
5 some slight differences for some of the
6 means-plus-function terms.

7 Q. So for any differences between this
8 construction that you proposed in your declaration and
9 the agreed constructions that you are referring to from
10 the district court case, do you believe those
11 differences have any substantive effect on the meaning
12 of this term feature detection unit?

13 A. I think the analysis that I have would apply
14 to the agreed-upon construction, which is, as I said,
15 very similar. The only thing is if there are any
16 distinctions, I would just have to explain how it is
17 met, based on a similar description that I have in my
18 declaration.

19 Q. Since you reviewed the agreed constructions
20 from the district court case, do you agree with those
21 agreed-upon constructions?

22 A. Again, it is my understanding that this is a
23 matter of law. And it is not my job to agree or not
24 agree. It is up to the board and up to the Court to
25 decide whether they are acceptable or not. And I

1 believe that for the purpose of the court proceedings at
2 least, I think it is already -- the agreed constructions
3 have been adopted or at least they have not been
4 rejected to the best of my knowledge.

5 Q. But here you are acting as a person of
6 ordinary skill of the art. So here you can provide an
7 opinion on whether or not you agree with those
8 constructions regardless of whether or not they are
9 adopted or agreed to by the parties.

10 So as a person of ordinary skill, do you agree
11 with the constructions that were agreed upon in the
12 corresponding district court case that we have been
13 discussing?

14 A. I think that given the fact that they are
15 almost identical to my proposed constructions, I don't
16 have any disagreement.

17 Q. Okay.

18 So let's go back to Claim 1. So in this
19 feature detection unit element that we have been talking
20 about, the claim states that the unit detects a position
21 where features of each pixel of an input picture signal
22 have changed.

23 What is your understanding of a feature of a
24 pixel?

25 A. So it could -- it is a pretty broad term.

1 Feature of a pixel just refers to some characteristics
2 of a pixel.

3 Q. Could you give me some examples of
4 characteristics of a pixel that would qualify as a
5 feature?

6 A. Sure. I mean, you could have, for example --
7 an example from the specification is -- which is -- the
8 differential of the luminance value would be an example
9 from the specification.

10 Q. So using that example, the feature detection
11 unit would be detecting a position where the luminance
12 value of a particular pixel from the input picture
13 signal has changed; is that correct?

14 MS. BIFANO: Objection; form.

15 THE WITNESS: Could you repeat it, please?

16 BY MR. STANFORD:

17 Q. Sure. So I'm applying the example that you
18 just gave for what a feature of a pixel would be.

19 In the example, the feature detection unit
20 would detect a position where the luminance value of
21 each pixel from the input picture signal has changed; is
22 that correct?

23 A. It might or might not. I mean, it might do it
24 based on the average luminance value of a segmented
25 portion and whether or not that specific pixel belongs

1 to that portion.

2 So it depends on how you are using those
3 luminance values. But, ultimately, for each pixel, you
4 know whether it is associated with a feature that has
5 changed.

6 Q. So you looking at each pixel and evaluating --
7 in your example, evaluating its luminance value and then
8 identifying whether or not there has been a change. And
9 then the feature detection unit would detect that
10 position of that pixel; is that right?

11 A. That would be one example, but it is not
12 limited. As I mentioned in the previous example, you
13 could, for example, segment the image and then look at
14 the luminance of each pixel and then look, let's say, at
15 the average luminance of the segmented region and then
16 decide for each pixel whether or not the overall average
17 luminance has changed and whether that pixel belongs to
18 the segmented region or not, in which case that would be
19 another way of making the claim in a way that I do not
20 think is consistent with your characterization. So your
21 characterization is correct for some examples, but not
22 necessarily for all examples.

23 Q. Okay. So if we are looking at an average over
24 a segment, which is what I believe you were just
25 discussing, would we be looking at individual pixels or

1 would we be looking at the average over multiple pixels?

2 A. Well, in that example that I just mentioned,
3 that would be an example where you would be looking at
4 the average of multiple pixels, and then you would be
5 making an assessment for each individual pixel whether
6 its corresponding value belongs to a segmented region
7 that has an average which has changed compared to other
8 segmented regions. But you would be making the decision
9 ultimately in deciding whether, for each pixel, whether
10 it is associated with a feature that has changed or not.
11 But you could -- but you don't have to do the
12 calculation exclusively based on information from one
13 pixel, but you have to make the decision for each pixel
14 ultimately.

15 Q. So you are looking at a region of pixels. And
16 then once you look at the region, you then look at
17 whether or not an individual pixel is part of that
18 region. Is that what I'm understanding your example to
19 be?

20 A. That would be a loose characterization of one
21 example that could be an example consistent with the
22 scope of the claim, yes.

23 Q. And so in that example, the evaluation that
24 you're -- that the device is making is whether or not
25 the pixel is associated with a certain -- I think

1 segment was the word you used; is that right?

2 A. I would say no. You are using the word
3 evaluation, so I just want to first say there is a
4 separate claim element about evaluating valued
5 extraction unit. And I think you meant evaluation in
6 the context of the detection process, is probably what
7 I'm assuming you meant.

8 And then, secondly, the -- that detection is
9 not limited to whether the pixel belongs to the segment
10 or not. It also has to do with whether or not there is
11 an overall change of the feature associated with that
12 particular pixel or not.

13 Q. But if you are only looking at the average of
14 a group of pixels, where is the -- where, in your
15 example, is the detection of individual pixels within
16 your example?

17 A. So you would look, for example, whether or not
18 there is a change from one average pixel for one region
19 to another average pixel of a different region in this
20 hypothetical example. And you would then determine --
21 if you determine that the particular region has a change
22 compared to its neighbors, then you would have to
23 determine, then, separately whether each given pixel is
24 part of the region that changed or not.

25 And so there is a -- it would be a

1 multiple-step process, but ultimately you will have to
2 make a decision on a pixel-by-pixel basis.

3 Q. So when you are comparing the pixel of one
4 region to another region, is the comparison based on the
5 average value of each entire region or are you looking
6 at the individual pixel itself and looking at the value
7 of it? I'm trying to understand your example here.

8 A. In my hypothetical example, you would look at
9 the average luminance value of the -- of each separate
10 region, make a decision whether there was a change from
11 one region to the other. And if there was a change,
12 then you would make a decision separately for each
13 individual pixel whether it belongs to the region that
14 has changed or not.

15 So, ultimately, the luminance value you are
16 using is the average for the region compared to the
17 average of the other regions and the decision is on the
18 pixel-by-pixel basis.

19 Q. Your pixel-by-pixel basis decision is whether
20 or not the pixel is part of one of the two regions; is
21 that correct?

22 A. It is whether or not it is part of the region
23 where the region has changed compared to other
24 neighboring regions. So being part of that region is
25 part of the decision.

1 Q. Okay. Understood.

2 MR. STANFORD: So we have actually been going
3 for a little over an hour now. So if you would
4 like, we can take a ten-minute break.

5 THE WITNESS: Sure.

6 (Recess 11:04 a.m. until 11:16 a.m.)

7 BY MR. STANFORD:

8 Q. Before we go back to talking about the claim,
9 I realized we were talking about a document that was not
10 actually in front of any of us here. And I don't
11 believe -- I could not confirm whether or not it is part
12 of this proceeding yet.

13 So I'm just going to upload the Joint Claim
14 Construction and prehearing statements from the district
15 court case where we were talking before there were some
16 agreed-upon definitions for some of these terms.

17 And why don't we mark this as deposition
18 Exhibit 1 or something like that.

19 (Exhibit 1 was marked for identification.)

20 BY MR. STANFORD:

21 Q. And, Dr. Schonfeld, if you can open this and
22 just confirm that this is the document that you have
23 been referring to?

24 A. Yep. I believe this is the document, yes.

25 Q. We don't need to go through it. I just want

1 to make sure that the record is clear.

2 So let's look at Claim 1 again of the '950
3 patent. So let's go to the next claim element, which is
4 a region creation unit. Do you see that?

5 A. I do.

6 Q. And this is another one of the terms that the
7 parties agreed upon in the district court case and that
8 I believe you indicated you agreed with. Correct?

9 A. I think my response was a bit more nuanced,
10 that it is not my decision, that I only have my
11 perspective, but I don't have any reason to disagree.
12 It is almost identical to what I proposed in my
13 declaration.

14 Q. Okay. Fair enough.

15 So, Doctor, the region creation unit states in
16 Claim 1 that it creates a region by removing pixels with
17 the features from an evaluated value extraction region.
18 Do you see that?

19 A. I do.

20 Q. So the region creation unit is creating a
21 region from another region, and that other region is
22 called an evaluated value extraction region; is that
23 correct?

24 A. So if I understood your question correctly,
25 your review was that the evaluated value extraction

1 region is the region that concludes both the value
2 extracted and the values that have not been extracted.

3 And I think my -- and I think my view is the
4 following: That the evaluated value -- that the
5 evaluated value extraction unit extracted the evaluated
6 value in accordance with the evaluated value extraction
7 region, which means it generates an extraction region in
8 which the extracted values have been removed or
9 excluded.

10 And so, in the specification, the examples
11 were the evaluated value extraction region is defined in
12 advanced and then you modify it or other times it is the
13 entire image and then you end up with the extracted
14 region. But I'm not sure that I would agree that the
15 evaluated value extraction region is only what you --
16 the description of what you had prior to the evaluated
17 value extraction unit process, which is what my
18 understanding of your question was.

19 Q. Okay. That was not my question. We are not
20 talking -- I was not talking about the evaluated value
21 extraction unit. I was talking about the region
22 creation unit, which is the limitation before that in
23 Claim 1.

24 The region creation unit in Claim 1 recites,
25 Which creates a region by removing pixels with the

1 features from an evaluated value extraction region.

2 Do you see that in Claim 1?

3 A. I do.

4 Q. So my question for you is, is it your
5 understanding that this limitation of Claim 1 is
6 discussed -- is reciting two different regions. It is a
7 region that is being created and a separate -- not a
8 separate -- excuse me, let me start over.

9 That the region creation -- is it your
10 understanding that the region creation unit is creating
11 a new region from an evaluated value extraction region?

12 A. So the way I apply it is if you have some
13 region, you can refer to it as an evaluated value
14 extraction region. And you do, and I think I agree with
15 you, you do generate and create a region that is some
16 subset of that region.

17 Q. And Claim 1 recites that that new region is
18 created by removing pixels with features that are
19 detected and that are discussed in the prior rotation of
20 the claim from the prior evaluated value region, right?

21 A. Well --

22 MS. BIFANO: Objection -- hold on.

23 Objection; form.

24 THE WITNESS: Sorry. It specifically says
25 that the region creation unit creates a region by

1 removing pixels with the features from an evaluated
2 value extraction region.

3 BY MR. STANFORD:

4 Q. So let's -- you already started talking about
5 this a little bit earlier, but let's now talk about the
6 evaluated value extraction unit, which is the next
7 element of Claim 1.

8 This is, again, another one of the terms that
9 the parties agreed upon, a construction in the district
10 court case which was laid out and the joint statement
11 that I uploaded just a few minutes ago and we were
12 discussing earlier.

13 And, again, I'll just ask you one more time,
14 do you have any reason to disagree with the parties
15 agreed-upon instruction from the district court case for
16 the term evaluated value extraction units?

17 A. I do not. And same response as I gave for the
18 other terms.

19 Q. And in your own words, what is your
20 understanding of what the evaluated value extraction
21 unit is doing?

22 A. Well, in my own words, it is what the claim
23 requires, which is to extract an evaluated value in
24 accordance with an evaluated value extraction region,
25 which I stated in paragraph 53 of my declaration. The

1 function would be creating a region by removing pixels
2 with the detected features from an evaluated value
3 extraction region for the region creation unit.

4 And, I'm sorry, I think we are talking about
5 the evaluated value extraction unit?

6 Q. Correct.

7 A. And in that case, it would be paragraph 55,
8 which is extracting an evaluated value in accordance
9 with the created region.

10 So once the region has been created by the
11 region creation unit, the evaluation is done based on
12 the data after the extraction.

13 Q. And what is an evaluated value?

14 A. So I don't recall a particular definition of
15 it in the specification, but the evaluated value
16 extraction unit, which extracts an evaluated value,
17 and -- it could be in the scope of the claim.

18 Any value that is used later on for -- well,
19 in the case of the patent, it describes in the abstract
20 it is an evaluated value for automatic control of the
21 camera. And so it could be anything.

22 For example, a value that relates to exposure,
23 to focus. Those are some examples in the patent
24 specification, but it could really be any value. It
25 could be the luminance. It could be any value.

1 Q. All right. Let's look at the next element,
2 which is a processing unit. You see that in Claim 1?

3 A. I do.

4 Q. So Claim 1 states, A processing unit, which
5 applies a predetermined processing to the picture
6 signal.

7 And I believe in your declaration at --
8 starting in paragraph 39 and 40, you propose a
9 construction of the term processing unit; is that right?

10 A. I do.

11 Q. And am I understanding correctly that from the
12 way that paragraph 39 and 40 are laid out, that this is
13 a -- you are interpreting this under means-plus-function
14 or 112 F; is that correct?

15 A. I think that the way I did the analysis and
16 declaration is that I simply did the analysis under both
17 means-plus-function and the plain and ordinary meaning,
18 but I did it under both possibilities. I'm not taking
19 the view that it must be means-plus-function.

20 So if you look, for example, in paragraph 38
21 of my declaration, I state, I analyze these claims,
22 terms in this declaration under both their plain and
23 ordinary meaning and the means-plus-function
24 interpretation.

25 I did not necessarily take the view that it

1 must be a means-plus-function term for any of the terms.
2 And I believe that the processing unit is not part of
3 the joint -- of the means-plus-function term for the
4 joint claim construction in the district court.

5 Q. That is correct. It is not one of the terms
6 from the joint claim construction statement.

7 Just trying to understand the scope of your
8 opinion here for processing unit. And, actually, I
9 believe this will apply to control unit as well.

10 Are you -- is it your opinion that these two
11 terms have a plain and ordinary meaning or is it your
12 opinion that they are interpreted and should be
13 interpreted under 112, sixth paragraph of 112 F?

14 A. I did not -- I do not believe that I took the
15 view that any term must be interpreted only under plain
16 and ordinary meaning or only under means-plus-function
17 term.

18 I simply analyzed everything, all of these
19 terms under both, and I did not take a view as to what
20 the proper construction should be.

21 Q. So, in your opinion -- let's start with
22 processing unit. In your opinion, a processing unit, as
23 used in the '950 patent, has a plain and ordinary
24 meaning and has a meaning under means-plus-function; is
25 that correct?

1 A. That is not what I said. What I said was to
2 the extent it has its plain and ordinary meaning, I
3 analyzed the claims under its plain and ordinary
4 meaning.

5 To the extent the board agrees that it should
6 be given a means-plus-function interpretation, I also
7 analyzed the claims under the means-plus-function term
8 for the term processing unit.

9 And so I -- I don't take the view, I just
10 simply say, regardless of the view, the board might take
11 on the term processing unit.

12 I believe it is met with the understanding of
13 processing unit having the means-plus-function term as I
14 proposed it or alternatively the plain and ordinary
15 meaning and not as a means-plus-function term.

16 Q. In your opinion, does processing unit have a
17 plain and ordinary meaning?

18 A. In my opinion, this is a matter of law. My
19 understanding of the joint claim construction from the
20 district court is that this term was not given a
21 means-plus-function term. And from the purpose of my
22 analysis and my declaration, I did not take a view as to
23 whether it should be given a plain and ordinary meaning
24 or means-plus-function interpretation. I simply said it
25 is satisfied in the prior art grounds under either

1 interpretation.

2 Q. Okay. So you are not offering an opinion on
3 whether or not plain and ordinary meaning or
4 means-plus-function should apply to processing unit.
5 Correct?

6 A. That is correct. And that is true for any of
7 the terms.

8 Q. And is it also correct that you are not
9 offering an opinion of what the plain and ordinary
10 meaning would be of processing unit. Correct?

11 A. That is incorrect.

12 Q. So what is your opinion on the plain and
13 ordinary meaning of processing unit?

14 A. My opinion is that the plain and ordinary
15 meaning is whatever the claim element says, which is the
16 processing unit which applies predetermined processing
17 to the picture signal. And I apply the plain and
18 ordinary to those words.

19 Q. And let me ask you the same question for
20 control unit, which is the next term in your declaration
21 paragraphs 41 and 42.

22 So, for control unit, is it correct that you
23 are not offering an opinion of whether or not plain and
24 ordinary should apply or means-plus-function should
25 apply to this term?

1 A. That is correct.

2 Q. In your opinion, does control unit have a
3 plain and ordinary meaning?

4 A. I applied the plain and ordinary meaning of
5 control unit to the context of the claim to a control
6 unit that controls the processing unit in accordance
7 with the evaluated value having been extracted by the
8 evaluated value extraction unit, which is that claim
9 element.

10 Q. So, in your opinion, the plain and ordinary of
11 control unit is what the words of the claim recite.
12 Correct?

13 A. That is right. It is what we just -- any unit
14 which controls the processing unit in accordance with
15 the evaluated value having been extracted by the
16 evaluated value extraction unit. And to the extent that
17 the board feels that this term should be given a
18 means-plus-function interpretation in the alternative, I
19 also provided an analysis under a means-plus-function
20 where the function and structure of control unit are, as
21 defined, in paragraphs 41 and 42 of my declaration.

22 Q. And just so I'm understanding, you are not
23 applying an opinion on which you should apply plain and
24 ordinary or means-plus-function. Correct?

25 A. That is true for this term, and it's true for

1 all of the other terms including the terms that have
2 been agreed.

3 Q. Okay. Understood. Let's turn back to the
4 patent and go to the last clause of Claim 1, which is in
5 column 8. I believe that is line 49, is where it
6 begins. It is the wherein clause. Do you see that?

7 A. I do.

8 Q. And this element recites, Wherein the control
9 unit controls the processing unit by using an evaluated
10 value of a region from which pixels having an extracted
11 predetermined feature are removed.

12 You see that?

13 A. Yes.

14 Q. In your own words, what is the meaning of this
15 claim element?

16 A. Well, we already talked about the evaluated
17 value extraction unit. So we have an evaluated value
18 from the unit which was extracted -- I mean, from the
19 region which it was extracted. And then we use that
20 value to control the processing unit. And I think it is
21 just what the claim limitation says.

22 Q. And the control of the processing control unit
23 would be controlling how the processing unit applies the
24 predetermined processing to the picture signal; is that
25 correct?

1 A. No.

2 Q. And what does the claim element mean when it
3 says that the control unit controls the processing unit?

4 A. It just means that it controls the processing
5 unit. And it has to do it in a particular way, which is
6 by using the evaluated value. And that evaluated value
7 has to be taken from a particular region, which is the
8 region after extraction. But there is no requirement.

9 I think you -- if I understood your previous
10 question correctly, you conflated two separate
11 limitations and required the wherein clause to be
12 limited only to predetermined processing to the picture
13 signal. And I don't view the two elements as being
14 conflated in that way.

15 Q. In your opinion, the wherein clause does not
16 connect the operation of the processing unit with the
17 operation of the control unit?

18 A. I didn't understand that question.

19 Q. Let me ask it a different way.

20 The last clause of Claim 1 states, Wherein the
21 control unit controls the processing unit, what is the
22 control unit controlling the processing unit to do?

23 A. There is no requirement for the wherein
24 element that you do anything. For example, part of the
25 specification -- and I'm doing it from memory, I would

1 have to check, but it talks about things like
2 controlling the exposure or controlling the focus and
3 doing it with a driver.

4 So in those cases, it is not controlling
5 necessarily the predetermined processing to the picture
6 signal. It is prior to generating the picture signal.
7 But it could also do other things.

8 It could do predetermined -- it could apply to
9 the predetermined processing to the picture signal, but
10 the -- some of the embodiments are not limited in that
11 way and would not satisfy it in that way.

12 Q. Some embodiments -- sorry, let me start over.

13 So the last element of Claim 1 does say that
14 the control unit could control the processing unit to
15 apply the predetermining processing to the picture
16 signal, but the specification provides other options as
17 well. Am I understanding you correctly?

18 A. I'm not sure if I follow the question, but I
19 think you put again the predetermined processing into
20 the last element, and I don't see it here.

21 It talks about predetermined features that are
22 removed. It does not talk about the predetermined
23 processing from the processing unit limitation. That is
24 a separate thing. And so if I heard you correctly, you
25 put that portion into the last element and it is not

1 there. And my point is only that there are embodiments
2 where the control unit controls the processing unit and
3 where it controls issues relating to predetermined
4 processing such as white balance.

5 There are other times where it controls
6 exposure such as -- I forget whether it is aperture or
7 shutter or the focal plane and it has a driver to move
8 the focal plane, position of the lens, where it has
9 nothing to do with the predetermined processing to the
10 picture signal.

11 So if I understood you -- if I heard your
12 question correctly, if you use the word "predetermined
13 processing" in connection with the last element, I
14 disagree.

15 If you are just talking about the
16 predetermined feature that was removed for the purpose
17 of the extraction, that I agree with. But I think I
18 heard you say predetermined processing in your question.
19 I don't have the realtime. If that is correct, I
20 disagree with you.

21 Q. Okay. Yes. I did use the term predetermined
22 processing. I just wanted to understand your
23 interpretation for the scope of Claim 1.

24 So it sounds like -- and please correct me if
25 I'm wrong, it sounds like what you are saying is that

1 the specification provides embodiments where the control
2 unit controls the processing unit to perform
3 predetermined processing, but it also includes
4 embodiments where, in your opinion, the control unit
5 controls the processing unit to do something else that
6 is not -- would not fall under the scope of
7 predetermined processing as it is used in Claim 1; is
8 that correct?

9 MS. BIFANO: Objection; form.

10 THE WITNESS: So there are examples in the
11 specifications or embodiments where the control is
12 on things like, I believe, white balance, which you
13 can view as predetermined processing.

14 Obviously whatever is predetermined is not
15 controlled. It is only other portions that are
16 predetermined. And then the control has to be
17 something where you have the option of determining
18 it while processing.

19 And then there are other cases where it is not
20 predetermined, but the -- the main issue is not
21 only the term predetermined processing, but I think
22 where you begin the sequence of questions, you are
23 referring to the predetermined processing from the
24 processing unit limitation, which is not only
25 predetermined, but it is predetermined processing

1 to the picture signal. And in some of the
2 embodiments, like changing the focal plane, there
3 is no picture signal yet. It is prior to the
4 generation of the picture signal. And so it is --
5 conflating the two elements would not work -- would
6 exclude certain embodiments.

7 BY MR. STANFORD:

8 Q. Okay. I understand your position there.

9 Let's move on to your opinions on the prior
10 art. I'd like to start by looking at paragraph 3 of
11 your declaration. It's page 1.

12 Let me know once you get there.

13 A. Yes, I'm there.

14 Q. So paragraph 3 you provide a table that is --
15 my understanding is an overview of the three grounds
16 that you're providing opinions on in your declaration;
17 is that right?

18 A. That is correct. It is a high-level summary
19 of my opinions.

20 Q. So Ground 1 is based on the combination of --
21 and excuse me for butchering the name of this prior
22 reference, but I think it is Tsujino. If you have a
23 better way of saying it, I'm all ears.

24 A. If that is the question, I'm the wrong person
25 to ask about this, but Tsujino is how I pronounce it as

1 well.

2 Q. So if we say Tsujino, we will be on the same
3 page. I just want to make sure.

4 So it is a combination of Tsujino and Iwasaki.
5 And then Ground 2 is a combination of Tsujino and Shui,
6 I think we'll call it, and Iwasaki. Correct?

7 A. Correct.

8 Q. The final ground is Shui with Iwasaki. You
9 are providing opinions on all of these grounds.
10 Correct?

11 A. That is correct.

12 Q. So looking at Grounds 1 and 2 of this table
13 here, Ground 1 is just Tsujino and Iwasaki and then
14 Ground 2 adds in the Shui reference to those -- to that
15 combination from Ground 1.

16 What was missing from Ground 1 that you needed
17 to add the Shui reference to teach?

18 A. I would not characterize it that way. I
19 wouldn't say anything was missing or else I couldn't
20 have found -- I couldn't have reached the opinion that
21 Ground 1 was sufficient to find invalidity or
22 obviousness for all of the -- for all of the claims, for
23 all of the challenged claims.

24 And the Ground 2 is just to the extent that
25 patent owner or the board disagrees of the combination

1 of Tsujino and Iwasaki are sufficient to find a
2 particular element obvious. I provided an alternative
3 in Ground 2, which also included Shui.

4 Q. So this is like a backup position if Ground 1
5 is unsuccessful; is that right?

6 A. I would not characterize it this way. It is
7 an alternative position. Obviously if Ground 1 is
8 sufficient to find obviousness, Ground 2 is almost also,
9 by definition, sufficient. But it does provide an
10 alternative way of looking at it when you combine all
11 three references for some of the elements.

12 Q. So Shui is being used to potentially fill in
13 some gaps that might be missing in the combination of
14 Tsujino and Iwasaki?

15 A. I would not view it this way. In my view, it
16 is an alternative to the combination of Tsujino and
17 Iwasaki and it does achieve the same results, which is
18 invalidity under obviousness in a slightly different
19 way.

20 Q. Okay. So sort of a similar question, then,
21 for Grounds 2 and 3. So on Ground 2, like we were just
22 saying, there is Tsujino Shui and Iwasaki. But then in
23 Ground 3, which is related to the same claims, 1 through
24 15, you dropped Tsujino and now are just relying on Shui
25 and Iwasaki, right?

1 A. Ground 3 is only Shui and Iwasaki and Tsujino
2 is not part of it. That is correct.

3 Q. So help me understand why was Tsujino part of
4 the combination to begin with. If Shui and Iwasaki
5 disclosed everything on its own, again, why is Ground 2
6 included?

7 A. So it is the same answer I gave for the
8 distinctions between Ground 1 and Ground 2. Same thing
9 would apply to the distinction between Ground 2 and
10 Ground 3. And it provides an alternative -- an
11 alternative mapping to the prior art. And you can see
12 that in the case of Ground 3. I am relying on Shui as
13 what I referred to as -- loosely as the primary
14 reference, which all it means is that when I'm applying
15 the combinations.

16 I often look to what Shui discloses as the
17 first, and then only using Iwasaki to -- in order to
18 show that certain elements would have been obvious with
19 the additional disclosure of Iwasaki.

20 As opposed to in Ground 2, where I initially
21 looked to Tsujino and then looked at Shui and Iwasaki to
22 show that certain elements would have been obvious in
23 light of that combination.

24 Q. And you don't consider either Ground 2 or 3 to
25 be redundant of each other?

1 A. No. I think that the way in which I actually
2 did the analysis is they are distinct.

3 Q. All right. Well, let's go ahead and take a
4 look at your analysis for these grounds. And let's
5 start with -- I'll go through them somewhat in order.
6 So we'll start with -- let's start looking at the
7 Tsuji no reference first, and I'll drop that into the
8 chat.

9 And for the Shui reference, I'm only uploading
10 the English language version, which is Exhibit 1006,
11 unless you would like to look at the Japanese version.

12 So first we'll talk about the Tsuji no
13 reference. So if you'll pull that up, which is Exhibit
14 1005, and let me know once you have it open.

15 A. Yes.

16 Q. And I guess, just for the record, this is
17 Patent Number 8,237,850, which we have been referring to
18 as Tsuji no.

19 So, in general, what is your understanding of
20 what Tsuji no is describing?

21 A. So it describes, for example, in paragraph 62
22 of my declaration, which is Exhibit 1003, I state that
23 Tsuji no relates to an electronic camera that adjusts the
24 distance from an optical lens to an imaging surface.
25 And then I talk about how it discloses the exclusion of

1 high-luminance pixels as part of the process. And this
2 is consistent with, for example, Tsujino.

3 In the abstract describes in a similar way and
4 also in the field of invention, where he talks about an
5 electronic camera that referenced as an object scene
6 image generated on an imaging surface to adjust the
7 distance from an optical lens to the imaging surface.

8 Q. The one place that I found that Tsujino gives
9 somewhat of a concise statement of, I believe, what its
10 benefit is, if you go to column 13, starting on line 20,
11 the beginning of the paragraph starts with "as a
12 result."

13 Let me know when you see that.

14 A. I see that. Yes.

15 Q. So column 13, line 20 says, As a result, it
16 becomes possible to correctly arrange the focus lens 12
17 at the focal point while avoiding the defocusing caused
18 by the blurred image on the periphery of the light
19 source, LS.

20 This is consistent, I believe, with what you
21 were just describing as the solution, overall solution
22 that Tsujino is providing. Correct?

23 A. I would describe it not as an overview of the
24 entire Tsujino reference, but rather as one important
25 outcome of what Tsujino proposes. But I view this

1 statement as a little bit more nuance and specific than
2 the kind of high-level description of both the abstract
3 of Tsujino, the field of the invention, as well as in my
4 own summary.

5 Q. Okay.

6 Let's look in your declaration now, starting
7 at photograph 77.

8 So here I believe is the beginning of your
9 opinions for Ground 1 related to Claim 1; is that
10 correct?

11 A. That is correct.

12 Q. And you take an element-by-element breakdown
13 of Claim 1. Correct?

14 A. Correct.

15 Q. Let's go to what you call element 1a, which is
16 the feature detection unit element, and that starts at
17 paragraph 80. You see that?

18 A. I do.

19 Q. So for -- if I'm understanding your opinion
20 correctly here, you are looking primarily to column 11
21 and Figure 12 to allege that Tsujino teaches the feature
22 detection unit detecting a position where features of
23 each pixel of an imprint picture signal have changed.

24 Is that a fair characterization of where the
25 support for your opinions are coming from? The

1 primarily support for your opinions, I should say.

2 A. So I would not characterize my opinion as
3 being focused on column 11. It is a three-page opinion,
4 and I think it speaks for itself, but I think what you
5 describe is at least part of my opinion.

6 Q. Yes. I'm just looking at the pin cites you
7 include at the end of your sentence, and those seem to
8 be primarily directed to column 11. So I think that
9 would be a good starting place for us to discuss Claim
10 1a. So if you could turn to column 11 of Tsujino.

11 A. Again, I would not describe it in this way.
12 This a part of my overall analysis in an analysis that
13 both talks about Tsujino and Tsujino in combination with
14 Iwasaki. But column 11 is part of the analysis.

15 Q. And just to be clear, before we go look at
16 Tsujino, it is your opinion that both Tsujino and
17 Iwasaki are required for Claim Element 1a. Correct?

18 A. So my analysis is based on the combination of
19 Tsujino in view of Iwasaki, but I'm not -- I did not say
20 that both of them are required. I just simply did the
21 analysis based on the combination.

22 Q. So your opinion, for Claim Element 1a, is
23 based on the combination of both Tsujino and Iwasaki.
24 Correct?

25 A. That is correct.

1 Q. Now, if you're looking at Tsujino and if
2 you'll go to column 11, let's start at line 22. Let me
3 know once you get there.

4 A. I'm there.

5 Q. So here, line 22 starts with, The light source
6 determining process in step S9 shown in Figure 11 is
7 executed according to the subroutine shown in Figure 12.
8 And then this paragraph goes on to explain the steps of
9 Figure 12.

10 So let's walk through some of those right now.
11 So in step S21, it states -- and I'm now on line 24 of
12 column 11 -- Each of the coefficients of K1 and K2 is
13 set to 0 in response to the generation of the vertical
14 synchronization signal Vsync.

15 In step S23, It is determined whether or not
16 the current pixel is a start pixel (a pixel arranged at
17 the upper left coordinate) for the focus area FA. And
18 when yes is determined in step S25, whether or not the Y
19 data value of the current pixel exceeds a threshold,
20 which they refer to as TH1.

21 Am I reading that correctly?

22 A. I did not follow it all completely, but I
23 think so. What I did follow was correct.

24 Q. Just for my own education, what is Y data?

25 A. I'm not sure if Tsujino spells it out

1 specifically, but you can see for example in column 6,
2 line 59, it talks about a luminous evaluation circuit 28
3 integrates Y data belonging to each evaluation area.

4 So Y data is what it says here, which is
5 luminance. And that is a common convention in the field
6 of any imaging.

7 So it is a representation of -- to put it in
8 simple terms, it is the monochrome component. It is
9 what you would view as a black and white image.

10 Q. And just looking at the luminance value; is
11 that right?

12 A. Yeah. Like I said, it is luminance. And some
13 people describe it as the monochrome representation of
14 the image or the black and white representation of the
15 image, but the proper technical term is "luminance."

16 Q. Okay. Thank you.

17 So continuing on now on column 11, line 31, it
18 says, When the Y data value is greater than TH1, the
19 process proceeds from S25 to S27 to increment the
20 coefficient K1. And then in S29, it is determined
21 whether or not the Y data value of the current pixel
22 exceeds TH2. And when the answer is yes, the
23 coefficient K2 is incremented in step S31?

24 Then finally, at the end of that paragraph,
25 which spans from line 36 to 40 says, Because TH1 is

1 greater than TH2 -- I'm slightly paraphrasing just for a
2 grammatical sake -- Because TH1 is established to be
3 greater than -- TH2, excuse me, is established to be
4 greater than TH1 when the Y data value exceeds TH1 and
5 is equal to or less than TH2, only coefficient K1 is
6 incremented. And when the Y data value exceeds TH2,
7 coefficient K1 and K2 are both incremented.

8 Now, I believe you relied on this portion of
9 column 11 for the feature detection unit -- or for what
10 aspects of the feature detection unit, I should be more
11 precise.

12 Can you explain to me where in this section
13 Tsujino is describing a change in a pixel -- or a change
14 in a feature of a pixel?

15 A. So this is what I addressed in paragraphs 80,
16 81, 82 and -- yeah, sorry, 82 of my declaration.

17 So the response is those paragraphs -- and if
18 you don't mind, I'll just reread them before giving you
19 my own synopsis of the same response because those
20 paragraphs addressed your question?

21 So if you just give me a couple of minutes.

22 Q. Okay.

23 A. Thank you. So first of all, let me just
24 preface it by saying that my analysis is based both on
25 Tsujino, but in Tsujino in combination with Iwasaki.

1 But when we are just focused on Tsujino, as I mentioned
2 in paragraph 80, I talk about the cases where the
3 luminance value exceeds a certain threshold.

4 And that is an indication of change, as I
5 described in both paragraphs 81 and 82, because
6 Tsujino -- and it uses it for identifying areas of very
7 high luminance corresponding to a light source and it
8 wants to avoid it. And, therefore, it expects the
9 change to result in a very high-luminance value compared
10 to some baseline value. And it just simply says an easy
11 and efficient way of achieving it is to determine if the
12 luminance value is very high. That means that the light
13 source is there as long as you set the threshold
14 correctly. And so the change is whether or not there is
15 a light source that influence the luminance value at
16 that location or not.

17 Q. So, as you say, Tsujino is comparing -- for a
18 particular pixel, Tsujino is looking -- is comparing the
19 value, the Y data value, to the two thresholds, TH1 and
20 TH2, right?

21 A. Correct, yes.

22 Q. What is the change portion of this analysis?

23 A. The change is that it normally expects pixels
24 that were the light source of very high luminance -- did
25 not result in very high luminance, those values of the

1 luminance to be below the threshold. The change is that
2 it now has exceeded the threshold. And so the regions
3 where the light source has affected are the regions
4 where the pixels have a very high luminance value above
5 the threshold and the other regions are below that
6 threshold.

7 Q. So, in your mind, is the change -- the value
8 of a particular pixel has changed over maybe some time
9 period. I'm not seeing that in column 11. That is why
10 I'm trying to understand your position here.

11 A. So in column 11, you go through a
12 pixel-by-pixel basis I believe in raster scan format.
13 And, in particular, if you have a particular region
14 where there is the influence of a light source, we
15 expect the luminance values in those pixel locations to
16 be very high and above threshold.

17 And so the change is that when you go in a
18 raster scan format and you are in a region that does not
19 have the influence of the light source, you expect all
20 those luminance values to be below threshold. And then
21 as you transition into a pixel that is within the region
22 of the light source, you expect the change to now exceed
23 that threshold. And so the change is the fact that the
24 luminance values in the region where there is a light
25 source are above the threshold and then other regions

1 are below the threshold.

2 Q. So you are comparing -- so Tsujino is
3 comparing the luminance value of one pixel to other
4 pixel?

5 A. Well, it is comparing the luminance value to a
6 threshold. And the threshold is determined to be a
7 value, which is higher than some baseline of some
8 nominal luminance value it expects to receive if there
9 is no light source contamination.

10 So if it expects the normal images without the
11 light source to be, let's say, up to 200 and then the
12 regions that are in the -- within the light source to be
13 above, let's say, 240, it might set a threshold between
14 the two at 220 and the change is, as you migrate from a
15 pixel without a light source, you expect to be below the
16 threshold. And the changes that you now -- when you are
17 in the region where it is above the threshold, you know
18 that you have changed into a region that is within the
19 luminance -- within the light source. And therefore it
20 is a change compared to what you would expect from
21 neighboring pixels that are not within the light source.

22 Q. So where in Tsujino is discussing this
23 comparison between a current pixel and its neighboring
24 pixel? Because I'm having trouble finding that in
25 column 11 where we just read through.

1 A. So in the case of Tsujino, it puts a threshold
2 and it applies it to each and every pixel.

3 If there was no difference and all of the
4 pixels were only above the threshold, you would exclude
5 everything. There would be no analysis to be done.

6 It expects that only the regions that are
7 within the area of the light source would be above the
8 threshold. And it chooses a threshold such that all of
9 the pixels that are not within the light source would be
10 below the threshold.

11 And so, therefore, the change is that some
12 pixels are presumed to be above the threshold and some
13 pixels are below the threshold. And the change is in
14 transition as you go from an area -- from a pixel
15 outside of the light source to a pixel in the light
16 source area.

17 Q. So Tsujino is not comparing one pixel to
18 another pixel. It is only comparing it to a threshold
19 that is predetermined and indicates a certain luminance
20 value.

21 A. So, as I explained, for example, in
22 paragraph 82, there is an implicit baseline that
23 compares to -- and as I stated in paragraph 82, A POSITA
24 would have understood that Tsujino's threshold-based
25 detection method considers a baseline range of luminance

1 values that are below the threshold value and identifies
2 pixel positions whose luminance value exceed the
3 baseline, i.e. luminance values that are higher than the
4 threshold.

5 This detection therefore identifies pixel
6 locations as luminance values have changed compared to
7 the luminance values of other pixel locations in the
8 image. And as I state in paragraph 81, you do it on a
9 pixel-by-pixel basis in Tsujino.

10 Q. So you stated that this is implicit, meaning
11 it is not actually stated in Tsujino, right?

12 A. Well, I think it is very clear from Tsujino
13 because Tsujino just takes all of the pixels. And for
14 each one, it applies this analysis where it looks at the
15 thresholds and decides whether to exclude that pixel or
16 not. And the intention is not to exclude the entire
17 image or not to allow the entire image, but only to
18 exclude those pixels where there is a very high
19 luminance value because of a light source.

20 And so the change is -- as you are moving in
21 this -- I believe it is a raster scan format is how we
22 describe it -- is as you are moving from pixel to pixel,
23 you make a decision, is this pixel going to be one that
24 is part of what was made artificially high by the light
25 source or is this pixel one that does not influence by

1 the light source. And the change is a transition of
2 going from one pixel to the next pixel. And I think
3 that that is exactly what Tsujino teaches.

4 Q. And where in Tsujino is it discussing this
5 transition from one pixel to another pixel indicating --
6 or excuse me -- being part of determining a change in
7 luminance of the -- I guess current pixel?

8 A. It discusses it several times. But just since
9 we are on column 11, if you go to line 64, it says, In a
10 step S49, the coordinate value XY is updated in a raster
11 scanning direction. And in step S51, it is determined
12 whether or not the updated coordinate value XY shows 88.

13 So it goes through pixel by pixel and makes a
14 determination of whether to exclude or not each pixel in
15 the entire region going all the way from 11, which is
16 the upper left corner, to 88, which is the bottom right
17 corner.

18 And so it describes exactly what I tried to
19 characterize, which is for each pixel it makes a
20 decision should it be excluded or not based on its
21 luminance value. And the change is the fact that some
22 of the pixels will be excluded and others will not be.

23 Q. But the particular pixel is only being
24 compared to the two thresholds TH1 and TH2. Correct?

25 A. That is correct. But the thresholds are

1 designed to take advantage of the expected luminance
2 range. And they are chosen such that there is a
3 baseline value, which is lower than the threshold. And
4 if you are below the threshold, you are -- it is
5 detected or estimated that you not part of the light
6 source.

7 If you are above that threshold, you would be
8 part of the light source. And so the change is going
9 from lower luminance for the neighbors that are not part
10 of the light source to higher luminance for the current
11 pixel, which is part of the light source and therefore
12 excluded.

13 Q. But Tsujino does not actually discuss that
14 comparison of a pixel with its neighbors, does it?

15 A. No. As I said, it is implicit in a sense that
16 it is -- when you just look at Tsujino in isolation by
17 itself without the combination with Iwasaki or with Shui
18 as well for Grounds 1 and 2.

19 Respectively, when you are just looking at
20 Tsujino, there is an implicit comparison to the neighbor
21 because the threshold is chosen such that it is above
22 the value of all the neighbors that are out of the light
23 source, but lower than the value of all the neighbors
24 that are inside the light source.

25 So the threshold has an implicit baseline

1 value that takes into account the expected luminance
2 range for the light source pixels and for those that are
3 not in the light source.

4 Q. Okay. Thank you.

5 MR. STANFORD: I think we -- if my math is
6 right, we have been going for about an hour and 15
7 minutes now.

8 You want to take a 10-minute break?

9 THE WITNESS: That sounds good.

10 MS. BIFANO: Great.

11 MR. STANFORD: See you in 10 minutes.

12 (Recess 12:29 p.m. until 12:40 p.m.)

13 BY MR. STANFORD:

14 Q. All right. Welcome back, Doctor. We were
15 talking about Tsujino and its identifying luminance and
16 looking at luminance value and basically trying to find
17 light sources within an image. And so there is another
18 passage within Tsujino that I would like to take a look
19 at with you.

20 If you go to column 8 of Tsujino and look at
21 the paragraph that starts at line 61, starts with "in
22 order to determine." And then the paragraph goes on to
23 the top of column 9. Do you see that?

24 A. I see it, yes.

25 Q. I'm just going to give you a moment. If you

1 could just read through that paragraph and then I would
2 just like to talk about it.

3 A. Okay. Yes, I read it.

4 Q. Is it your understanding that this paragraph
5 in Tsujino is describing determining the presence of the
6 light source, LS, based on a ratio of pixels that are
7 above the TH2 threshold relative to the pixels that are
8 above the TH1 threshold, which refers to as the K2 over
9 K1 ratio?

10 A. Could you repeat the question, please?

11 Q. Is it your understanding that Tsujino
12 describes determining the presence of the light source,
13 LS, based on the ratio K2 over K1?

14 A. In this particular embodiment, that K2 or K1
15 is the basis for determining whether the light source is
16 present or not.

17 Q. Okay. And K2 over K1 is a ratio that is based
18 on the number of pixels that exceed each of the two
19 thresholds. Correct?

20 A. Correct.

21 Q. So towards the bottom of column 8, it states
22 that K1 is the number of pixels in which the Y data
23 value exceeds TH1. And then it says the number of --
24 and then K2 is the number of pixels in which the Y data
25 exceeds TH2. Correct?

1 A. Correct.

2 Q. So Tsujino is looking at all of the pixels
3 that exceed TH1, comparing it to all of the pixels that
4 exceed TH2, and then using that ratio to determine
5 whether or not there is a light source. Correct?

6 A. In this embodiment, that is correct.

7 In other places, it talks about the exclusion
8 just based on the luminance of the particular pixel. In
9 this case, it talks about the comments K2 and K1 and the
10 ratio as being the criteria. So in this embodiment, I
11 agree with you.

12 Q. Okay. And so you mention exclusion. I think
13 where you are talking about is further down in column 9.
14 So I believe it is starting on column 9, line 31, where
15 it says a high-luminance excluding function.

16 Is that what you are referring to?

17 A. I was talking more broadly. It is used
18 throughout the entire Tsujino reference, but this may be
19 one of them.

20 Q. Okay. Well, let's take a look at that -- at
21 this one. So at column 9, line 31, Tsujino states,
22 High-luminance excluding function (a function for
23 excluding a high-luminance image above TH1 from the
24 focussed evaluation target), which is described above,
25 is turned on when capturing the object seen on the light

1 source.

2 You see that?

3 A. Yes.

4 Q. What is your understanding of Tsujino's
5 high-luminance excluding function?

6 A. So I'm not sure exactly what you mean by your
7 question, but I can describe what I see in this
8 paragraph in column 9, beginning at line 31, which is
9 there is an excluding function, which is simply based on
10 the threshold TH1, which goes pixel by pixel, as we
11 described, and is applied to each pixel. It either
12 eliminates that pixel or not, depending on whether or
13 not it is above or below TH1. But the entire exclusion
14 function is applied to regions in 8 by 8 blocks or there
15 was a determination based on criteria, such as the one
16 we just described above, where the K2 over K1 was above
17 the threshold, which is then used to determine that
18 there is a light source present, and in which case you
19 turn on the exclusion function. And if that
20 determination was not reached, that there is a light
21 source, then you do not turn it on. That is the example
22 talked about in this embodiment.

23 Q. So the exclusion function -- high luminance
24 exclusion function is used once you determine that you
25 have a light source?

1 A. You -- in this particular example, in this
2 particular embodiment, it says that you only turn it on
3 when you determine that you have a light source.

4 There are other embodiments where that is not
5 practiced, but, in this example, you are right. You
6 first go through a process, look at a block, determine
7 whether or not there is a light source or not so you can
8 allow for what is described at the end of this
9 paragraph, which is the white board, to be included in
10 the focus evaluation. And, in that case, you decide
11 whether that is a white board or a light source. If it
12 is a white board, you include it. If it is a light
13 source, you go through the exclusion function.

14 Q. And this -- let me start over. And this
15 high-luminance excluding function is turned on or off
16 based on the K2 to K1 ratio that we were talking about a
17 few moments ago. Correct?

18 A. These are two separate specific embodiments,
19 but the kind of combination of -- in a particular
20 embodiment consistent with Tsujino would be applicable
21 to what you are describing.

22 You could do exactly, based on the teaching of
23 Tsujino, exactly that, which is look at the K2 over K1
24 for a block, determine if the light source is present or
25 not for the block. If it is present, turn on the

1 exclusion function. If it is absent, turn it off.

2 Q. And just to make sure -- sorry, at the
3 beginning of that, you are saying that the discussion --
4 the description, excuse me, that bridges from the bottom
5 of column 8 to the top of column 9, going from column 8,
6 line 61 to column 9, line 7, that is a separate
7 embodiment from column 9 starting at line 31, where it
8 introduces the high-luminance excluding function?

9 A. I view it as potentially a separate embodiment
10 in the sense that it just -- in that paragraph in
11 column 9, line 31, it only talks about turning on when
12 you are capturing things including light source LS shown
13 in Figure 5.

14 It does not necessarily say that it must be
15 determined in the specific manner described in column 8,
16 but clearly the specific manner described in column 8,
17 line 61, would be applicable there. But I'm not sure
18 that it is limited to it. As a matter of fact, I don't
19 think it is limited to it.

20 Q. So are they separate embodiments or are they
21 in the same embodiment or are there -- is there no
22 distinction between embodiments in this description
23 either? I'm just trying to understand your reading of
24 Tsujino.

25 A. My reading of Tsujino is I'm focused on the

1 excluding function, and that can be applied with or
2 without the detection of the light source in a block.
3 And it could just simply be applied to all.

4 There is nothing limiting Tsujino to be
5 confined to first determine the presence of the light
6 source in the block and only then apply the excluding
7 function. It talks specifically about applying the
8 excluding function in general.

9 But it is possible to practice Tsujino while
10 also including the light source determination process,
11 such as the one described in column 8, line 61. But it
12 is not something that there was -- it is not something
13 that is essential in the disclosure of Tsujino, and it
14 is not critical for my analysis. My analysis with or
15 without it would remain unchanged.

16 Q. With or without what aspect of Tsujino?

17 A. The turning on and off of the exclusion
18 function.

19 Q. Do you mean the ability to turn it on and off
20 or just the fact that it could be off all the time or on
21 all the time?

22 A. I'm not sure if I follow the question, but --
23 whether you only turn it on for blocks that have been
24 determined to have -- to include a light source or
25 whether you turn it on for all blocks without making

1 that determination. They -- the disclosure would be
2 applicable in my analysis regardless.

3 Q. I understand. I understand your position
4 there.

5 So if we look at Column 9, line 31, where it
6 begins, "The discussion of the high-luminance excluding
7 function," in this first sentence, it states on -- let's
8 see if it's -- line 33, 34, where it says the
9 high-luminance function -- I'm paraphrasing slightly --
10 is turned on when capturing the object scene including
11 the light source LS shown in Figure 5, thereby making it
12 possible to avoid a situation in which focusing control
13 fails due to a blurred image of the light source.

14 Are you saying that your opinion -- are you
15 saying that Tsujino allows for the use of the
16 high-luminance excluding function regardless of whether
17 or not it has determined that there is a light source in
18 the object scene?

19 A. Yes. Certainly. Tsujino does not necessarily
20 limit the disclosure to exclusively requiring that
21 you -- that you be able to turn on the exclusion
22 function.

23 You could apply the exclusion function
24 everywhere and not determine whether the light source is
25 present or not and just simply always apply the

1 exclusion function that would be consistent with the
2 disclosure of Tsujino. And so I'm relying on the
3 exclusion function when it is available. And so to the
4 extent that there is the ability to turn it off, I'm not
5 relying on it when it is turned off.

6 Q. You are relying on it when it is turned on
7 though?

8 A. Yeah, which could be either when the light
9 source is included or always depending on how you choose
10 to implement Tsujino. Both disclosures are part of
11 Tsujino.

12 Q. Do you agree that this paragraph starting at
13 line 31 of column 9, though, is specifically calling out
14 the circumstance in which the light source has been
15 determined to be present?

16 A. Yeah, that is correct. And in that case then,
17 it applies the exclusion function to decide which pixels
18 to rely on and which pixels are in the spot of the light
19 source and therefore are not reliable. And that is what
20 I'm -- that is what I am relying on for the disclosure
21 in my analysis for claim invitation 1a. And that is
22 what I'm pointing to.

23 In a sense, whether you turn it on all the
24 time or turn it on some of the time, the disclosure that
25 you have the ability to exclude is what I'm relying on.

1 Q. And it does not matter for your opinion
2 whether or not the light source has been determined to
3 be present prior to you implementing the high-luminance
4 excluding function?

5 A. Not particularly because there is a disclosure
6 of exclusion. So to the extent that you do it only when
7 the light source is present, I'm relying on the ability
8 of having the exclusion function when both the light
9 source is present and the threshold has been passed.

10 To the extent that you use the exclusion
11 function also disclosed by Tsujino in general, then I'm
12 relying on it in general in just the fact that it passes
13 the threshold.

14 So, in other words, if I were to -- my
15 discussion is about exceeding the threshold as being the
16 feature that represents change. But if you were to
17 insist on this particular embodiment in conjunction with
18 column 8, line 61 as being the only embodiment I could
19 rely on, then it would be the same.

20 Either I would rely on the blocks where it is
21 turned on, which means that light source is present, or
22 alternatively I could rely on the fact that the feature
23 represents both being above the threshold TH1 and the
24 fact that the neighboring blocks have at least a ratio
25 of K2 over K1 being above the threshold so that the

1 light source is determined to be detected. And it would
2 just make the feature a bit more nuanced and involve the
3 neighboring values.

4 I did not describe it in my declaration
5 because it is not needed. The simple explanation of
6 just being above the threshold TH1, as described in the
7 parentheses, for example, in column 9, line 31 through
8 33, is sufficient for the purpose of my analysis. And
9 that is what I focused on.

10 Q. So let's take a -- let's back up just a little
11 bit for what your analysis is.

12 So your analysis is relying on the
13 high-luminance excluding function to teach the claim
14 element 1b, which is the region creation unit, right?

15 A. Well --

16 Q. I believe that is what it said in
17 paragraph 80 -- starting on 85 of your declaration.

18 A. The exclusion -- as I state in paragraph 85,
19 The high luminance excluding function that excludes
20 pixels having luminance exceeding the threshold TH1 from
21 being considered during a focus evaluation is part of my
22 analysis of claim limitation 1b. That is correct.

23 Q. And it appears you are relying on column 12,
24 lines 41 through, I believe, it is 58 of Tsujino for
25 your opinions here; is that correct?

1 A. I did cite to column 12, 45 through 58, for
2 that sentence.

3 Q. And, correct me if I'm wrong, I believe the
4 only support that you cite to in this section from
5 Tsuji no is column 12, lines 41 through 45 and 45 to 58.
6 Correct? And Figure 1. Sorry.

7 A. From Tsujino, I believe that is correct.

8 Q. So let's take a quick look at that, if you go
9 to Tsujino and start at column 12, line 41. And just go
10 ahead and read those two paragraphs from line 41 of
11 column 12 to line 58 and let me know when you are done.

12 A. Yeah. I'm done.

13 Q. Okay. And just to be clear, we are talking
14 about claim element 1b, which is the region creation
15 unit limitation, right?

16 A. I think we were in the middle of talking about
17 1a, but the two are closely intertwined, and so they are
18 both related. And they both refer to the same thing.
19 That feature in 1a is exceeding the threshold of TH1 and
20 the exclusion is the fact that it has been exceeded and
21 therefore discarded. But the two are very closely
22 related.

23 Q. And the high-luminance excluding function of
24 Tsuji no is the basis of your opinion for the region
25 creation unit, right?

1 A. That is right. The -- exceeding the threshold
2 is the feature that we described in 1a. And then the
3 fact that when that feature has been exceeded, you
4 exclude it, it is the basis of the extraction in the
5 region creation unit of 1b.

6 Q. And so you just read through the passage that
7 you rely on, which is column 12, lines 41 through 58.

8 Where in this passage does it describe
9 creating a region?

10 A. It talks about having an exclusion function
11 and it talks about the fact that when you exclude it, it
12 is not used for the evaluation in both this section and
13 then throughout the entire Tsujino reference.

14 Q. Okay. But claim element 1b states, A region
15 creation unit, which creates a region.

16 What region is being created in this passage
17 of Tsujino?

18 A. The region that is created is the region of
19 pixels that have not been excluded.

20 Q. So what -- okay. So let's look at -- so claim
21 element 1a says that you have -- or sorry, not 1a, 1b.
22 A region creation unit that creates a region by removing
23 pixels with the features from an evaluated value
24 extraction region.

25 So we discussed earlier that we have two

1 regions. We have the newly created region and then we
2 have the evaluated value extraction unit.

3 So, in your understanding of Tsujino, where in
4 column 12, lines 41 through 58, do we have the evaluated
5 value extraction region and then where is the created
6 region that is required by element 1b?

7 A. It says it right in the beginning. It says
8 the CPU. This is column 41 -- sorry. Column 12, line
9 41, The CPU 46 has the high-luminance excluding function
10 S37 for excluding from a target to be noticed by the
11 focused evaluation circuit 30, the partial image having
12 a luminance exceeding TH1 out of the object scene image
13 generated by the image sensor 16.

14 So, as I read this in the context of Tsujino
15 disclosure in total, it has an 8-by-8 block. And,
16 presumably, we are going to apply the exclusion
17 function, which means whether we apply the test that is
18 described later in this section in column 12 or the
19 test -- or the alternative test for turning on the
20 exclusion function described in column 8, line 61, that
21 we talked about earlier. Or whether we don't apply any
22 test at all and just always apply the exclusion
23 function.

24 We go through pixel by pixel of this 8-by-8
25 block. And then we either discard a particular pixel or

1 do not depending on whether it has been excluded,
2 whether it is above or below that threshold.

3 And so the region that is created is a region
4 of pixels in the 8-by-8 block that is below the
5 threshold and therefore has not excluded, whereas the
6 ones that have been excluded are no longer part of the
7 analysis for the evaluation.

8 Q. So, in your opinion, the region that is
9 created is the region that existed before. And then the
10 pixels within that region are excluded. And that same
11 region is then now your newly created region. Am I
12 following you correctly?

13 A. No. There is -- some pixels will survive and
14 some pixels will not survive in that 8-by-8 block
15 depending on the value. And so the ones that have been
16 excluded would not be part of it, and the ones that have
17 not been excluded will be part of it, of the evaluation.
18 And so you just get a new region where some pixels are
19 no longer part of the created region.

20 Q. Okay. So I think maybe now I'm following you
21 better.

22 So we are looking at an 8-by-8 grid, yes?

23 A. Yes.

24 Q. And then from that grid filled with pixels,
25 when the Tsujino applies the high-luminance excluding

1 function, takes this region and then pulls it --
2 excludes -- let's just say pulls out those pixels, is
3 that -- am I following you so far?

4 A. Yeah, I think so. They are excluded. They
5 are completely -- they have been disregarded.

6 Q. So in this 8-by-8 region -- let's think about
7 them as like, you know, white versus black, on versus
8 off. So we have the 8-by-8 square. We start with --
9 everything is turned on. It is all white. And then we
10 exclude certain values, so you end up having these black
11 pixel squares throughout your region. And then what you
12 are saying is that the newly created region, as you
13 interpret Tsujino, is the end result of excluding those
14 pixels.

15 So you start with -- let me just start there.

16 A. I think that is correct. When you apply
17 Tsujino by itself -- when you apply the combination of
18 Tsujino with Iwasaki, it is different. But with Tsujino
19 by itself, I agree.

20 Q. How are we looking at a different region then?
21 What region is created in that example?

22 A. It is the region where you only have the ones
23 that remain white in your hypothetical example. The
24 region -- the portions that are now being marked black
25 are not part of that region.

1 So the new region that is created is the
2 region corresponding to only the ones that remain white.

3 Q. But we are still looking at the same region,
4 right, the starting point?

5 A. That is true. In the claim language directly,
6 we spoke earlier about the meaning of the claim language
7 and we talked about the evaluated value extraction
8 region and how there is a portion that is going to be --
9 the created region. And, as I said earlier, the created
10 region is going to be a subset of the devaluated value
11 extraction region. And evaluated value extraction
12 region is a subset of the entire image.

13 So you are not going to create an image where
14 there was no image -- sorry, a pixel where there is no
15 pixel ever. You are just simply defining in the
16 creation process which pixels you are going to look at
17 and which ones are not. That is what the claim requires
18 regardless of how you implement it.

19 Q. Yes. But in Tsujino, what is -- or sorry. So
20 we have an 8-by-8 block in Tsujino, right?

21 A. Yes.

22 Q. And so then the high-luminance excluding
23 function comes in, and to your understanding it excludes
24 certain pixels throughout that same 8-by-8 region, yes?

25 A. Yes.

1 Q. And then, in result, is the same region with
2 certain pixels excluded. Correct?

3 A. So the resulting, you know, region that is
4 created is a subset of either the 8-by-8 block that has
5 survived the exclusion function and has not been
6 excluded or the entire image after applying the
7 exclusion function to the entire image and looking at
8 those pixels that have not been excluded.

9 Q. Which one of those two examples is what -- you
10 just gave two alternatives. Which of those two is what
11 Tsuji no is describing here in column 12?

12 A. Described in both because it is applying it to
13 an 8-by-8 block. And then it is applying the analysis
14 of that 8-by-8 block to the entire image, so both are
15 describing.

16 Q. And where do I see that in column 12? Point
17 me to where I would find that.

18 A. I think it assumes that a person of ordinary
19 skill is reading it and describes how you do the
20 analysis of an 8-by-8 block as described earlier. And
21 we spoke about the XY coordinates. And I think it is
22 shown in Figure --

23 Yeah, you can see in Figure 2, it shows the
24 8-by-8 block that we talked about earlier in the context
25 of what is described throughout the specification

1 including column 11 at the bottom around line --
2 beginning at line 50 -- 56. And it is not doing the
3 analysis for only one block. It then repeats it for
4 every block.

5 So I think that a person of ordinary skill,
6 when they read this paragraph in the context of the
7 entire Tsujino reference, understands exactly what I
8 just said, which is you do it for that block, you get
9 the extracted portion of the block, and then you repeat
10 it for every block.

11 Q. So Tsujino is an outright state that you are
12 creating a new region. But, in your opinion, it is
13 implied; is that right?

14 A. Well, I don't know that it uses a word
15 creating a new region per se. It says "excluding,"
16 which a person of ordinary skill would understand
17 excluding is one way in which you can create a region by
18 excluding -- by exclusion. The creation is not limited
19 to the exclusion, but it does definitely include
20 exclusion as a form of creation. And that is clear, by
21 the way, from the specification itself.

22 It talks about the exclusion in the '950
23 patent throughout. Even some of the claims, like
24 Claim 2, specifically talk about exclusion as the way in
25 which the creation is performed.

1 Q. You are talking about the exclusion of claim
2 '950?

3 A. That is right. That is just one example, but
4 there are other examples.

5 Q. But you will agree that Tsujino is not
6 explicitly describing in creating a new region as
7 described in Claim 1?

8 A. I do not recall seeing the words -- well, I
9 don't think I saw the words "creating a new region."

10 It talks about the use of an exclusion
11 function, which is the mechanism that is used for the
12 creation of a new region, which the '950 patent or the
13 '950 patent makes explicit is a method of creation.

14 It talks about exclusion in the abstract
15 throughout the specification in many of the claims as a
16 form of creation including Claim 2. And so I did not
17 see the words "create a new region" in Tsujino if you
18 are asking for those specific words.

19 Q. Now, does your opinion for element 1b, the
20 creation unit limitation, does it require a combination
21 of both Tsujino and Iwasaki or is it just Tsujino that
22 you can rely on in your opinion?

23 A. So, in my opinion, you couldn't do it based on
24 Tsujino by itself, but my analysis is based on the
25 combination with Iwasaki. And Iwasaki specifically

1 teaches to do what is essentially the same thing, but
2 instead of looking at luminance, it looks at average
3 luminance. And instead of making the exclusion decision
4 on a pixel-by-pixel basis, it makes the exclusion
5 decision for segmented regions and whether or not the
6 average luminance in that segmented region is above or
7 below a threshold.

8 And so, in my view, whether or not you meet
9 the claim limitation and the claim limitation is
10 disclosed, both if you were to apply it to individual
11 pixels or to the average luminance value of the
12 segments. Either way, the claim limitation is
13 disclosed.

14 Q. I want to break that up just a little bit. So
15 you are saying that your opinion is that -- let me start
16 over. Is it your opinion that Tsujino alone teaches the
17 region creation unit or is the combination of Tsujino
18 and Iwasaki required?

19 A. I believe Tsujino alone meets this limitation,
20 but my analysis is based on Tsujino in view of Iwasaki.
21 And, in particular, when you view Tsujino and view
22 Iwasaki, you either limit yourself to what Tsujino
23 states, which is to eliminate individual pixels, and to
24 simply look at Iwasaki as a way of reinforcing the fact
25 that the elimination can be viewed as a resulting in new

1 regions. And to the extent that you don't view what
2 Tsujino results in as being -- as a result of a new
3 region, you then look at the combination of Iwasaki
4 where you apply what Iwasaki teaches, which is looking
5 at the average luminance value rather than the luminance
6 value in discarding the entire region or not discarding
7 it, depending on whether it is above or below a
8 threshold, in which case it is clearly resulting in
9 coherent regions based on the segmentation provided by
10 Iwasaki.

11 Q. So Iwasaki is dealing with -- first of all,
12 thank you. I think I now understand your opinion. I
13 was not quite sure from the declaration, so thank you.

14 And when you're talking about Iwasaki now,
15 which I think we'll save for after our lunch break, but
16 just one quick question before we break.

17 So what I believe you were just describing is
18 that Iwasaki focuses on the average luminance of certain
19 areas and excluding -- let me start over.

20 Iwasaki is dealing with the average luminance
21 over a group of pixels and then deciding whether or not
22 to exclude that entire group or not. Am I understanding
23 your characterization of Iwasaki correctly?

24 A. That is -- I believe that is accurate. I --
25 yeah, I believe that is accurate.

1 Q. All right. We'll -- I'll save -- we'll look
2 at Iwasaki in a little more detail in a moment, and
3 we'll save that and take our lunch break.

4 MR. STANFORD: Larissa, you said your call was
5 a half hour or so?

6 MS. BIFANO: Yes. So come back at 2:00
7 Eastern, 1:00 Central. Does that work?

8 MR. STANFORD: That works for me. Do you want
9 a little time to eat some lunch too?

10 MS. BIFANO: I'll be fine. I don't know, Dan.
11 How long do you need? That is the more
12 important -- and we can go off the record too. We
13 don't need to be on the record for this.

14 (Recess 1:24 p.m. until 2:01 p.m.)

15 BY MR. STANFORD:

16 Q. Okay. Welcome back, Dr. Schonfeld.

17 A. Thank you.

18 Q. So right before the break, we were switching
19 over to starting to talk about another prior reference,
20 the Iwasaki reference. And so I dropped that in the
21 chat earlier on. That is Exhibit 1007. So if you could
22 pull that up, I have a few questions about it.

23 A. I have it up.

24 Q. Okay. So could you just give me your general
25 understanding of what Iwasaki describes?

1 A. So I have a high-level description of Iwasaki
2 in my declaration in photograph 68 and 69 and just a
3 very high level in paragraph 68 of my declaration, I
4 state that Iwasaki relates to a camera and imaging
5 methods for appropriately photographing scenes having
6 large differences in luminance.

7 Iwasaki discloses a photometry section that
8 contains photometry values at multiple positions of the
9 subject in exposure calculation section -- calculating
10 section that obtains exposure values based on photometry
11 values and the correction calculating section that
12 obtains correction values based on the highest values
13 and photometry values belonging to the predetermined
14 range.

15 And then I go on to describe what it does in a
16 little bit more detail in the next paragraph, in
17 paragraph 69. And that is, I believe, consistent with
18 both the abstract of Iwasaki, which I'm not going to
19 read it, but it talks generally about the same kind of
20 things. Photometry calculation and then the field of
21 the invention of Iwasaki in column 1 -- sorry, in
22 page 1, paragraph 2 and 3, talks about that it relates
23 to a camera for photography and subject image and a
24 method of imaging related to the camera.

25 And throughout Iwasaki, it talks about various

1 things including both the exposure correction, the focus
2 issues, identifying during face detection for
3 identification purposes and various other things.

4 Q. Thank you. And I think you mentioned this in
5 your declaration as well as there. The main focus of
6 Iwasaki has to do with this automatic image processing
7 of exposure and preventing sort of the oversaturation
8 of, you know, sort of light and dark within an image.
9 And I think it -- would you agree that that is sort of
10 on a broad level of what Iwasaki is talking about?

11 A. Yeah. It is one of the -- the exposure
12 correction based on the light -- light source
13 high-luminance values.

14 It is part of what Iwasaki is talking about.
15 It addresses various issues all related to automatic
16 capture including exposure as well as focusing and
17 position of the focusing lens, but the exposure is
18 probably the main area that I highlighted.

19 Q. And in the areas that you -- excuse me.

20 The portions you rely on for Iwasaki in
21 grounds -- I guess each of Grounds 1, 2 and 3, because
22 Iwasaki is in all three of them, much of the discussion
23 is around paragraphs 80 to 84. So I think that would be
24 a good starting point for us.

25 So if you'll just navigate there and let me

1 know when you get there.

2 A. I'm there.

3 Q. And so these paragraphs are walking through
4 certain steps of the operation of the camera that
5 Iwasaki is directed to. And, specifically, these go
6 through steps 106 to 108, I believe.

7 If you would like -- I would like to talk
8 about these for a second. If you would like, you can
9 read through these photographs first or I can just
10 start -- we can just start diving right in.

11 A. You can ask your question. It is a long
12 sequence of paragraph. If you ask me, I will probably
13 have to read it twice. So might as well ask me
14 directly.

15 Q. Fair enough.

16 So we discussed this just a little bit before
17 our break too, but I just wanted to revisit once we are
18 actually looking at Iwasaki.

19 So it -- is it your understanding that what
20 Iwasaki is -- part of what Iwasaki is doing in these
21 paragraphs is grouping areas or pixels of what it is
22 referring to, grouping them together and then
23 determining an average luminance of each of these
24 groups?

25 A. Just going directly to my declaration, in

1 paragraph 83, for example, I state that Iwasaki teaches
2 and then -- just skip a little bit.

3 Subject to segmentation processing to a group
4 pixel areas -- to group pixel areas belonging to the
5 same subject and calculate average luminance values for
6 each group area. And I cite to paragraphs 80 to 82.

7 So I think what you just said is consistent to
8 my characterization in paragraph 83, which is you
9 segment a subject or region and then you look at the
10 average luminance of that particular group or region.

11 Q. And then one -- and I guess we'll keep looking
12 at your declaration here. So calculating of the average
13 luminance values for each of the groups, and then I
14 believe -- actually, I believe Figure 6 of Iwasaki has
15 histograms of the different distributions of luminance
16 values throughout the groups. That is Figure 6 of
17 Iwasaki. And then based on the average luminance
18 values, they are compared to a threshold or
19 predetermined value. Correct?

20 A. Are you just summarizing Iwasaki broadly or
21 reading from a particular portion?

22 Q. I'm not reading from a particular portion. I
23 was just sort of summarizing the step. If you would
24 like, we can step through these paragraphs in more
25 detail, but I just wanted to on a more general level, in

1 paragraphs 80 to 84 --

2 A. I think what you said is correct, but let me
3 be precise and I'll read it before I respond.

4 Q. Please, go ahead.

5 A. And do you mind repeating the question,
6 please?

7 Q. So based on these paragraphs of Iwasaki, which
8 is what you rely on in your -- for your opinions in your
9 declaration, is it correct that Iwasaki is selecting
10 groups of pixels, calculating an average luminance of
11 each of those groups, and then based on the average
12 luminance of each group, determining whether or not to
13 exclude one or more of those groups by comparing the
14 average luminance to a predetermined luminance value
15 range?

16 A. I think there are -- you know, it was a long
17 question. And so if I had to parse every little part of
18 it, I would probably pick some issue with some of them.
19 Like, for example, you begin by selecting region.

20 It actually has -- it segments a region. So
21 it actually identifies the region by segmenting them.
22 It even has a reference that it refers to for examples
23 of how one would go about it that it includes in
24 paragraph 81. So I would not call it selecting. I
25 would call it, it generates a segmented region. But I

1 think if we were to go carefully over your entire
2 description, I probably could pick a few items where I
3 would modify the way I characterize it. But the high
4 level is consistent with my description in paragraphs 87
5 and 83.

6 Q. Well, why don't we just go through it just to
7 make sure that it is -- you know what you are agreeing
8 to?

9 A. I am agreeing to 87 -- 83 and 87. So to the
10 extent you modify them, unless it says the same thing in
11 a different way, I'm not agreeing.

12 So it is -- but I'm happy to go through your
13 characterization of it, if you prefer to do it that way.

14 Q. Well, maybe let's try it a different way
15 instead of going through all of that.

16 So does Iwasaki look at -- does Iwasaki
17 determine a luminance value of individual pixels?

18 A. It does know the luminance value of individual
19 pixels, yes.

20 Q. And does it look at a change of each
21 individual pixel?

22 A. Well, it looks at a change in the average
23 luminance of segmented regions or segmented groups and
24 then determines for each individual pixel. And then it
25 decides -- sorry, and then it decides on a change for

1 the entire group.

2 So prior to the exclusion function, it decides
3 whether the average luminance value is above a
4 threshold. And if it is, then it decides whether each
5 individual pixel within that particular group is part of
6 that group or not. And so, yes, there is a change for
7 each individual pixel. And the change is whether or not
8 it belongs to a grouped area whose average luminance
9 value is above a threshold or not.

10 Q. Okay. Let's break that down just a little
11 bit. So you are saying that Iwasaki does look at
12 changes in individual pixels -- excuse me -- luminance
13 value changes of individual pixels. Correct?

14 A. I did not phrase it like that. What I said
15 was it looks to see whether the individual pixel belongs
16 to an average -- sorry, to a grouped -- to a pixel group
17 that -- whose average luminance value is above a
18 threshold or not. And, therefore, it looks at the
19 change in a particular pixel group compared to
20 neighboring or adjacent pixel groups that may be above
21 or below the threshold. And then it looks to see
22 whether each individual pixel is part of that particular
23 pixel group whose average luminance value is above a
24 threshold or not.

25 Q. So if we look at step 106 of Iwasaki, this is

1 what we call -- I'll call it the grouping step. Looking
2 at paragraph -- starting at paragraph 80.

3 Where in either paragraphs 80 or the following
4 paragraphs through to 84 does Iwasaki describe looking
5 at changes in an individual pixels luminance value?

6 A. So if you look at paragraphs 80, it states,
7 the analyzing calculating section executes grouping,
8 processing of subjects in the photographic screen by
9 analyzing the image obtained in S103, then the analyzing
10 calculating in Section 34 calculates an average
11 luminance value for each of the grouped area.

12 Then in paragraph 84, it states, First the
13 analyzing calculating section excludes from objects of
14 calculation for the highest value a group showing an
15 average luminance value larger than a predetermined
16 value. For example, 11.3 BV.

17 And so if you put the two together, it
18 excludes -- it calculates the average luminance value --
19 sorry, it completes the group.

20 It then completes the average luminance value
21 for each group. It then look -- compares the average
22 luminance value of each group to a threshold, and then
23 it decides to exclude the ones whose average luminance
24 value is above a threshold. And so what Iwasaki is
25 teaching is to exclude each individual pixel that

1 belongs to a group who's that particular group average
2 luminance value exceeds a threshold. And that is
3 done -- that ultimately is done on every pixel in the
4 group. And, therefore, there is a change that is
5 detected. The change is whether or not a given pixel is
6 part of a grouped region that is excluded because its
7 average luminance value is above a threshold or not.

8 Q. But these steps that you described are done on
9 a group basis, not on an individual pixel basis.
10 Correct?

11 A. Not exactly. The calculation of the luminance
12 is done -- is collecting the luminance of each pixel to
13 contain the average for the entire group. And then when
14 you dismiss the entire group and exclude it, you are
15 dismissing or excluding each and every pixel in that
16 group. So it is both in the group and on the individual
17 pixels within that group.

18 Q. But the calculation of the average is done on
19 a group level because it is done by the average of the
20 entire group, right?

21 A. Well, no, because to get the average luminance
22 for the group, you have to take the luminance for each
23 pixel and add them up and divide by the number of pixels
24 in that group.

25 So the average is not done on the group level.

1 It's done on the individual luminance. The result is
2 obtained for the group, but the calculation is done on
3 the individual pixels.

4 Q. Well, the calculation is based on values from
5 individual pixels, but the calculation is done on a
6 group level. Because otherwise you would be taking an
7 average of one particular pixel, right? And that is not
8 what Iwasaki is describing.

9 A. Well, I don't know what you mean by that. If
10 you want to say that the calculation gives you a result
11 that is applicable to the entire group, I will agree.
12 But if the calculation is done on a pixel-by-pixel basis
13 and gives you a result, that is applicable to the entire
14 group.

15 Q. All right. Let's take an example. So I know
16 you were talking before about an 8-by-8 grid. If we
17 have -- one pixel on the grid position would be at, you
18 know, 1, 1; 1, comma, 1. You following me?

19 A. I am. In the case of Iwasaki, it is not
20 limited to grid. It is arbitrary statements, but I can
21 entertain that hypothetical.

22 Q. Yeah. I understand. This is just for trying
23 to illustrate the concept that Iwasaki is trying to
24 teach.

25 A. Yeah.

1 Q. So if we look at a group of pixels, whether or
2 not we call them an 8-by-8 grid or however we want to
3 describe them, the calculation of the average luminance
4 is done by looking at the luminance values of multiple
5 pixels and calculating the average of that group of
6 multiple pixels. Correct?

7 A. If by multiple pixels you mean all of the
8 pixels in that group or grid, yes, I agree.

9 Q. We are not just calculating a quote/unquote
10 average luminance of one particular pixel within the --
11 that group because that would not be an average value.
12 That would be one specific value. Correct?

13 A. That is correct. We are doing it for the
14 entire group, which means we are doing it for all of the
15 pixels in that group.

16 Q. And then when we get to excluding pixels, we
17 are also doing that on a group level by excluding all of
18 the pixels within a group where the average luminance of
19 that group has been determined to be over a certain
20 value. Correct?

21 A. Generally, I agree that we are excluding the
22 entire group or not excluding the entire group. But
23 when we are excluding a group, we are excluding all of
24 the pixels in that group. Or if we are not excluding a
25 group, we are not excluding any of the pixels in that

1 group, which means that we have to have a mechanism to
2 allow us to identify for each pixel whether it has been
3 excluded or not based on the group exclusion.

4 Q. And as part of the -- well, let me scratch
5 that.

6 So looking at paragraph 84, which is -- sorry,
7 not paragraph 84 -- yeah, paragraph 84, which is
8 discussing the -- this excluding step.

9 You rely on this paragraph for claim element
10 1b, which is the region reaction unit. Where is the
11 region -- where in paragraph 84 is the region that is
12 created and where in paragraph 84 is what the '950
13 patent calls the evaluated value extraction region?

14 A. And I -- it cut off. Did you say evaluated
15 value extraction or evaluated value extraction region?

16 Q. Region.

17 A. Region. Okay.

18 Q. I'm looking at claim element 1b, the two
19 regions that are discussed at that claim element.

20 A. Yes. So this is -- it is very much what we
21 talked about with Tsujino. What we start with is the
22 evaluated value extraction region.

23 In the case of Tsujino, it was either the
24 8-by-8 block or the entire image, either way. And the
25 recreated region is whatever you were left with after

1 exclusion. And the same thing with Iwasaki. You begin
2 with the entire image, which is the evaluated value
3 extraction region. And then in Iwasaki, you exclude the
4 grouped regions that are above the threshold. And what
5 you are left with is the created region.

6 Q. All right. I lost you there at the very end.
7 Let me check the realtime.

8 A. I can repeat the last sentence.

9 Q. It is okay. I can see it on the realtime
10 though.

11 So in Iwasaki then, if I'm understanding you
12 correctly, you're saying that the created -- the region
13 that is created is the entire region except that there
14 are pixels, groups of pixels, that have been excluded?

15 A. I mean, that is right. Every group region
16 that is above the threshold and thus has been excluded.
17 Average luminance has been -- is above the threshold and
18 therefore has been excluded and is not part of the
19 created region and you're left with everything else.

20 Q. And this is, in your opinion, a created
21 region, even though we are looking at the same region?

22 A. It is a -- I think you asked me a similar
23 question about Tsujino, and I did not quite understand
24 it there and I don't quite understand it now. The
25 exclusion is the mechanism of creating.

1 You begin -- that is what the claim requires.
2 You begin with an evaluated extraction region. And then
3 one mechanism of extraction is by exclusion as described
4 throughout the abstract specification and many of the
5 claims, including, for example, Claim 2. And what you
6 are left with is a subset of the evaluated value
7 extraction region. And that subset is the created
8 region.

9 Q. Okay. So let's look at the last reference,
10 the Shui reference.

11 And this is patent application reference
12 2007-25559, and we have been talking about it as Shui
13 today.

14 So this is -- Exhibit 1006 is the English
15 translation of that. Do you have that up in front of
16 you?

17 A. I do.

18 Q. So can you briefly describe for me what is the
19 problem that Shui is trying to address?

20 A. So it is explained, for example, or described
21 in paragraph 65 of my declaration, I state that Shui
22 relates to a focal position detection method and
23 apparatus that can accurately detect focal position even
24 when high-luminance point light source exist in the
25 image.

1 Shui discloses dividing a focus area into
2 multiple regions, obtaining focus evaluation values and
3 photometric values across the entire focal range and
4 selectively excluding regions with high-luminance points
5 from focus evaluation.

6 The system detects positions where focus
7 evaluation peaks and compares photometric values at
8 positions before and after these peaks to determine
9 whether they represent true focal positions or false
10 peaks caused by a point light source. And if you look
11 at the abstract, for example, of Shui, it talks about
12 the problem to be solved. This is on page 2 of the
13 document -- of the exhibit.

14 And this describes that to accurately detect
15 focal positions, even in cases where high-luminance
16 point light sources exist such as during nighttime
17 photography, and the solution means it describes
18 something that is similar to what I described earlier.
19 I won't repeat it.

20 So basically Shui, like Iwasaki and Tsujino,
21 all address the problem of high-luminance point light
22 sources and how it affects imaging, whether it is focus
23 exposure, the way the imaging is performed, and so on.

24 Q. So if we look at the abstract, and that is a
25 good starting point here, I just want to break it down

1 slower.

2 So Shui is looking at -- looking for or trying
3 to detect the position of a peak -- a focal evaluation
4 peak; is that right?

5 A. In the abstract, you are talking about --

6 Q. In the abstract and sort of throughout, but
7 the abstract is a good place for us to look to see the
8 words on the page. So is it correct that Shui is
9 looking for the position of this peak?

10 A. Well, it is a bit more involved. It is part
11 of it, but it is looking to come up with an evaluation
12 value and both focus on the evaluation value and the
13 photometric evaluation values and use them for
14 calculations of both exposure and focus. And the way it
15 goes about it is it looks for peaks in the range and
16 then it uses the differences in peak especially in
17 regions, in areas, and then it decides whether or not to
18 exclude these areas based on those maximum to minimum
19 differences.

20 Q. So it is looking at -- it is seeing -- correct
21 me if I'm wrong, it is seeing multiple peaks and then
22 evaluating them sort of over this area; is that right?

23 A. That is a loose characterization of part of
24 what it does, but I would say, yeah, I agree with it.

25 Q. I'm not a PhD, so I'm doing my best here.

1 A. No, it is not a PhD, but I think your
2 description is fine. It is first dividing the image
3 into a grid pattern, into regions. And then for each
4 one of them, it first decides the peak for each pixel.
5 It adjusts it, then it looks for the differences of
6 those peaks across those regions and whether or not they
7 are too far apart or not and the maximum and minimum.
8 And then it decides whether to exclude those regions or
9 not, but it is a sequence of steps.

10 It is not like in the case that we looked at
11 in Tsujino and Iwasaki. It was kind of a one-step
12 exclusion. Here it is a couple of steps, both looking
13 at the individual pixel range and then looking at the
14 estimated peak for the individual peaks of range and
15 then using it to compare to the other values in that
16 particular region and using that to exclude particular
17 regions of that particular image.

18 Q. So say -- so it is picking, let's say, a
19 particular focal position and then looking at the
20 photometric values, like before and after that position,
21 like immediately before and after?

22 A. Partly. Let me -- let me be more precise and
23 go to my declaration and state it more accurately, but
24 what you described is correct for the first half.

25 One second. Would you mind -- oh, let me just

1 state what I state in my declaration, and I think that
2 addresses your question.

3 For example, in paragraph 139, I describe what
4 Shui does with the peak of a photometric value in a
5 given pixel. And then later on in paragraph 143, I
6 describe the second part of it which ultimately leads to
7 the exclusion of a given area or to its incorporation
8 into the created region.

9 And if you want, I'll be happy to go over the
10 details of each of those descriptions.

11 Q. Let's look at 139. That might be a good place
12 to start. So paragraph 13 says, Shui is analyzing
13 positions before and after a peak, X1 and X2, and
14 looking at the differential between their photometric
15 values, right?

16 I'm reading just like the words off the page.

17 A. Yeah. That is for the first half of the page.

18 Q. Yeah. We'll walk it -- yeah.

19 So when you -- when you say here, in paragraph
20 139 that you look at positions before and after a peak,
21 put this in terms of pixels for me. Where are you
22 looking at in terms of pixels?

23 A. So in the first half of the process of Shui,
24 it is looking at the individual pixel. And in the
25 second half, it is looking at neighboring pixels within

1 the region. One corresponding to the maximum peak and
2 one for the minimum peak. But in the first part of it,
3 it is not looking at different pixels. It is looking at
4 a single pixel and looking at a range of focal depth or
5 a focal range, and then it is looking at neighboring
6 potential focal depth and the value -- the photometric
7 value associated with each. And so it is looking at one
8 pixel and the focal range resolution at that pixel.

9 Q. And then evaluating different values within
10 that range?

11 A. Well, there is a two-step process. One is to
12 determine the true peak for each pixel and one is to
13 determine the maximum peak and minimum peak for each
14 region and the difference between them.

15 So for the first part, just to determine --
16 you first determine the actual maximum value over the
17 focal range for a given pixel, and then you look at
18 whether or not that peak should be relied on. And the
19 way you do it is by looking at the value before and
20 after, and then you look to make sure that it calculates
21 the differential between the photometric values. And
22 then if it is -- then if it is acceptable, if the
23 difference is not above a particular threshold, it
24 accepts that peak. If not, it actually looks to the
25 minimum and replaces that peak altogether.

1 Q. Actually that -- let's take a look at one of
2 the figures of Shui, which I believe is Figure -- let's
3 look at Figure 7. I think that is one of the ones you
4 cite in your declaration too.

5 Looking at Figure 7, is this representing
6 along the lines of what you're just describing?

7 A. Yeah. It is described, for example, in
8 page 23 of the document of the Exhibit 1006.

9 Figure 7 is described as the figure showing
10 the change of the focus evaluation value and the
11 photometric value -- sorry, focus evaluation value (a)
12 and photometric value (b) from the minimum distance to
13 infinity in the case where the high-luminance point
14 light source exists in the focus area.

15 And so it shows -- you can see (a) and (b) for
16 the focus evaluation value and photometric value
17 respectively, and then it is looking at neighboring
18 values of the peak. And, in this case, it says that
19 there is a light source in this particular example.

20 Q. So the goal here is to find -- what is the
21 maximum value or the true peak -- maybe not necessarily,
22 but the true peak of a particular pixel in this first
23 part?

24 A. In the first part, that is correct. A true
25 peak of a particular pixel, ignoring any potential peaks

1 that could be a result of a light source.

2 Q. For that one particular pixel?

3 A. For that one particular pixel. And that is --
4 as I said, the two steps are strongly coupled because
5 once you have made that decision and then now you have
6 determined the true peak, which is either the true peak
7 or the minimum, then you go through the next step, which
8 is to compare the maximum and minimum in a given region
9 for the exclusion purpose. But in the first part, you
10 are correct.

11 Q. That is a good transition. So for the second
12 part, we are looking at areas, regions, and excluding
13 certain regions, not certain pixels. Correct?

14 Sorry. We are excluding regions, not a
15 particular pixel?

16 A. It is exactly like the discussion we just had
17 about Iwasaki for the segmented regions. Here, these
18 are not segmented regions. They are areas that have
19 been divided such as by a grid pattern unlike Iwasaki.
20 But in terms of the impact of the individual pixel, it
21 is exactly like the discussion we just had for Iwasaki,
22 which is once you made the determination to exclude,
23 which is done differently from Iwasaki, then you have to
24 exclude each and every one of the pixels in that region
25 and you have to have some mechanism to inform the system

1 to exclude each and every one of those pixels.

2 Q. Within a group? So, again, it is on a group
3 level, right?

4 A. I don't think that Shui calls it a group. I
5 think it is called an area.

6 Q. Area. Let me rephrase. On an area level?

7 A. That is correct. It does not do a
8 segmentation like Iwasaki does, but it does define areas
9 and it excludes those areas or keeps those areas and
10 therefore excludes or keeps all of the pixels in that
11 area.

12 MR. STANFORD: Give me one second. That is
13 all my questions. Thank you for your time. I'll
14 pass the witness.

15 MS. BIFANO: Okay. Can we go off the record
16 for like 10 minutes and then come back on?

17 MR. STANFORD: Yeah.

18 MS. BIFANO: Okay. Great.

19 (Off the record.)

20 CROSS-EXAMINATION

21 BY MS. BIFANO:

22 Q. All right. So we just have a couple of
23 questions.

24 So, Dr. Schonfeld, do you remember we were
25 just talking about the Shui reference. Do you remember

1 that discussion?

2 A. Yes.

3 Q. Can you explain how Shui teaches the claim
4 limitation of detecting where features of each pixel of
5 an input signal have changed?

6 A. Sure. So as we spoke about it earlier, there
7 are two parts of Shui. One, where it does it for a
8 given pixel, it looks at the neighboring peak values and
9 their differential to determine the actual peak. And
10 then the second part is where it looks at the maximum
11 and minimum peak for a given area to decide whether or
12 not a change has occurred for that region. And, in
13 particular, for Shui, this limitation is done in two
14 ways. The second part does it directly.

15 Just like Iwasaki makes a decision on a group
16 area, here the decision is made for the entire area.
17 And, therefore, it influences and impacts each
18 individual pixel and whether a change of that particular
19 region has occurred -- in that particular area has
20 occurred or not.

21 In the first part, it is done for an
22 individual pixel only. And, therefore, it is not a
23 change of pixels compared to other pixels. And to the
24 extent that the claim limitation requires a change
25 compared to other -- compared to other pixels, but not

1 only a change in the pixel, and that would come only in
2 the form of the means-plus-function requirement; in that
3 case, the first part of Shui teaches to do the
4 differential for the given peak from the different range
5 values. And a person of ordinary skill would apply the
6 same thing to Iwasaki or to Tsujino to actually modify
7 it, but spatially to do whatever Shui is doing in terms
8 of peak range, to do it spatially instead.

9 MS. BIFANO: Thank you. I have no further
10 questions.

11 MR. STANFORD: Nothing from me.

12 MS. BIFANO: Okay. We can go off the record.
13 (Proceedings concluded at 3:04 p.m.)

14
15
16
17
18
19
20
21
22
23
24
25

REPORTER'S CERTIFICATE

STATE OF FLORIDA

COUNTY OF ORANGE

I, MICHELLE PULIDO STUBBEN, RPR, FPR-C Court Reporter and Notary Public, certify that I was authorized to and did stenographically report the foregoing deposition of DAN SCHONFELD, Ph.D.; that a review of the transcript was requested; and that the transcript, Pages 4 through 118, is a true record of my stenographic notes.

I FURTHER CERTIFY that I am not a relative, employee, attorney, or counsel of any of the parties' attorneys or counsel connected with the action, nor am I financially interested in the action.

The certification does not apply to any reproduction of the same by any means unless under the direct control and/or direction of the reporter.

DATED May 6, 2026.



MICHELLE PULIDO STUBBEN, RPR, FPR-C

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

CERTIFICATE OF OATH

STATE OF FLORIDA
COUNTY OF ORANGE

I, MICHELLE PULIDO STUBBEN, RPR, FPR-C,
Court Reporter and Notary Public, State of Florida,
certify that DAN SCHONFELD, Ph.D. personally appeared
before me by videoconference and was duly sworn on
April 30, 2026.

WITNESS my hand and official seal this
30th day of April, 2026.

Personally Known:
Or Produced Identification: Yes
Type of Identification Produced: Driver's License


MICHELLE PULIDO STUBBEN, RPR, FPR-C
NOTARY PUBLIC AND COURT REPORTER
MY COMMISSION #HH 739266
EXPIRES: MARCH 8, 2030
Bonded Through Notary Association

1 E R R A T A S H E E T

2 IN RE: SAMSUNG ELECTRONICS CO., LTD. vs. MAXELL, LTD.
DEPOSITION OF: DAN SCHONFELD, Ph.D.

3 TAKEN: April 30, 2026
4 JOB NO. 7122435

5 DO NOT WRITE ON THE TRANSCRIPT - ENTER CHANGES HERE

6 Please sign, date, and return this sheet to our office.
7 If additional lines are required for corrections, attach
8 additional sheets.

9 At the time of the reading and signing of the
10 deposition, the following changes were noted:

11	PAGE	LINE	CHANGE	REASON
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				

22 Under penalty of perjury, I declare that I have read my
23 deposition and that it is true and correct subject to
any changes in form or substance entered here.

24 SIGNATURE OF DEPONENT: _____

25 DATE: _____

1 WITNESS NOTIFICATION LETTER

2 May 6, 2026
3 DAN SCHONFELD, Ph.D.
4 C/O: Mayer Brown, LLP
1999 K Street NW
Washington, D.C. 20006

5
6 In Re: SAMSUNG ELECTRONICS CO., LTD. vs. MAXELL, LTD.
Deposition, taken April 30, 2026
7 Job No. 7122435

8 The transcript of the above-referenced proceeding has
9 been prepared and is being provided to your office for
10 review by the witness.

11 We respectfully request that the witness complete their
12 review within 30 days and return the errata sheet to our
13 office address or via email:

14 Sincerely,

15 
16 MICHELLE PULIDO STUBBEN, RPR, FPR-C

17
18
19
20
21
22
23
24
25

Exhibits	100 20:9 22:14	12:40 72:12	20 15:2 59:10, 15
EX 0001 Dan S chonfeld, Ph. D. 043026 3:21 38:18, 19	1001 25:1	13 59:10, 15 112:12	200 67:11
(	1003 11:18 21:12 58:22	139 112:3, 11, 20	2001 18:8, 11, 14 19:3, 7, 11
(a) 114:11, 15 (b) 114:12, 15	1004 12:14	14 22:17	2002 18:15
0	1005 58:14	143 112:5	2007-25559 108:12
0 62:13	1006 58:10 108:14 114:8	15 56:24 72:6	2024 14:23 16:17
1	1007 94:21	16 85:13	2025 12:22
1 28:23 29:1, 11 32:18 38:18, 19 39:2, 16 40:23, 24 41:2, 5, 17 42:7 44:2, 4 49:4 50:20 51:13 52:23 53:7 54:11, 20 55:12, 13, 15, 16, 21 56:4, 7, 23 57:8 60:9, 13 71:18 83:6 91:7 95:21, 22 96:21 104:18	106 97:6 101:25	1990 17:18	22 62:2, 5
1 72:11 116:16	108 97:6	1997 17:19	220 67:14
10-minute 72:8	11 18:6 60:20 61:3, 8, 10, 14 62:2, 6, 12 63:17 64:9 66:9, 11 67:25 70:9, 15 90:1	1:00 94:7	23 114:8
	11.3 102:16	1:24 94:14	24 62:11
	112 44:14 45:13	1a 60:15 61:10, 17, 22 80:21 83:17, 19 84:2, 21	240 67:13
	11:04 38:6	1b 82:14, 22 83:14 84:5, 14, 21 85:6 91:19 106:10, 18	28 63:2
	11:16 38:6	2	2:00 94:6
	12 13:14 18:23 19:13 26:17 59:16 60:21 62:7, 9 82:23 83:1, 5, 9, 11 84:7 85:4, 8, 18 89:11, 16	2 27:1, 2 55:5, 12, 14, 24 56:3, 8, 21 57:5, 8, 9, 20, 24 71:18 89:23 90:24 91:16 95:22 96:21 108:5 109:12	2:01 94:14
	12:29 72:12	3	3 54:10, 14 56:21, 23 57:1, 10, 12, 24 95:22 96:21
		3	30 25:14 26:6, 8 85:11
		31	31 26:19 63:17 74:14, 21

75:8 77:7, 11 79:5 80:13 82:7 33 79:8 82:8 34 28:23 29:2 79:8 102:10 35 22:22 23:7 36 63:25 38 44:20 39 44:8, 12	50 90:2 51 30:18, 21 52 30:18, 21 53 42:25 55 43:7 56 90:2 58 82:24 83:1, 5, 11 84:7 85:4 59 63:2	8 8 28:22, 23 49:5 72:20 73:21 75:14 77:5, 15, 16 78:11 81:18 85:20 8, 237, 850 58:17 8, 471, 950 25:6 8-by-8 85:15, 24 86:4, 14, 22 87:6, 8 88:20, 24 89:4, 13, 14, 20, 24 104:16 105:2 106:24 80 7:7, 8, 11 60:17 64:15 65:2 82:17 96:23 98:6 99:1 102:2, 3, 6 81 64:16 65:5 69:8 99:24 82 64:16 65:5 68:22, 23 98:6 83 98:1, 8 100:5, 9 84 96:23 99:1 102:4, 12 106:6, 7, 11, 12 85 82:17, 18	87 100:4, 9 88 70:12, 16 9 9 13:3 72:23 74:13, 14, 21 75:8 77:5, 6, 7, 11 79:5 80:13 82:7 90 7:8 950 22:12 24:18, 24 25:6, 12, 16 26:19 27:17, 21, 23 28:4, 5 39:2 45:23 90:22 91:2, 12, 13 106:12 A a.m. 38:6 ability 78:19 80:4, 25 81:7 able 21:22 79:21 above 66:4, 16, 25 67:13, 17 68:4, 7, 12 71:7, 21 73:7, 8 74:23, 24 75:13, 16 81:23, 25 82:6 86:2 92:6 93:7 101:3, 9, 17, 20, 23 102:24
4 4 26:18 40 44:8, 12 63:25 41 47:21 48:21 82:24 83:5, 9, 10 84:7 85:4, 8, 9 42 47:21 48:21 45 83:1, 5 46 85:9 48 27:1 49 27:2 49:5	6 6 63:1 98:14, 16 61 72:21 77:6, 17 78:11 81:18 85:20 62 58:21 64 70:9 65 108:21 68 95:2, 3 69 95:2, 17		
5 5 12:10 77:13 79:11	7 7 77:6 114:3, 5, 9 77 60:7		

103:7 107:4, 16,17 113:23 absence 25:20 absent 77:1 abstract 43:19 59:3 60:2 91:14 95:18 108:4 109:11,24 110:5,6,7 abstraction 26:1 academia 14:14 acceptable 31:25 113:22 accepts 113:24 accordance 40:6 42:24 43:8 48:6,14 account 72:1 accurate 12:6,17 93:24,25 accurately 8:12 108:23 109:14 111:23 achieve 56:17 achieving 65:11 acquisition 17:23 Acrobats 6:13 across 109:3 111:6 acting 21:6 32:5 actual 113:16	add 11:7 55:17 103:23 addition 15:23 additional 57:19 address 27:24 108:19 109:21 addressed 25:14 64:15, 20 addresses 25:16 96:15 112:2 adds 55:14 adjacent 101:20 adjunct 14:10 adjust 59:6 adjusts 58:23 111:5 Adobe 6:20 adopted 30:25 31:1 32:3,9 advanced 40:12 advantage 71:1 adverse 10:20 affected 66:3 affects 109:22 ago 7:8 10:21 42:11 76:17 agree 23:5,7 31:20,23,24	32:7,10 40:14 41:14 52:17 74:11 80:12 87:19 91:5 96:9 104:11 105:8,21 110:24 agreed 29:23 30:3, 5,6,9,24 31:4,9,19 32:2,9,11 39:7,8 42:9 49:2 agreed-upon 31:14,21 38:16 42:15 agreeing 100:7,9,11 agreement 29:25 agrees 46:5 ahead 24:24 58:3 83:10 99:4 allege 60:21 allow 69:17 76:8 106:2 allows 14:15 79:15 alongside 12:15 alternative 48:18 56:2, 7,10,16 57:10,11 85:19 alternatively 46:14 81:22 alternatives 89:10 altogether 113:25	analysis 30:11 31:2, 13 44:15,16 46:22 48:19 58:2,4 61:12,14,18, 21 64:24 65:22 68:5 69:14 78:14 79:2 80:21 82:8,11,12, 22 86:7 89:13,20 90:3 91:24 92:20 analyze 44:21 analyzed 25:21 45:18 46:3,7 analyzes 26:9 analyzing 102:7,9,13 112:12 answer 7:2 16:2 23:6 57:7 63:22 antitrust 7:16 anymore 14:12 16:2 anyone 4:18 9:11, 15,17 apart 111:7 aperture 52:6 apologize 25:8 apparatus 26:4 108:23 appears 11:25 12:11, 16 82:23
---	---	---	--

applicable 76:20 77:17 79:2 104:11, 13 application 108:11 applications 6:2 15:21,22 17:3 applied 48:4 75:11, 14 78:1,3 applies 44:5 47:16 49:23 68:2 69:14 80:17 86:25 apply 31:13 41:12 45:9 47:4, 17,24,25 48:23 51:8, 15 57:9 78:6 79:23,25 85:16,17,21, 22 87:16,17 92:10 93:4 applying 33:17 48:23 57:14 78:7 89:6,12,13 appointment 14:14,21 appointments 14:10 appropriately 95:5 approximately 23:1 arbitrary 104:20 area 62:17 63:3 68:7,14,16 96:18 98:6 101:8 102:11 109:1 110:22	112:7 114:14 116:5,6,11 areas 7:12,13,14 26:21 65:6 93:19 96:19 97:21 98:4 110:17,18 115:12,18 116:8,9 around 90:1 96:23 arrange 59:16 arranged 62:16 art 9:8 22:20 23:10,14 32:6 46:25 54:10 57:11 articulated 23:11 artificially 69:24 asked 107:22 asking 91:18 aspect 78:16 aspects 64:10 assessment 35:5 associated 27:11 28:8 34:4 35:10, 25 36:11 113:7 assume 8:8,9,18 10:5 12:8 assumes 89:18 assuming 36:7	attempts 27:24 audio 17:2,4,6,11, 24 August 12:22 author 16:3 automatic 26:4,23 43:20 96:6, 15 available 6:12 11:10 80:3 average 33:24 34:15, 16,23 35:1, 4,7 36:13, 18,19 37:5, 9,16,17 92:2,6,11 93:5,18,20 97:23 98:5, 10,12,17 99:10,11,14 100:22 101:3,8,16, 17,23 102:10,15, 18,20,21,23 103:1,7,13, 18,19,21,25 104:7 105:3, 5,10,11,18 107:17 avoid 65:8 79:12 avoiding 59:17 aware 8:13 9:19 10:12,16,17 30:24	B bachelor's 22:23 23:22 back 21:11 32:18 38:8 49:3 72:14 82:10 94:6,16 116:16 background 23:17 backup 56:4 balance 52:4 53:12 based 15:20 23:12 31:17 33:24 35:12 37:4 43:11 54:20 61:18,21,23 64:24 70:20 73:6,13,17 74:8 75:9,15 76:16,22 91:23,24 92:20 93:9 95:10,12 96:12 98:17 99:7,11 104:4 106:3 110:18 baseline 65:10 67:7 68:22,25 69:3 71:3,25 basically 15:9 72:16 109:20 basics 7:22 basis 23:9 28:20 37:2,18,19 66:12 69:9
--	---	--	---

73:15 83:24 84:4 92:4 103:9 104:12 began 21:17 begin 27:18 53:22 57:4 99:19 107:1 108:1, 2 beginning 22:8 59:11 60:8 75:8 77:3 85:7 90:2 begins 49:6 79:6 behalf 10:7 19:15 20:2 believe 7:2 12:22 24:13 28:23 29:25 30:17 31:10 32:1 34:24 38:11, 24 39:8 44:7 45:2, 9, 14 46:12 49:5 53:12 59:9, 20 60:8 64:8 66:12 69:21 74:14 82:16, 24 83:3, 7 92:19 93:17, 24, 25 95:17 97:6 98:14 114:2 belonging 63:3 95:13 98:4 belongs 33:25 34:17 35:6 36:9 37:13 101:8, 15 103:1 below 29:3, 6, 13	66:1, 5, 20 67:1, 15 68:10, 13 69:1 71:4 75:13 86:2, 4 92:7 93:7 101:21 benefit 59:10 besides 5:14 6:2 9:11, 14 18:16 21:5 best 7:24 8:2 12:18 20:25 32:4 110:25 better 54:23 86:21 BIFANO 8:18 20:11 28:11 33:14 41:22 53:9 72:10 94:6, 10 116:15, 18, 21 big 20:20 biometrical 14:4 bit 17:8 25:5 26:7 39:9 42:5 60:1 82:2, 11 92:14 95:16 97:16 98:2 101:11 110:10 black 63:9, 14 87:7, 10, 24 block 76:6, 24, 25 78:2, 6 85:15, 25 86:4, 14 88:20 89:4,	13, 14, 20, 24 90:3, 4, 8, 9, 10 106:24 blocks 75:14 78:23, 25 81:20, 24 blurred 59:18 79:13 board 31:1, 24 46:5, 10 48:17 55:25 76:9, 11, 12 bottom 12:11 18:23 70:16 73:21 77:4 90:1 break 38:4 72:8 92:14 93:15, 16 94:3, 18 97:17 101:10 109:25 breakdown 60:12 bridges 77:4 briefly 12:4 108:18 bright 25:22 26:10, 15 27:12 broad 32:25 96:10 broadly 17:1, 9 74:17 98:20 butchering 54:21 BV 102:16 C calculate 98:5	calculates 102:10, 18 113:20 calculating 95:9, 11 98:12 99:10 102:7, 10, 13 105:5, 9 calculation 35:12 95:9, 20 102:14 103:11, 18 104:2, 4, 5, 10, 12 105:3 calculations 110:14 call 16:19 24:13 27:9 55:6 60:15 94:4 99:24, 25 102:1 105:2 called 4:4 39:22 116:5 calling 80:13 calls 106:13 116:4 camera 26:5 43:21 58:23 59:5 95:4, 23, 24 97:4 capture 17:23 27:10 96:16 capturing 74:25 77:12 79:10 carefully 12:7 14:7 100:1 case 6:7, 11 10:19, 24 11:2 16:14
--	--	--	---

27:3 30:7,10 31:10,20 32:12 34:18 38:15 39:7 42:10,15 43:7,19 57:12 68:1 74:9 75:18 76:10 80:16 93:8 104:19 106:23 111:10 114:13,18 cases 7:7,8,11,12, 18 10:5,6 19:9,11 20:1,5,23 21:1,4 51:4 53:19 65:2 109:15 caused 59:17 109:10 caution 8:20 caveat 20:20 censor 85:13 Central 94:7 certain 20:21 21:23 22:15 35:25 54:6 57:18, 22 65:3 68:19 87:10 88:24 89:2 93:18 97:4 105:19 115:13 Certainly 79:19 challenged 55:23 change 12:20 25:19 26:20 34:8	36:11,18,21 37:10,11 64:13 65:4, 9,14,22,23 66:1,7,17, 22,23 67:14, 20 68:11,13 69:20 70:1, 6,21 71:8 81:16 100:20,22,25 101:6,7,19 103:4,5 114:10 changed 12:23 16:16 29:16 32:22 33:13,21 34:5,17 35:7,10 36:24 37:14, 23 60:23 66:8 67:18 69:6 changes 23:16 67:16 101:12,13 102:5 changing 54:2 characteristi cs 33:1,4 characterizat ion 27:16 34:20, 21 35:20 60:24 93:23 98:8 100:13 110:23 characterize 27:22 55:18 56:6 61:2 70:19 100:3 chat 6:17 11:6 24:25 58:8 94:21	check 12:7 51:1 107:7 Chicago 13:20,23 14:8 18:24 choose 14:16 15:10 80:9 chooses 68:8 chosen 71:2,21 Chrome 6:6 circuit 63:2 85:11 circumstance 80:14 cite 83:1,4 98:6 114:4 cites 61:6 claim 4:25 5:1,3 9:7 28:23 29:1,4,11,18 32:18,20 34:19 35:22 36:4 38:8,13 39:2,3,16 40:23,24 41:2,5,17,20 42:7,22 43:17 44:2,4 45:4,6 46:19 47:15 48:5, 8,11 49:4, 15,21 50:2, 20 51:13 52:23 53:7 60:9,13 61:9,17,22 80:21 82:13, 22 83:14 84:14,20 88:5,6,17	90:24 91:1, 7,16 92:9,12 106:9,18,19 108:1,5 claims 28:18,21 44:21 46:3,7 55:22,23 56:23 90:23 91:15 108:5 clarify 8:5,6 clause 49:4,6 50:11,15,20 clean 5:12,13 8:1 clear 30:4 39:1 61:15 69:12 83:13 90:20 clearly 77:16 93:8 closely 83:17,21 closing 6:19 co-supervise 14:16 codirector 16:13,18,21 17:19 coefficient 63:20,23 64:5,7 coefficients 62:12 coherent 93:9 collecting 103:12 column 27:1 28:22, 23 49:5 59:10,15 60:20 61:3, 8,10,14
--	---	---	---

62:2,12 63:1,17 64:9 66:9,11 67:25 70:9 72:20,23 73:21 74:13, 14,21 75:8 77:5,6,7,11, 15,16 78:11 79:5 80:13 81:18 82:7, 23 83:1,5,9, 11 84:7 85:4,8,18,20 89:11,16 90:1 95:21 combination 54:20 55:4, 5,15,25 56:13,16 57:4,23 61:13,18,21, 23 64:25 71:17 76:19 87:17 91:20, 25 92:17 93:3 combinations 57:15 combine 56:10 come 94:6 110:11 116:16 comes 88:23 comma 104:18 comments 74:9 committee 15:11 common 15:19 63:5 communication s 8:23 16:8, 11,13,25	17:4 companies 19:14 company 10:22 comparable 22:25 23:24, 25 24:6,8 compare 111:15 115:8 compared 35:7 36:22 37:16,23 65:9 67:20 69:6 70:24 98:18 101:19 compares 68:23 102:21 109:7 comparing 37:3 65:17, 18 67:2,3,5 68:17,18 74:3 99:13 comparison 37:4 67:23 71:14,20 complete 12:5 completely 62:22 87:5 completes 102:19,20 component 63:8 compression 17:23 comprising 29:3,5,12 computer 5:14 6:3 14:3,9 22:24,25 24:3,5,7,22 concept 104:23	concerned 26:3 concise 59:9 concludes 40:1 confined 78:5 confirm 25:19 38:11, 22 conflated 50:10,14 conflating 54:5 confusion 6:23 conjunction 81:17 connect 6:7 50:16 connection 6:10 52:13 consider 57:24 consideration s 23:18 considered 82:21 considering 23:13 considers 68:25 consistent 34:20 35:21 59:2,20 76:20 80:1 95:17 98:7 100:4 construction 4:25 5:1,3 9:7 30:3,5, 6,9,24 31:4, 8,14 38:14 42:9 44:9 45:4,6,20	46:19 constructions 5:9 31:9,19, 21 32:2,8, 11,15 construe 30:23 consultant 18:7 19:4,7, 10,15,17 consulting 13:11,21 18:6,17 contains 95:8 contamination 67:9 context 18:2 36:6 48:5 85:14 89:24 90:6 continuing 63:17 continuously 21:18,20 contract 7:16 control 26:4,23,24 43:20 45:9 47:20,22 48:2,5,11,20 49:8,20,22 50:3,17,21, 22 51:14 52:2 53:1,4, 11,16 79:12 controlled 53:15 controlling 25:23 49:23 50:22 51:2,4 controls 48:6,14 49:9 50:3,4,21 52:2,3,5 53:2,5
--	--	--	--

convention 63:5	103:10 105:6, 12, 13, 20 110:8, 20	39:7 42:10, 15 45:4 46:20	critical 78:14
conventional 25:18	111:24 114:24	courtesy 14:10, 14	CROSS- EXAMINATION 116:20
coordinate 62:17 70:10, 12	115:10, 13 116:7	covered 17:5	crude 21:17, 20 22:9
coordinates 89:21	correction 95:11, 12 96:1, 12	CPU 85:8, 9	current 12:17 13:17 62:16, 19 63:21 67:23 70:7 71:10
copies 5:12, 13	correctly 13:24 14:5 39:24 44:11 50:10 51:17, 24 52:12	create 41:15 88:13 90:17 91:17	cut 23:6 106:14
copy 11:23 12:6, 14	59:16 60:20 62:21 65:14 86:12 93:23 107:12	created 41:7, 18 43:9, 10 84:16, 18 85:1, 5 86:3, 9, 11, 19 87:12, 21 88:1, 9 89:4 106:12 107:5, 12, 13, 19, 20 108:7 112:8	CV 12:15, 17, 19 13:2, 24 16:12 17:17 18:5 19:5 21:11
copyright 7:15	corresponding 32:12 35:6 65:7 88:2 113:1	creates 39:16 40:25 41:25 84:15, 22	D
corner 70:16, 17	counsel 5:13 8:16, 17 9:11, 14 21:15	creating 39:20 41:10 43:1 84:9 90:12, 15 91:6, 9 107:25	D-A-N 4:13
Corporation 13:21 18:24	count 20:21	creation 39:4, 15, 20 40:22, 24 41:9, 10, 25 43:3, 11 82:14 83:14, 25 84:5, 15, 22 88:16 90:18, 20, 25 91:12, 13, 16, 20 92:17	Dan 4:3, 13 20:12 94:10
correct 12:12 18:9 19:16, 21, 22 24:14, 15, 19 28:9 30:8, 19 33:13, 22 34:21 37:21 39:8, 23 43:6 44:14 45:5, 25 47:5, 6, 8, 10, 22 48:1, 12, 24 49:25 52:19, 24 53:8 54:18 55:6, 7, 10, 11 57:2 59:22 60:10, 11, 13, 14 61:17, 24, 25 62:23 65:21 70:24, 25 73:19, 20, 25 74:1, 5, 6 76:17 80:16 82:22, 25 83:3, 6, 7 87:16 89:2 98:19 99:2, 9 101:13	counted 7:7	criteria 74:10 75:15	dark 27:4 96:8
	couple 12:24 13:3 64:21 111:12 116:22		data 43:12 62:19, 24 63:3, 4, 18, 21 64:4, 6 65:19 73:22, 24
	coupled 115:4		date 9:21, 23
	course 8:9 14:22		deal 5:18
	courses 14:18, 20, 25 15:3		dealing 93:11, 20
	court 7:25 30:7, 10, 25 31:10, 20, 24 32:1, 12 38:15		decide 31:25 34:16 76:10 80:17

decides 69:15 100:25 101:2, 4 102:23 110:17 111:4, 8 deciding 35:9 93:21 decision 35:8, 13 37:2, 10, 12, 17, 19, 25 39:10 69:23 70:20 92:3, 5 115:5 decisions 28:19 declaration 4:24 5:10 9:7 11:23 12:6, 15 18:14 21:12, 14, 23 22:2, 5, 17 23:8, 12 25:15 26:17 30:17, 18, 20 31:8, 18 39:13 42:25 44:7, 16, 21, 22 46:22 47:20 48:21 54:11, 16 58:22 60:6 64:16 82:4, 17 93:13 95:2, 3 96:5 97:25 98:12 99:9 108:21 111:23 112:1 114:4 deep 15:19, 20 default 6:7 define 116:8 defined 40:11 48:21	defining 88:15 definitely 24:8 30:14 90:19 definition 22:23 23:9, 21 27:25 28:3 30:16 43:14 56:9 definitions 38:16 defocusing 59:17 degree 20:6 22:24 23:22 24:2, 4, 5, 11, 21 department 14:9 departments 14:2, 11 depending 75:12 80:9 86:1, 15 93:7 depends 22:6, 8 34:2 deposed 7:3, 7 deposition 5:18 8:15 9:15 13:12 38:17 depositions 7:9, 10, 23 depth 113:4, 6 describe 29:21 59:23 61:5, 11 63:13 69:22 75:7 82:4 84:8 95:15 102:4 105:3 108:18 112:3, 6	described 65:5 74:24 75:11, 16 76:8 77:15, 16 78:11 82:6 84:2 85:18, 20 89:12, 20, 25 91:7 103:8 108:3, 20 109:18 111:24 114:7, 9 describes 26:2 43:19 58:21 59:3 70:18 73:12 89:19 94:25 109:14, 17 describing 25:13 58:20 59:21 64:13 73:5 76:21 89:11, 15 91:6 93:17 104:8 114:6 description 26:1, 6 31:17 40:16 60:2 77:4, 22 95:1 100:2, 4 111:2 descriptions 112:10 designed 71:1 detail 94:2 95:16 98:25 detailed 26:7 details 112:10 detect 33:20 34:9 108:23 109:14 110:3	detected 41:19 43:2 71:5 82:1 103:5 detecting 26:14, 20 33:11 60:22 detection 25:18 27:14 29:14, 23 31:12 32:19 33:10, 19 34:9 36:6, 8, 15 60:16, 22 64:9, 10 68:25 69:5 78:2 96:2 108:22 detects 25:22 26:9 29:14 32:20 109:6 determination 70:14 75:15, 20 78:10 79:1 115:22 determine 36:20, 21, 23 65:11 72:22 74:4 75:17, 24 76:3, 6, 24 78:5 79:24 100:17 109:8 113:12, 13, 15, 16 determined 62:15, 18 63:20 67:6 70:11 77:15 78:24 79:17 80:15 81:2 82:1 105:19 115:6 determines 100:24 determining 27:11, 14 28:7 53:17
---	--	--	--

62:6 70:6 73:5,12,15 97:23 99:12 devaluated 88:10 device 27:8 35:24 difference 68:3 113:14, 23 differences 12:24 31:5, 7,11 95:6 110:16,19 111:5 different 7:13 12:9 14:2 15:2,20 16:9 24:9,22 29:6 30:3 36:19 41:6 50:19 56:18 87:18,20 98:15 100:11,14 113:3,9 differential 33:8 112:14 113:21 differently 115:23 digital 26:5 DIRECT 4:7 directed 61:8 97:5 direction 70:11 directly 88:5 97:14, 25 disagree 28:10,12 39:11 42:14 52:14,20	disagreement 32:16 disagrees 55:25 discard 85:25 discarded 83:21 discarding 93:6 disclose 8:22 disclosed 57:5 81:11 92:10,13 discloses 57:16 58:25 95:7 109:1 disclosure 57:19 78:13 79:1,20 80:2,20,24 81:5 85:15 disclosures 80:10 disconnected 6:8 discuss 6:16 11:15 28:3 61:9 71:13 discussed 41:6,19 84:25 97:16 106:19 discusses 70:8 discussing 32:13 34:25 42:12 67:22 70:4 106:8 discussion 77:3 79:6 81:15 96:22 115:16,21 dismiss 103:14	dismissing 103:15 display 17:24 disputes 7:16 disregarded 87:5 distance 58:24 59:7 114:12 distinct 58:2 distinction 57:9 77:22 distinctions 31:16 57:8 distributions 98:15 district 30:7,10 31:10,20 32:12 38:14 39:7 42:9,15 45:4 46:20 divide 103:23 divided 115:19 dividing 109:1 111:2 diving 97:10 Doctor 39:15 72:14 doctoral 15:17 document 5:2 6:24 11:18,19 12:13 15:1,4 38:9,22,24 109:13 114:8 documents 4:20 5:11 6:14,16,20 8:16 9:5,6,	10 11:5,7,15 doing 13:14 15:23 25:4 42:21 50:25 51:3 90:2 97:20 105:13,14,17 110:25 download 6:17 11:6,11 draft 21:16,17,20, 21 22:2 drafted 21:23 22:1 drafting 21:13 22:4 drafts 22:9 driver 51:3 52:7 drop 6:16 58:7 dropped 56:24 94:20 dropping 24:25 due 79:13 duly 4:4 E e-mail 6:9,10 e.g. 27:3 earlier 11:4 42:5,12 84:25 85:21 88:6,9 89:20,24 94:21 109:18 early 18:15
---	---	--	--

ears 54:23	82:14 83:14 84:14, 21	engagements 18:25	15, 16, 20 48:7, 8, 15, 16
easier 25:10	85:6 91:19 106:9, 18, 19	engineering 14:3, 4, 9	49:9, 16, 17 50:6 84:23
Eastern 94:7	element-by-element 60:12	22:24, 25 24:3, 5, 7, 23	85:2, 4 88:7, 11 106:13,
easy 65:10	elements 29:4, 6 50:13	English 58:10 108:14	14, 15, 22 107:2 108:2, 6
eat 94:9	54:5 56:11 57:18, 22	entertain 104:21	evaluating 34:6, 7 36:4
educate 16:4	eliminate 92:23	entire 25:11 37:5	110:22 113:9
education 23:16 62:24	eliminates 75:12	40:13 59:24 69:16, 17	evaluation 25:23 35:23
effect 31:11	elimination 92:25	70:15 74:18 75:13 84:13	36:3, 5 43:11 63:2, 3 74:24
efficient 65:11	embodiment 27:24 73:14	88:12 89:6, 7, 14 90:7	76:10 82:21 84:12 85:11
either 8:3 24:20	74:6, 10 75:22 76:2,	93:6, 22 100:1 101:1	86:7, 17 109:2, 5, 7
46:25 57:24 75:11 77:23	20 77:7, 9, 21 81:17, 18	103:13, 14, 20 104:11, 13	110:3, 11, 12, 13 114:10, 11, 16
80:8 81:20 85:25 89:4	embodiments 51:10, 12	105:14, 22 106:24	everyone 20:12
92:12, 22 102:3	52:1 53:1, 4, 11 54:2, 6	107:2, 13 109:3	evolved 21:20
106:23, 24 115:6	76:4, 18 77:20, 22	entirely 21:23	exact 8:25 9:22
electrical 14:3, 9 22:24	emeritus 13:20, 25	equal 64:5	10:4, 10 22:13
24:2, 5, 7, 23	14:8, 21 15:7, 9	essential 78:13	exactly 20:4 22:6
electronic 6:13 58:23	employed 21:9	essentially 92:1	29:20 70:3, 18 75:6
59:5	employer 13:17	established 64:2, 3	76:22, 23 90:7 103:11
electronics 5:16	end 11:9 15:2, 5	estimated 71:5 111:14	115:16, 21
element 29:13, 19	40:13 61:7 63:24 76:8	evaluated 26:22 39:17,	EXAMINATION 4:7
32:19 36:4 39:3 42:7	87:10, 13 107:6	22, 25 40:4, 5, 6, 11, 15,	examples 18:19 23:23,
44:1 47:15 48:9 49:8, 15	end-to-end 17:22	16, 20 41:1, 11, 13, 20	25 33:3 34:21, 22
50:2, 24 51:13, 20, 25	ended 14:22 27:20	42:1, 6, 16, 20, 23, 24	40:10 43:23 53:10 89:9
52:13 56:2 60:15, 16		43:2, 5, 8, 13,	91:4 99:22
61:17, 22			

exceed 66:22 69:2 73:18 74:3, 4	78:1, 6, 8 79:6, 16 81:4 82:13, 19 83:23 85:9, 10 86:25 87:13 88:22 90:15, 17, 18 93:19 103:15 105:16, 17, 21, 22, 23, 24, 25 106:8 109:4 115:12, 14	108:14 109:13 114:8 exhibits 11:17 exist 25:17 108:24 109:16 existed 86:9 exists 114:14 expanded 21:18 expect 66:15, 19, 22 67:15, 20 expected 71:1 72:1 expects 65:8, 23 67:8, 10 68:6 experience 13:5 18:6 23:2, 3 24:13, 14, 21 29:7 expert 7:19 9:25 10:2 18:10, 12, 13, 16 19:1, 7, 8, 10, 15, 18 20:18 21:6 explain 21:13 26:16 31:16 62:8 64:12 explained 68:21 108:20 explanation 82:5 explicit 91:13 explicitly 91:6 exposure 43:22 51:2	52:6 95:9, 10 96:1, 7, 11, 16, 17 109:23 110:14 extent 10:23 46:2, 5 48:16 55:24 80:4 81:6, 10 93:1 100:10 extract 42:23 extracted 40:2, 5, 8, 13 48:7, 15 49:10, 18, 19 90:9 extracting 43:8 extraction 26:22 36:5 39:17, 22, 25 40:5, 6, 7, 11, 15, 17, 21 41:1, 11, 14 42:2, 6, 16, 20, 24 43:3, 5, 12, 16 48:8, 16 49:17 50:8 52:17 84:4, 24 85:2, 5 88:7, 11 106:13, 15, 22 107:3 108:2, 3, 7 extracts 43:16
exceeded 66:2 83:20 84:3			
exceeding 81:15 82:20 83:19 84:1 85:12			
exceeds 62:19 63:22 64:4, 6 65:3 73:23, 25 103:2			
Exchange 18:25			
exclude 54:6 68:4 69:15, 16, 18 70:14 80:25 84:4, 11 87:10 93:22 99:13 102:23, 25 103:14 107:3 110:18 111:8, 16 115:22, 24 116:1	exclusion 58:25 74:7, 12 75:13, 19, 23, 24 76:13 77:1 78:17 79:21, 23 80:1, 3, 17 81:6, 8, 10 82:18 83:20 84:10 85:16, 20, 22 89:5, 7 90:18, 19, 20, 22, 24 91:1, 10, 14 92:3, 4 101:2 106:3 107:1, 25 108:3 111:12 112:7 115:9		
excluded 40:9 70:20, 22 71:12 84:19 86:1, 5, 6, 10, 16, 17 87:4 89:2, 6, 8 103:6 106:3 107:14, 16, 18	exclusively 35:12 79:20 excuse 14:13 41:8 54:21 64:3 70:6 77:4 96:19 101:12		
excludes 25:22 82:19 87:2 88:23 102:13, 18 116:9, 10	executed 62:7 executes 102:7 exhibit 5:6 11:16, 18 12:14 21:12 25:1 38:18, 19 58:10, 13, 22 94:21		
excluding 26:21 74:15, 22, 23 75:5, 9 76:15 77:8			

F

FA

62:17

face

96:2

fact

27:1 32:14
66:23 70:21

77:18 78:20 81:12, 22, 24 83:20 84:3, 11 92:24 factors 23:13 faculty 16:6 fails 79:13 fair 27:7, 16 39:14 60:24 97:15 fairly 25:25 fall 53:6 false 109:9 familiarity 23:19 far 87:3 111:7 fashion 22:11 feature 29:14, 23 31:12 32:19, 23 33:1, 5, 10, 18, 19 34:4, 9 35:10 36:11 49:11 52:16 60:16, 21 64:9, 10, 14 81:16, 22 82:2 83:19 84:2, 3 features 29:15 32:21 39:17 41:1, 18 42:1 43:2 51:21 60:22 84:23 feels 48:17	field 15:16 16:23 22:25 23:15, 16, 17, 19, 24 24:1, 6, 8 26:2 27:10 29:10 59:4 60:3 63:5 95:20 fields 16:22 24:12 figure 26:18 27:2 60:21 62:6, 7, 9 77:13 79:11 83:6 89:22, 23 98:14, 16 114:2, 3, 5, 9 figures 114:2 fill 56:12 filled 86:24 filtering 17:21 final 21:21 55:8 finally 63:24 find 15:1 55:21 56:1, 8 72:16 89:17 114:20 finding 67:24 fine 94:10 111:2 first 4:4 9:19, 23, 24 11:14, 18 12:1, 10, 11 13:22 21:16 22:7 29:11, 13 36:3 57:17 58:7,	12 64:23 76:6 78:5 79:7 93:11 97:9 102:12 111:2, 4, 24 112:17, 23 113:2, 15, 16 114:22, 24 115:9 five 20:8, 17 focal 52:7, 8 54:2 59:17 108:22, 23 109:3, 9, 15 110:3 111:19 113:4, 5, 6, 8, 17 focus 17:11 43:23 51:2 59:16 62:17 76:10 82:21 96:1, 5 109:1, 2, 5, 6, 22 110:12, 14 114:10, 11, 14, 16 focused 17:2 61:3 65:1 77:25 82:9 85:11 focuses 93:18 focusing 25:17 79:12 96:16, 17 focussed 74:24 follow 51:18 62:22, 23 78:22 following 40:4 86:12, 20 87:3 102:3 104:18 follows 4:5	forget 52:6 form 28:11 33:14 41:23 53:9 90:20 91:16 format 66:12, 18 69:21 found 55:20 59:8 four 9:1 front 4:21 6:12 38:10 108:15 frozen 20:12, 14 fully 8:4 function 6:17 11:6 29:24, 25 43:1 48:20 74:15, 22 75:5, 9, 14, 19, 23, 24 76:13, 15 77:1, 8 78:1, 7, 8, 18 79:7, 9, 16, 22, 23 80:1, 3, 17 81:4, 8, 11 82:13, 19 83:23 84:10 85:9, 17, 20, 23 87:1 88:23 89:5, 7 91:11 101:2 functions 26:23 fundamental 15:21 future 26:20
---	--	--	--

G	goes 62:8 70:13 72:22 75:10 110:15 going 5:8,18 6:16 8:18,19,20 11:5,7,15 19:2 38:2,13 69:23 70:2, 15 71:8 72:6,25 77:5 85:16 88:8, 10,13,16 95:18 97:25 100:15 good 4:9,10 25:25 61:9 72:9 96:24 109:25 110:7 112:11 115:11 graduate 15:10,13 grammatical 64:2 Great 72:10 116:18 greater 63:18 64:1, 3,4 grid 86:22,24 104:16,17,20 105:2,8 111:3 115:19 ground 54:20 55:5, 8,13,14,15, 16,21,24 56:3,4,7,8, 21,23 57:1, 5,8,9,10,12, 20,24 60:9 grounds 46:25 54:15 55:9,12 56:21 58:4	71:18 96:21 group 36:14 93:21, 22 98:3,4,6, 10 99:12 101:1,5,6, 16,19,23 102:14,19, 21,22 103:1, 4,9,13,14, 16,17,19,20, 22,24,25 104:2,6,11, 14 105:1,5, 8,11,14,15, 17,18,19,22, 23,24,25 106:1,3 107:15 116:2,4 grouped 101:8,16 102:11 103:6 107:4 grouping 97:21,22 102:1,7 groups 97:24 98:13, 16 99:10,11, 13 100:23 101:20 107:14 guess 58:16 70:7 96:21 98:11 guessing 20:9 22:14 <tr><td colspan="2"> H </td></tr> <tr><td></td><td> half 9:23 94:5 111:24 112:17,23,25 hand 15:25 </td></tr> <tr><td></td><td> handling 17:16 Hang 5:5 happy 100:12 112:9 head 11:1 12:21 30:1 heading 13:5 19:6 hear 8:4 11:21 heard 8:8 51:24 52:11,18 help 17:13 57:3 high 65:7,12,24, 25 66:4,16 69:18,24 75:23 82:19 95:3 100:3 high-level 25:25 26:6 54:18 60:2 95:1 high-luminance 25:17,20 26:21 59:1 65:9 74:15, 22,23 75:5 76:15 77:8 79:6,9,16 81:3 82:13 83:23 85:9 86:25 88:22 96:13 108:24 109:4,15,21 114:13 higher 20:23 26:1 67:7 69:3 71:10 </td></tr>	H			half 9:23 94:5 111:24 112:17,23,25 hand 15:25		handling 17:16 Hang 5:5 happy 100:12 112:9 head 11:1 12:21 30:1 heading 13:5 19:6 hear 8:4 11:21 heard 8:8 51:24 52:11,18 help 17:13 57:3 high 65:7,12,24, 25 66:4,16 69:18,24 75:23 82:19 95:3 100:3 high-level 25:25 26:6 54:18 60:2 95:1 high-luminance 25:17,20 26:21 59:1 65:9 74:15, 22,23 75:5 76:15 77:8 79:6,9,16 81:3 82:13 83:23 85:9 86:25 88:22 96:13 108:24 109:4,15,21 114:13 higher 20:23 26:1 67:7 69:3 71:10
H								
	half 9:23 94:5 111:24 112:17,23,25 hand 15:25							
	handling 17:16 Hang 5:5 happy 100:12 112:9 head 11:1 12:21 30:1 heading 13:5 19:6 hear 8:4 11:21 heard 8:8 51:24 52:11,18 help 17:13 57:3 high 65:7,12,24, 25 66:4,16 69:18,24 75:23 82:19 95:3 100:3 high-level 25:25 26:6 54:18 60:2 95:1 high-luminance 25:17,20 26:21 59:1 65:9 74:15, 22,23 75:5 76:15 77:8 79:6,9,16 81:3 82:13 83:23 85:9 86:25 88:22 96:13 108:24 109:4,15,21 114:13 higher 20:23 26:1 67:7 69:3 71:10							

highest 95:12 102:14 highlighted 96:18 hired 18:12 20:4, 18 histograms 98:15 history 13:9,11,13 hold 41:22 holds 10:22 home 16:10 hour 38:3 72:6 94:5 hours 22:4,7,14 hypothetical 36:20 37:8 87:23 104:21 I i.e. 69:3 identical 32:15 39:12 identificatio n 38:19 96:3 identifies 69:1,5 99:21 identify 21:22 28:18 106:2 identifying 27:9,10 34:8 65:6 72:15 96:2 ignoring 114:25	Illinois 4:17 13:18, 19,23 14:8 illustrate 104:23 image 23:2 25:21 26:9 27:10 34:13 40:13 59:6,18 63:9,14,15 69:8,17 72:17 74:23 79:13 85:11, 12,13 88:12, 13,14 89:6, 7,14 95:23 96:6,8 102:9 106:24 107:2 108:25 111:2,17 images 17:6,21 67:10 imagine 22:13 imaging 17:12 58:24 59:6,7 63:6 95:4,24 109:22,23 immediately 111:21 impact 115:20 implement 80:10 88:18 implementing 81:3 implicit 68:22 69:10 71:15,20,25 implied 90:13 implies 30:11	imply 28:2 important 23:13 59:24 94:12 imprint 60:23 include 7:15 61:7 76:12 78:24 90:19 included 5:9 16:25 17:20,21,24, 25 56:3 57:6 76:9 80:9 includes 53:3 99:23 including 17:9 49:1 77:12 78:10 79:10 90:1 91:16 96:1, 16 108:5 incorporation 112:7 incorrect 47:11 increment 63:19 incremented 63:23 64:6,7 indicated 39:8 indicates 18:7 68:19 indicating 70:5 indication 65:4 individual 28:6,17,20 34:25 35:5, 17 36:15 37:6,13 92:10,23 100:17,18,	21,24 101:5, 7,12,13,15, 22 102:5,25 103:9,16 104:1,3,5 111:13,14 112:24 115:20 industry 23:3 inefficient 25:21 infinity 114:13 influence 65:15 66:14, 19 69:25 inform 115:25 information 8:19 35:12 initially 57:20 input 25:24 29:15 32:21 33:12, 21 inside 71:24 insist 81:17 instruction 42:15 integrates 63:3 intensity 25:23 26:24 intention 69:16 interested 15:11 interpret 87:13 interpretatio n 44:24 46:6, 24 47:1
--	--	---	---

48:18 52:23 interpreted 45:12, 13, 15 interpreting 44:13 interrupt 20:11 intertwined 83:17 introduces 77:8 invalidity 55:21 56:18 invention 26:2 59:4 60:3 95:21 invitation 80:21 involve 82:2 involved 10:19, 25 11:3 110:10 involves 26:20 involving 21:2 IPR 5:6 9:20, 25 10:3, 11 11:24 19:23 30:7, 12, 14, 15 isolation 71:16 issue 53:20 99:18 issues 15:21 16:24 21:3 27:24 52:3 96:2, 15 items 100:2 iterative 22:11 Iwasaki 55:4, 6, 8, 13	56:1, 14, 17, 22, 25 57:1, 4, 17, 19, 21 61:14, 17, 19, 23 64:25 71:17 87:18 91:21, 25 92:18, 20, 22, 24 93:3, 4, 10, 11, 14, 18, 20, 23 94:2, 20, 25 95:1, 4, 7, 18, 21, 25 96:6, 10, 14, 20, 22 97:5, 18, 20 98:1, 14, 17, 20 99:7, 9 100:16 101:11, 25 102:4, 24 104:8, 19, 23 107:1, 3, 11 109:20 111:11 115:17, 19, 21, 23 116:8 J Japanese 58:11 job 15:8 16:4 31:23 joint 4:25 5:1, 3 9:7 38:13 42:10 45:3, 4, 6 46:19 jointly 21:15 junior 16:6	 K K1 62:12 63:20 64:5, 7 73:9, 13, 14, 17, 22 74:9 75:16 76:16, 23 81:25 K2 62:12 63:23 64:7 73:8, 13, 14, 17, 24 74:9 75:16 76:16, 23 81:25 keep 98:11 kind 13:14 18:1 60:2 76:19 95:19 111:11 knew 10:22 know 6:6 7:2 8:21 10:4, 18 11:3, 8, 12 19:8 22:7, 13 25:2, 6 27:9 29:20 30:10 34:4 54:12 58:14 59:13 62:3 67:17 83:11 87:7 89:3 90:14 94:10 96:8 97:1 99:16 100:7, 18 104:9, 15, 18 knowledge 12:18 32:4 L labeled	27:15 laboratory 16:8, 11, 13 labs 16:10 laid 42:10 44:12 language 58:10 88:5, 6 large 18:1 95:6 largely 12:20 larger 102:15 Larissa 94:4 late 18:14 law 30:23 31:23 46:18 leads 112:6 learning 15:19, 20 17:3 left 12:11 62:17 70:16 106:25 107:5, 19 108:6 legal 19:9 lens 25:17 52:8 58:24 59:7, 16 96:17 level 24:18 26:1 95:3 96:10 98:25 100:4 103:19, 25 104:6 105:17 116:3, 6 light 27:4, 12 28:9
---	---	---	---

57:23 59:18 62:5 65:7, 12,15,24 66:3,14,19, 22,24 67:9, 11,12,15,19, 21 68:7,9,15 69:19,24 70:1 71:5,8, 10,11,22,24 72:2,3,17 73:6,12,15 74:5,25 75:18,20,25 76:3,7,11, 12,24 77:12 78:2,5,10,24 79:11,13,17, 24 80:8,14, 18 81:2,7,8, 21 82:1 96:8,12 108:24 109:10,16,21 114:14,19 115:1 limit 79:20 92:22 limitation 40:22 41:5 49:21 51:23 53:24 82:22 83:15 91:20 92:9,12,19 limitations 50:11 limited 28:17,19 34:12 36:9 50:12 51:10 77:18,19 90:18 104:20 limiting 78:4 line 27:1,2 28:23 29:2,11 49:5 59:10,15	62:2,5,11 63:2,17,25 70:9 72:21 74:14,21 75:8 77:6,7, 11,17 78:11 79:5,8 80:13 81:18 82:7 83:9,10,11 85:8,20 90:1,2 lines 82:24 83:5 84:7 85:4 114:6 list 13:14 15:2 23:23 29:3 listed 14:1 18:20, 22 19:3,14, 20 listing 13:9 25:11 lists 16:12 litigation 10:20 20:1 litigation- related 19:11 little 17:8 25:4 30:3 38:3 42:5 60:1 82:10 92:14 94:2,9 95:16 97:16 98:2 99:17 101:10 located 4:15 location 65:16 locations 66:15 69:6,7 long 22:11 65:13	94:11 97:11 99:16 longer 15:12 86:6, 19 look 11:14 24:24 28:21 30:16 34:13,14 35:16 36:17 37:8 39:2 44:1,20 57:16 58:4, 11 60:6 61:15 71:16 72:18,20 74:20 76:6, 23 79:5 83:8 84:20 88:16 92:24 93:3 94:1 98:9 100:16,20 101:11,25 102:6,21 105:1 108:9 109:10,24 110:7 112:11,20 113:17,20 114:1,3 looked 9:9 16:24 57:21 111:10 looking 12:13 16:23 28:6 34:6, 23,25 35:1, 3,15 36:13 37:5,6 54:10 55:12 56:10 58:6 60:20 61:6 62:1 63:10 65:18 71:19 72:16 74:2 86:22 87:20 88:3 89:7 92:2 93:4 97:18	98:11 102:1, 4 105:4 106:6,18 107:21 110:2,9,11, 20 111:12, 13,19 112:14,22, 24,25 113:3, 4,5,7,19 114:5,17 115:12 looks 12:8 69:14 92:2 100:22 101:15,18,21 110:15 111:5 113:24 loose 35:20 110:23 loosely 57:13 lost 107:6 lot 16:1 lower 20:22 71:3, 9,23 LS 59:19 73:6, 13 77:12 79:11 luminance 33:8,11,20, 24 34:3,7, 14,15,17 37:9,15 43:25 63:5, 10,12,15 65:3,7,12, 15,24,25 66:1,4,15, 20,24 67:3, 5,8,19 68:19,25 69:2,3,6,7, 19 70:7,21
--	---	---	--

71:1, 9, 10 72:1, 15, 16 74:8 75:23 82:19, 20 85:12 92:2, 3, 6, 11 93:5, 18, 20 95:6 97:23 98:5, 10, 13, 15, 17 99:10, 12, 14 100:17, 18, 23 101:3, 8, 12, 17, 23 102:5, 11, 15, 18, 20, 22, 23 103:2, 7, 11, 12, 21, 22 104:1 105:3, 4, 10, 18 107:17 luminous 63:2 lunch 93:15 94:3, 9	making 34:19 35:5, 8, 24 78:25 79:11 92:3 manage 27:13 manner 77:15, 16 mapping 57:11 marginal 20:23 mark 38:17 marked 11:16 38:19 87:24 markups 5:12 Master's 24:21 math 72:5 matter 30:22 31:23 46:18 77:18 81:1 Maxell 10:12, 14, 15, 16, 20, 25 11:3 maximum 110:18 111:7 113:1, 13, 16 114:21 115:8 MCL 16:19, 21, 23 17:16 18:3 mean 17:17 22:6 25:7 26:12, 13 28:2 29:20 33:6, 23 49:18 50:2 75:6 78:19 104:9 105:7 107:15	meaning 31:11 44:17, 23 45:11, 16, 24 46:2, 4, 15, 17, 23 47:3, 10, 13, 15 48:3, 4 49:14 69:10 88:6 means 40:7 50:4 57:14 65:12 81:21 85:17 105:14 106:1 109:17 means-plus- function 31:6 44:13, 17, 19, 23 45:1, 3, 16, 24 46:6, 7, 13, 15, 21, 24 47:4, 24 48:18, 19, 24 meant 19:11 36:5, 7 mechanism 91:11 106:1 107:25 108:3 115:25 medicine 15:22 meet 8:17 9:11, 14 92:8 meets 92:19 memory 50:25 mention 74:12 mentioned 9:4 11:4 22:8 26:3 34:12 35:2 65:1 96:4 Mercantile	18:25 met 8:16, 21 9:1 31:17 46:12 method 68:25 91:13 95:24 108:22 methods 95:5 middle 83:16 migrate 67:14 mind 5:20 6:19 64:18 66:7 99:5 111:25 minimal 20:24 minimized 6:10, 11 minimum 110:18 111:7 113:2, 13, 25 114:12 115:7, 8 minutes 13:3 42:11 64:21 72:7, 11 116:16 missing 55:16, 19 56:13 modified 12:19 modify 40:12 100:3, 10 moment 7:17 21:25 72:25 94:2 moments 76:17 monochrome 63:8, 13 morning 4:9, 10
M			
machine 17:3 made 69:24 115:5, 22 main 17:11 53:20 96:5, 18 major 13:1 make 16:4 35:13 37:2, 10, 12 39:1 55:3 69:23 77:2 82:2 100:7 113:20 makes 70:13, 19 91:13 92:4			

move 18:5 52:7 54:9	14, 22, 23	obtained 102:9 104:2	35:16 43:10
moving 69:20, 22	newly 85:1 86:11	obtaining 109:2	54:12 58:14
multimedia 16:8, 10, 13, 22, 24 17:1, 9	87:12	obtains 95:10, 12	62:3 75:24
multiple 7:10 35:1, 4 95:8 105:4, 6, 7 109:2 110:21	nighttime 109:16	obvious 56:2 57:18, 22	97:17 115:5, 22
multiple-step 37:1	nominal 67:8	obviously 12:7 53:14 56:7	one 14:3, 4 15:17 24:12 34:11 35:12, 20 36:18 37:3, 11, 20 39:6 42:8, 13 45:5 59:8, 24 67:3 68:17 69:14, 23, 25 70:2, 5 74:19, 21 75:15 78:11 89:9 90:3, 17 91:3 93:16 96:11 98:11 99:13, 23 104:7, 17 105:10, 12 108:3 111:4, 25 113:1, 2, 7, 11, 12 114:1, 3 115:2, 3, 24 116:1, 12
muted 5:17	nonlinear 17:20	obviousness 55:22 56:8, 18	one-step 111:11
	nonpatent- related 21:3	occasion 17:8	ones 22:1 86:6, 15, 16 87:22 88:2, 17 102:23 114:3
N	normal 67:10	offering 47:2, 9, 23	open 6:3, 5, 14, 18, 21 11:11 30:1 38:21 58:14
	Northbrook 4:17	offhand 11:2 12:8	opened 6:9, 12
name 4:11, 13, 14 10:24 11:2 24:9 54:21	noticed 26:25 85:10	okay 5:14, 25 6:15, 25 7:14 8:1, 5, 8 9:24 11:4, 14 13:2, 16 15:6 16:19 18:4 19:2, 13, 20 25:4, 10 30:16 32:17 34:23 38:1 39:14 40:19 47:2 49:3 52:21 54:8 56:20 60:5 63:16 64:22 72:4 73:3, 17 74:12, 20 83:13 84:14, 20 86:20 94:16, 24 101:10 106:17 107:9 108:9 116:15, 18	operation 50:16, 17 97:4
navigate 96:25	nuance 60:1	once 10:21 25:2	opinion 22:23 24:11
necessarily 30:25 34:22 44:25 51:5 77:14 79:19 114:21	nuanced 39:9 82:2		
need 6:11 12:4 25:19 38:25 94:11, 13	number 5:6 6:13 7:6 8:25 10:4, 10 20:5, 7 22:7, 13 25:5, 11 58:17 73:18, 22, 23, 24 103:23		
needed 55:16 82:5	numbers 11:16		
neighbor 71:20			
neighboring 37:24 67:21, 23 81:24 82:3 101:20 112:25 113:5 114:17	0		
neighbors 36:22 71:9,	object 59:5 74:25 79:10, 18 85:12		
	Objection 28:11 33:14 41:22, 23 53:9		
	objects 102:13		

32:7 45:8, 10,12,21,22 46:16,18 47:2,9,12, 14,23 48:2, 10,23 50:15 53:4 55:20 60:19 61:2, 3,5,16,22 79:14 81:1 83:24 86:8 90:12 91:19, 22,23 92:15, 16 93:12 107:20	outright 90:11 outside 68:15 oversaturatio n 96:7 overview 54:15 59:23 owner 10:7,12,14, 15 55:25	102:2,12 106:6,7,9, 11,12 108:21 112:3,5,12, 19 paragraphs 22:1,2 47:21 48:21 64:15, 17,20 65:5 83:10 96:23 97:3,21 98:6,24 99:1,7 100:4 102:3,4,6 paraphrasing 64:1 79:9 parentheses 26:10,15 82:7 parse 99:17 part 16:8,9 17:18 26:13 30:13, 15 35:17 36:24 37:20, 22,24,25 38:11 45:2 50:24 57:2,3 59:1 61:5, 12,14 69:24 70:6 71:5,8, 9,11 80:10 82:21 86:6, 16,17,19 87:25 96:14 97:20 99:17 101:5,22 103:6 106:4 107:18 110:10,23 112:6 113:2, 15 114:23,24 115:9,12 partial 85:11 particular 33:12 36:12,	21 43:14 50:5,7 56:2 65:18 66:8, 13 70:23 73:14 74:8 76:1,2,19 81:17 85:25 92:21 98:10, 21,22 101:5, 19,22 103:1 104:7 105:10 111:16,17,19 113:23 114:19,22,25 115:2,3,15 parties 4:25 5:2 11:2 29:22 32:9 39:7 42:9,14 Partly 111:22 parts 21:19 pass 116:14 passage 72:18 84:6, 8,16 passed 81:9 passes 81:12 past 17:17 patent 4:24 7:12,15 9:7 10:7,12, 14,15,20 21:1 22:12 24:19,25 25:5,6,11, 13,16 26:1, 9,19 27:1, 17,21 28:4, 5,22 39:3 43:19,23 45:23 49:4
opinions 22:10,17,19 54:9,16,19 55:9 60:9,25 61:1 82:25 99:8 opposed 57:20 optical 58:24 59:7 option 53:17 options 51:16 order 57:17 58:5 72:22 ordinary 22:19 23:10, 14,22 32:6, 10 44:17,23 45:11,16,23 46:2,3,14, 17,23 47:3, 9,13,14,18, 24 48:3,4, 10,24 89:18 90:5,16 outcome 59:25 outdated 16:14,15	P p.m. 72:12 94:14 page 6:7 12:2,10, 11 13:3 18:5,6,23 19:13 22:17, 18 26:17 54:11 55:3 95:22 109:12 110:8 112:16,17 114:8 paragraph 22:22 23:7 25:14 26:6, 8,19 30:18 42:25 43:7 44:8,12,20 45:13 54:10, 14 58:21 59:11 60:17 62:8 63:24 65:2 68:22, 23 69:8 72:21,22 73:1,4 75:8 76:9 77:10 80:12 82:17, 18 90:6 95:3,16,17, 22 97:12 98:1,8 99:24		

55:25 58:17 90:23 91:12, 13 106:13 108:11 patented 25:21 patents 10:22 pattern 111:3 115:19 PDF 6:12,13,20 peak 110:3,4,9,16 111:4,14 112:4,13,20 113:1,2,12, 13,18,24,25 114:18,21, 22,25 115:6 peaks 109:7,8,10 110:15,21 111:6,14 114:25 people 17:10 23:17, 19 24:9 63:13 percent 20:9 perform 53:2 performed 90:25 109:23 performing 27:13 period 66:9 periphery 59:18 person 22:19,23 23:10,14,21 32:5,10 54:24 89:18 90:5,16	perspective 39:11 petition 9:9 petitioner 9:12 10:8 Ph.d. 4:3 Phd 110:25 111:1 phone 5:17 photograph 30:21 60:7 95:2 photographic 102:8 photographing 95:5 photographs 97:9 photography 95:23 109:17 photometric 109:3,7 110:13 111:20 112:4,14 113:6,21 114:11,12,16 photometry 95:7,8,10, 13,20 phrase 101:14 physical 4:20 pick 99:18 100:2 picking 111:18 picture 27:3 29:15 32:21 33:12, 21 44:5 47:17 49:24 50:12 51:5,	6,9,15 52:10 54:1,3,4 60:23 pin 61:6 pixel 27:6,8 28:20 29:15 32:21, 24 33:1,2,4, 12,18,21,25 34:3,6,10, 14,16,17 35:5,9,13, 17,25 36:9, 12,18,19,23 37:3,6,13,20 60:23 62:16, 19 63:21 64:13,14 65:18 66:8, 15,21 67:3, 4,15,23,24 68:2,14,15, 17,18 69:2, 5,7,15,22, 23,25 70:2, 5,7,13,14, 19,23 71:11, 14 74:8 75:10,11,12 85:24,25 87:11 88:14, 15 98:4 100:21,24 101:5,7,15, 16,19,20,22, 23 102:25 103:3,5,9, 12,15,23 104:7,17 105:10 106:2 111:4,13 112:5,24 113:4,8,12, 17 114:22,25 115:2,3,15, 20	pixel-by-pixel 37:2,18,19 66:12 69:9 92:4 104:12 pixels 25:22 26:10, 14 27:9,10, 15 28:6,17, 18 34:25 35:1,4,15 36:14,15 39:16 40:25 41:18 42:1 43:1 49:10 59:1 65:23 66:4 67:21 68:4,9,12,13 69:13,18 70:22 72:2 73:6,7,18, 22,24 74:2,3 80:17,18 82:20 84:19, 23 86:4,10, 13,14,18,24 87:2,14 88:16,24 89:2,8 92:11,23 93:21 97:21 99:10 100:17,19 101:12,13 102:5 103:17,23 104:3,5 105:1,5,6,7, 8,15,16,18, 24,25 107:14 112:21,22,25 113:3 115:13,24 116:1,10 place 59:8 61:9 110:7 112:11
---	---	---	---

places 74:7	66:10 79:3 96:17 104:17 108:22, 23 110:3, 9 111:19, 20	predeterminin g 51:15	primary 16:10 57:13
plain 44:17, 22 45:11, 15, 23 46:2, 3, 14, 17, 23 47:3, 9, 12, 14, 17, 23 48:3, 4, 10, 23	positions 26:20 69:2 95:8 109:6, 8, 9, 15 112:13, 20	preface 64:24	printed 4:23
plane 52:7, 8 54:2	possibilities 44:18	prefer 100:13	printouts 4:20
please 4:11 5:23 7:24 8:4, 22 9:13 21:13 33:15 52:24 73:10 99:4, 6	possible 20:23, 24 21:3 27:23 59:16 78:9 79:12	prehearing 5:4 38:14	prior 9:8 13:9, 11, 13 14:21 18:25 19:3, 23 40:16 41:19, 20 46:25 51:6 54:3, 9, 21 57:11 81:3 94:19 101:2
point 17:22 27:4, 12 28:8 52:1 59:17 88:4 89:16 96:24 108:24 109:10, 16, 21, 25 114:13	potential 113:6 114:25	preliminary 22:10	privileged 8:19, 23
pointing 80:22	potentially 56:12 77:9	preparation 8:24	probably 9:1, 22 10:5 16:16 20:4 22:14 36:6 96:18 97:12 99:18 100:2
points 109:4	PR4-3 5:3	prepare 8:14	problem 25:16 108:19 109:12, 21
portion 33:25 34:1 51:25 64:8 65:22 88:8 90:9 98:21, 22	practice 78:9	preparing 9:15	problematic 25:22 26:10, 14 27:6, 8, 15, 19 28:8
portions 25:17, 20 26:22 53:15 87:24 96:20	practiced 76:5	presence 73:5, 12 78:5	problems 23:15, 20
POSITA 68:23	Prairiecomm 18:24	present 14:7 16:16 73:16 75:18 76:24, 25 79:25 80:15 81:3, 7, 9, 21	proceeding 9:25 19:23 30:7 38:12
position 25:18 29:14 32:20 33:11, 20 34:10 52:8 54:8 56:4, 7 60:22	precise 9:21 13:13 64:11 99:3 111:22	presentations 12:25	proceedings 32:1
	precisely 14:6	presumably 13:8 85:16	proceeds 63:19
	predetermined 44:5 47:16 49:11, 24 50:12 51:5, 8, 9, 19, 21, 22 52:3, 9, 12, 16, 18, 21 53:3, 7, 13, 14, 16, 20, 21, 23, 25 68:19 95:13 98:19 99:14 102:15	presumed 68:12	process 21:14 36:6 37:1 40:17 59:1 62:6 63:19 76:6 78:10 88:16 112:23
		pretty 10:23 17:5, 17 20:8 32:25	
		preventing 96:7	
		previous 25:9 34:12 50:9	
		previously 11:16 19:24 20:1	
		primarily 15:10, 17 17:2 60:20 61:1, 8	

113:11 processing 17:5,21 23:2 25:24 27:13 29:10 44:2, 4,5,9 45:2, 8,22 46:8, 11,13,16 47:4,10,13, 16 48:6,14 49:9,20,22, 23,24 50:3, 4,12,16,21, 22 51:5,9, 14,15,19,23 52:2,4,9,13, 18,22 53:2, 3,5,7,13,18, 21,23,24,25 96:6 98:3 102:8 processor 29:2,5,8,9, 10,12 professional 23:1 24:13, 21 professor 13:20,25 14:2,7,11,21 15:7,9 16:4 projects 15:18 17:16 pronounce 54:25 proper 45:20 63:15 propose 44:8 proposed 30:20 31:2,8 32:15 39:12 46:14 proposes 59:25 provide 22:19 32:6	54:14 56:9 provided 5:13 48:19 56:2 93:9 provides 51:16 53:1 57:10 providing 54:16 55:9 59:22 publication 12:25 publish 16:2 published 17:10 pull 58:13 94:22 pulls 87:1,2 purpose 30:12 32:1 46:21 52:16 82:8 115:9 purposes 96:3 purview 17:7 put 5:24 11:5 18:1 21:11 30:2 51:19, 25 63:7 102:17 112:21 puts 68:1	39:24 40:18, 19 41:4 47:19 50:10, 18 51:18 52:12,18 54:24 56:20 64:20 73:10 75:7 78:22 93:16 97:11 99:5,17 107:23 112:2 questions 53:22 94:22 116:13,23 quick 83:8 93:16 quite 7:21 93:13 107:23,24 quote/unquote 105:9	read 8:16 67:25 73:1,3 83:10 84:6 85:14 90:6 95:19 97:9,13 99:3 reader 6:13 reading 62:21 77:23, 25 89:19 98:21,22 112:16 realized 38:9 realtime 52:19 107:7, 9 reason 8:11 39:11 42:14 recall 8:25 9:21 10:24 11:2 21:25 43:14 91:8 receive 67:8 recess 38:6 72:12 94:14 recite 48:11 recites 40:24 41:17 49:8 reciting 41:6 recognize 11:19 12:14 recollection 20:25 record 4:12 5:5 8:1 11:15 20:15 25:1 39:1 58:16 94:12,
		R	
		range 68:25 71:2 72:2 95:14 99:15 109:3 110:15 111:13,14 113:4,5,8, 10,17 rapidity 23:15 raster 66:12,18 69:21 70:10 ratio 73:6,9,13,17 74:4,10 76:16 81:24 reached 31:4 55:20 75:20 reaction 106:10	
		Q	
		qualified 24:23 qualify 33:4 question 8:3,8 9:13 10:13 27:18	

13 116:15, 19 recreated 106:25 redundant 57:25 refer 25:5 27:5 41:13 62:20 83:18 reference 54:22 55:14, 17 57:14 58:7, 9, 13 59:24 74:18 84:13 90:7 94:19, 20 99:22 108:9, 10, 11 116:25 referenced 59:5 references 9:8 56:11 referred 57:13 referring 5:2 30:5, 6 31:9 38:23 53:23 58:17 74:16 97:22 refers 27:1 29:25 33:1 73:8 99:22 reflected 27:4 region 34:15, 18 35:6, 15, 16, 18 36:18, 19, 21, 24 37:4, 5, 10, 11, 13, 16, 22, 23, 24 39:4, 15, 16, 17, 20, 21, 22 40:1, 7, 11, 14, 15, 21, 24, 25 41:1, 7, 9,	10, 11, 13, 14, 15, 16, 17, 20, 25 42:2, 24 43:1, 3, 9, 10, 11 49:10, 19 50:7, 8 66:13, 18, 21, 24 67:17, 18 70:15 82:14 83:14, 24 84:5, 9, 14, 15, 16, 18, 22, 24 85:1, 5, 6 86:3, 8, 9, 10, 11, 18, 19 87:1, 6, 11, 12, 20, 21, 22, 24, 25 88:1, 2, 3, 8, 9, 10, 11, 12, 24 89:1, 3 90:12, 15, 17 91:6, 9, 12, 17 92:6, 17 93:3, 6 98:9, 10 99:19, 20, 21, 25 103:6 106:10, 11, 13, 15, 16, 17, 22, 25 107:3, 5, 12, 13, 15, 19, 21 108:2, 7, 8 111:16 112:8 113:1, 14 115:8, 24 regions 25:18, 19 26:22 35:8 37:17, 20, 24 41:6 66:2, 3, 5, 25 67:12 68:6 75:14 85:1 92:5 93:1, 9 100:23 106:19 107:4 109:2, 4 110:17 111:3, 6, 8, 17	115:12, 13, 14, 17, 18 regular 14:11 reinforcing 92:24 rejected 32:4 related 13:11 56:23 60:9 83:18, 22 95:24 96:15 relates 17:6 43:22 58:23 95:4, 22 108:22 relating 52:3 relative 73:7 relevance 30:11 relevant 23:3 reliable 80:19 relied 64:8 113:18 rely 80:18 81:19, 20, 22 84:7 91:22 96:20 99:8 106:9 relying 56:24 57:12 80:2, 5, 6, 20, 25 81:7, 12 82:12, 23 remain 78:15 87:23 88:2 remarking 11:17 remember 9:22 10:7, 9 116:24, 25	reminder 7:23 removed 40:8 49:11 51:22 52:16 removing 39:16 40:25 41:18 42:1 43:1 84:22 repeat 9:13 10:13 33:15 73:10 90:9 107:8 109:19 repeatedly 25:19 repeating 99:5 repeats 90:3 rephrase 116:6 replaces 113:25 report 18:14 30:2 reporter 7:25 20:13 represent 109:9 representatio n 63:7, 13, 14 representing 114:5 represents 81:16, 23 require 28:18 91:20 required 24:14 50:11 61:17, 20 85:6 92:18 requirement 50:8, 23 requires 42:23 88:17
--	---	--	--

108:1 requiring 79:20 requisite 24:18 reread 64:18 research 15:24, 25 researching 17:14 resolution 113:8 respectively 71:19 114:17 respond 99:3 response 25:9 39:9 42:17 62:13 64:17, 19 responses 9:10 responsibilit ies 15:8 result 59:12, 15 65:9, 25 87:13 89:1 93:2 104:1, 10, 13 115:1 resulting 89:3 92:25 93:8 results 56:17 93:2 retained 10:11 retrieval 17:23 review 9:5 39:25 reviewed 9:4 31:19 revised 21:18 22:11	revisit 97:17 right 4:15 5:7, 15 7:1 11:7, 24 13:9, 18 14:18 18:8 19:6, 9 20:19 22:16 29:4 30:18 34:10 36:1 41:20 44:1, 9 48:13 54:17 56:5, 25 58:3 62:10 63:11 65:20 69:11 70:16 72:6, 14 76:5 82:14 83:15, 25 84:1 85:7 88:4, 20 90:13 91:3 94:1, 18 97:10 103:20 104:7, 15 107:6, 15 110:4, 22 112:15 116:3, 22 room 4:18 5:19, 24 6:1 rotation 41:19 S S-C-H-O-N-F- E-L-D 4:14 S103 102:9 S21 62:11 S23 62:15 S25	62:18 63:19 S27 63:19 S29 63:20 S31 63:23 S37 85:10 S49 70:10 S51 70:11 S9 62:6 sake 64:2 Samsung 9:17 19:20, 25 20:2, 18 21:4, 5, 9 satisfied 46:25 satisfy 51:11 save 93:15 94:1, 3 saying 27:18 52:25 54:23 56:22 64:24 77:3 79:14, 15 87:12 92:15 101:11 107:12 says 23:21 29:11 41:24 47:15 49:21 50:3 59:15 63:4, 18, 25 65:10 70:9 73:23 74:15 76:2 79:8 84:21 85:7 90:15 100:10 112:12	114:18 scan 66:12, 18 69:21 scanning 70:11 scene 59:5 79:10, 18 85:12 scenes 95:5 Schonfeld 4:3, 13, 14 13:21 38:21 94:16 116:24 science 22:24 24:6, 22 scope 35:22 43:17 45:7 52:23 53:6 scratch 106:4 screen 102:8 scroll 13:3 28:22 scrolling 12:5 second 97:8 111:25 112:6, 25 115:11 116:12 secret 7:16 section 13:5, 8 18:6, 24 19:6 22:18 64:12 83:4 84:12 85:18 95:7, 9, 10, 11 102:7, 10, 13 sections 21:19, 22
--	---	--	---

22:1 see 11:1 12:8 13:6,10 14:1 18:22 19:13 22:20 23:3 28:24 29:5, 16 39:4,18 41:2 44:2 49:6,12 51:20 57:11 59:13,14 60:17 63:1 72:11,23,24 75:2,7 79:8 89:16,23 91:17 101:15,21 107:9 110:7 114:15 seeing 66:9 91:8 110:20,21 segment 34:13,24 36:1,9 98:9 segmentation 93:9 98:3 116:8 segmented 33:24 34:15, 18 35:6,8 92:5,6 99:25 100:23 115:17,18 segmenting 99:21 segments 92:12 99:20 selecting 99:9,19,24 selectively 109:4 sense 18:13 71:15 77:10 80:23 sentence	61:7 79:7 83:2 107:8 separate 15:18 36:4 37:9 41:7,8 50:10 51:24 76:18 77:6, 9,20 separately 14:1 36:23 37:12 sequence 53:22 97:12 111:9 series 19:14 serve 13:20 18:13 20:18 served 9:24 19:17 service 12:24 serving 7:18 19:1 21:6 sessions 8:24 set 62:13 65:13 67:13 several 7:13 10:21 16:9 70:8 show 26:17 57:18, 22 showing 11:8 102:14 114:9 shown 62:6,7 77:12 79:11 89:22 shows 70:12 89:23 114:15	Shui 55:5,8,14,17 56:3,12,22, 24 57:1,4, 12,16,21 58:9 71:17 108:10,12, 19,21 109:1, 11,20 110:2, 8 112:4,12, 23 114:2 116:4,25 shutter 52:7 side 5:17 sides 10:10 signal 17:21 25:24 26:23 27:3 29:2,5,7,9, 10,11,15 32:21 33:13, 21 44:6 47:17 49:24 50:13 51:6, 9,16 52:10 54:1,3,4 60:23 62:14 signature 12:1 similar 31:3,15,17 56:20 59:3 107:22 109:18 simple 63:8 82:5 simply 44:16 45:18 46:10,24 61:20 65:10 75:9 78:3 79:25 88:15 92:24 single 16:3 113:4	situation 79:12 sixth 45:13 skill 22:19 23:10, 14,22 24:18 32:6,10 89:19 90:5, 16 skip 98:2 skipping 27:2 slight 31:5 slightly 12:19 24:9 56:18 64:1 79:9 slower 110:1 solution 25:21 26:9, 19 59:21 109:17 solve 23:20 27:25 solved 109:12 sort 56:20 96:7, 8,9 98:23 110:6,22 sounds 52:24,25 72:9 source 27:4,12,13 28:9 59:19 62:5 65:7, 13,15,24 66:3,14,19, 22,25 67:9, 11,12,15,19, 21 68:7,9, 15,16 69:19,
--	--	---	--

25 70:1 71:6,8,10, 11,23,24 72:2,3 73:6, 12,15 74:5 75:1,18,21, 25 76:3,7, 11,13,24 77:12 78:2, 6,10,24 79:11,13,17, 24 80:9,14, 19 81:2,7,9, 21 82:1 96:12 108:24 109:10 114:14,19 115:1 sources 72:17 109:16,22 space 27:5 spans 63:25 speaks 61:4 specific 17:15 33:25 60:1 76:18 77:15,16 91:18 105:12 specifically 26:3 41:24 63:1 78:7 80:13 90:24 91:25 97:5 specification 26:18 33:7,9 40:10 43:15, 24 50:25 51:16 53:1 89:25 90:21 91:15 108:4 specification s 53:11	spell 4:11 spells 62:25 spend 22:4 spoke 88:6 89:21 spot 80:18 spotlight 27:3 spotlights 26:21 27:19 spots 25:22 26:11, 15 square 87:8 squares 87:11 stand 30:20 STANFORD 4:8 9:3 20:14,16 28:14 33:16 38:2,7,20 42:3 54:7 72:5,11,13 94:4,8,15 116:12,17 start 29:2 41:8 45:21 51:12 54:10 58:5,6 62:2,16 76:14 83:9 87:8,15 92:15 93:19 97:10 106:21 112:12 started 42:4 starting 44:8 59:10 60:6 61:9	74:14 77:7 80:12 82:17 88:4 94:19 96:24 102:2 109:25 starts 28:23 30:17 59:11 60:16 62:5 72:21 state 4:11 22:22 26:19 44:21 58:22 69:8 82:18 90:11 95:4 98:1 108:21 111:23 112:1 stated 42:25 68:23 69:10,11 statement 5:4 23:7 27:20 28:13, 16 42:10 45:6 59:9 60:1 statements 38:14 104:20 states 24:4,5 32:20 39:15 44:4 50:20 62:11 73:21 74:21 79:7 84:14 92:23 102:6, 12 stay 19:13 step 62:6,11,15, 18 63:23 70:10,11 98:23,24 101:25 102:1 106:8 115:7 steps 62:8 97:4,6 103:8 111:9,	12 115:4 stick 5:9 storage 17:23 strongly 115:4 structure 29:24 48:20 student 15:17 16:1,7 students 14:15 15:11, 14,16 16:5 24:16,17 students' 15:24 study 16:22,23 22:25 23:24 24:1,6,8,22 subject 95:9,23 98:3,5,9 subjects 102:8 submission 9:8,9 18:14 submitted 11:24 12:6, 9,15,21 subroutine 62:7 subset 41:16 88:10, 12 89:4 108:6,7 substance 13:1 substantive 31:11 sufficient 55:21 56:1, 8,9 82:8 summarizing 98:20,23
--	---	---	---

summary 54:18 60:4	115:25	52:15 72:15	tenure 13:25
supervise 15:10	systems 17:1,4 25:18	74:13,17	tenured 14:11
supervised 24:17		76:16 83:13, 16 91:1	term 31:12 32:25
supervising 15:13,24 16:7	T 	93:14 96:10, 14 104:16	42:16 44:9
support 60:25 61:1 83:4	table 54:14 55:12	108:12 110:5 116:25	45:1,3,15,17 46:7,8,11, 13,15,20,21 47:20,25 48:17,25 52:21 53:21 63:15
sure 4:13 6:22 7:6 8:6 9:14 12:10 16:4, 20 20:4,7,8, 10 23:6 27:25 31:1 33:6,17 38:5 39:1 40:14 51:18 55:3 62:25 75:6 77:2,17 78:22 93:13 100:7 113:20	tactics 17:10	talks 27:2 51:1,21 59:4 61:13 63:2 74:7,9 77:11 78:7 84:10,11 90:22 91:10, 14 95:19,22, 25 109:11	terms 14:14 30:23 31:6 38:16 39:6 42:8,18 44:22 45:1, 5,11,19 47:7 49:1 63:8 112:21,22 115:20
surface 58:24 59:6,7	take 16:1 24:24 38:4 44:25 45:19 46:9, 10,22 58:3 60:12 71:1 72:8,18 74:20 82:10 83:8 94:3 103:22 104:15 114:1	target 74:24 85:10	test 85:17,19,22
surveillance 17:24	taken 50:7	taste 17:11	testified 4:5
survive 86:13,14	takes 69:13 72:1 87:1	taught 14:20 24:17	testify 8:11
survived 89:5	taking 44:18 104:6	tax 7:16	TH1 62:20 63:18, 25 64:2,4 65:19 70:24 73:8,23 74:3,23 75:10,13 81:23 82:6, 20 83:19 85:12
switch 28:22	talk 5:8 7:24 8:21 13:2,23 22:16 42:5 51:22 58:12, 25 65:2 73:2 90:24 94:19 97:7	teach 14:16 15:12 55:17 82:13 104:24	TH2 63:22 64:1, 3,5,6 65:20 70:24 73:7, 25 74:4
switching 94:18	talked 9:6 49:16 75:22 85:21 88:7 89:24 106:21	teaches 27:23 60:21 70:3 92:1,16 93:4 98:1	thank 4:15 7:1 8:7 18:4 63:16 64:23 72:4
sworn 4:5	talking 5:15 6:24 19:8 32:19 38:8,9,15 40:20,21 42:4 43:4	teaching 14:18,24,25 76:22 102:25	
synchronizati on 17:25 62:14		team 21:15	
synopsis 64:19		technical 21:25 63:15	
system 26:4 109:6		technology 23:16	
		ten 10:5,6 20:9, 17	
		ten-minute 38:4	

93:12, 13 94:17 96:4 116:13 theoretical 15:21 thing 31:15 51:24 57:8 83:18 92:1 100:10 107:1 things 12:20, 25 13:15 14:17 17:9, 11 18:1, 2 51:1, 7 53:12 77:12 95:20 96:1, 3 think 7:17 10:20 12:22 18:20 19:19 20:22 21:2, 4 23:11 25:8, 25 26:16 27:18 28:16, 17 31:13 32:2, 14 34:20 35:25 36:5 39:9 40:3 41:14 43:4 44:15 49:20 50:9 51:19 52:17 53:21 54:22 55:6 58:1 61:4, 8 62:23 69:12 70:2 72:5 74:12 77:19 83:16 86:20 87:4, 6, 16 89:18, 21 90:5 91:9 93:12, 15 96:4, 9, 23 98:7 99:2, 16 100:1 107:22 111:1 112:1	114:3 116:4, 5 three 9:1 15:18 23:1 54:15 56:11 96:22 three-page 61:3 threshold 62:19 65:3, 13 66:1, 2, 5, 6, 16, 20, 23, 25 67:1, 6, 13, 16, 17 68:1, 4, 8, 10, 12, 13, 18 69:1, 4 71:3, 4, 7, 21, 25 73:7, 8 75:10, 17 81:9, 13, 15, 23, 25 82:6, 20 83:19 84:1 86:2, 5 92:7 93:8 98:18 101:4, 9, 18, 21, 24 102:22, 24 103:2, 7 107:4, 16, 17 113:23 threshold- based 68:24 thresholds 65:19 69:15 70:24, 25 73:19 time 9:24 14:20 22:11 42:13 66:8 78:20, 21 80:24 94:9 116:13 times 7:5, 6, 22 8:17, 21 9:1, 2 10:2 20:3,	17 40:12 52:5 70:8 titled 5:3 today 8:12 108:13 today's 8:14 9:15 top 11:1 12:21 22:18 30:1 72:23 77:5 topic 24:10, 22 total 7:9 20:7 85:15 touch 17:10 trade 7:16 transition 66:21 68:14 70:1, 5 115:11 translation 108:15 trouble 67:24 true 19:19 21:4 47:6 48:25 88:5 109:9 113:12 114:21, 22, 24 115:6 truthfully 8:12 try 7:24 100:14 trying 28:3 37:7 45:7 66:10 72:16 77:23 104:22, 23 108:19 110:2	Tsujino 54:22, 25 55:2, 4, 5, 13 56:1, 14, 16, 22, 24 57:1, 3, 21 58:7, 12, 18, 20, 23 59:2, 8, 22, 24, 25 60:3, 21 61:10, 13, 16, 19, 23 62:1, 25 64:13, 25 65:1, 6, 17, 18 67:2, 22 68:1, 17 69:9, 11, 12, 13 70:3, 4 71:13, 16, 20 72:15, 18, 20 73:5, 11 74:2, 18, 21 76:20, 23 77:24, 25 78:4, 9, 13, 16 79:15, 19 80:2, 10, 11 81:11 82:24 83:5, 7, 9, 24 84:13, 17 85:3, 14 86:25 87:13, 17, 18 88:19, 20 89:11 90:7, 11 91:5, 17, 21, 24 92:16, 17, 19, 20, 21, 22 93:2 106:21, 23 107:23 109:20 111:11 Tsujino's 68:24 75:4 turn 5:22 49:3 61:10 75:19, 21 76:2, 25
--	---	---	--

77:1 78:19, 23,25 79:21 80:4,23,24 turned 74:25 76:15 79:10 80:5,6 81:21 87:9 turning 5:20 77:11 78:17 85:19 twice 97:13 two 11:7 14:2 17:15 18:25 19:2 23:1 37:20 41:6 45:10 50:10, 13 54:5 65:19 67:14 70:24 73:18 76:18 83:10, 17,21 84:25 89:9,10 102:17 106:18 115:4 two-hour 7:9 two-step 113:11 type 9:10 12:25 14:16 16:21, 22 23:14,16, 18,20 types 14:24 18:17	unchanged 78:15 undergraduate 24:4,11,17 understand 8:4 17:13 29:22 37:7 45:7 50:18 52:22 54:8 57:3 66:10 77:23 79:3 90:16 93:12 104:22 107:23,24 understanding 13:24 14:5 23:12 25:12 27:7,17,19, 20 28:6 29:18 30:22, 23 31:3,22 32:23 35:18 40:18 41:5, 10 42:20 44:11 46:12, 19 48:22 51:17 54:15 58:19 60:19 73:4,11 75:4 85:3 88:23 93:22 94:25 97:19 107:11 understands 90:7 understood 8:8 13:16 38:1 39:24 49:3 50:9 52:11 68:24 unit 25:24 29:14, 23 31:12 32:19,20 33:11,19 34:9 36:5 39:4,15,20 40:5,17,21, 22,24 41:10,	25 42:6,21 43:3,5,11,16 44:2,4,9 45:2,8,9,22 46:8,11,13, 16 47:4,10, 13,16,20,22 48:2,5,6,8, 11,13,14,16, 20 49:9,17, 18,20,22,23 50:3,5,16, 17,21,22 51:14,23 52:2 53:2,4, 5,24 60:16, 22 64:9,10 82:14 83:15, 25 84:5,15, 22 85:2 91:20 92:17 106:10 units 29:3 42:16 University 13:17,19,23 14:8 unlike 115:19 unsuccessful 56:5 update 14:6 updated 70:10,12 upload 38:13 uploaded 42:11 uploading 58:9 upper 62:17 70:16	26:22 33:8, 12,20,24 34:7 35:6 37:5,6,9,15 39:17,22,25 40:1,4,5,6, 11,15,17,20 41:1,11,13, 20 42:2,6, 16,20,23,24 43:2,5,8,13, 15,16,18,20, 22,24,25 48:7,8,15,16 49:10,17,20 50:6 62:19 63:10,18,21 64:4,6 65:3, 9,10,12,15, 19 66:4,7 67:3,5,7,8 68:20 69:1, 2,19 70:10, 12,21 71:3, 22,23 72:1, 16 73:23 84:23 85:2,5 86:15 88:7, 10,11 92:11 93:5,6 98:19 99:14 100:17,18 101:3,9,13, 17,23 102:5, 11,14,15,16, 18,20,22,24 103:2,7 105:11,12,20 106:13,15,22 107:2 108:6 110:12 112:4 113:6,7,16, 19 114:10, 11,12,16,21 valued 36:4 values 34:3 40:2,8
U			
ultimately 34:3 35:9,14 37:1,15 103:3 112:6 umbrella 18:1			
		V	
		value	

65:25 66:15, 20, 24 69:1, 3, 6, 7 82:3 87:10 95:8, 10, 11, 12, 13 96:13 98:5, 13, 16, 18 104:4 105:4 109:2, 3, 7 110:13 111:15, 20 112:15 113:9, 21 114:18 variety 15:20 various 20:5 95:25 96:3, 15 vary 7:12 varying 20:5 versed 14:13 version 58:10, 11 versus 87:7 vertical 62:13 video 17:2, 4, 6, 12, 22, 24 23:2 26:4 view 17:22 40:3 44:19, 25 45:15, 19 46:9, 10, 22 50:13 53:13 56:15 59:25 61:19 63:9 77:9 92:8, 20, 21 93:1 viewed 92:25	Vsync 62:14 w walk 29:1 62:10 112:18 walking 97:3 want 15:3 30:13, 14 36:3 38:25 55:3 72:8 92:14 94:8 104:10 105:2 109:25 112:9 wanted 52:22 97:17 98:25 way 6:15 11:4 28:1 34:19 41:12 44:12, 15 50:5, 14, 19 51:11 54:23 55:18 56:6, 10, 15, 19 58:1 59:3 61:11 65:11 70:15 90:17, 21, 24 92:12, 24 100:3, 11, 13, 14 106:24 109:23 110:14 113:19 went 17:8 white 52:4 53:12 63:9, 14 76:9, 11, 12 87:7, 9, 23 88:2 witness	4:4, 6 7:19 8:20, 25 18:10, 12, 13, 16 19:1, 7, 8, 10, 15, 18 20:18 21:6, 7 28:12 33:15 38:5 41:24 53:10 72:9 116:14 word 14:6 16:15 27:19 36:1, 2 52:12 90:14 words 42:19, 22 47:18 48:11 49:14 81:14 91:8, 9, 17, 18 110:8 112:16 work 6:15 11:5 13:5, 9, 11, 13, 22 14:15 15:11, 23 16:1 19:24 20:1, 6, 24 21:5 23:19 24:12 54:5 94:7 worked 13:21 19:15 working 23:17 works 15:18 94:8 worry 5:7 write 21:16 written 21:15 wrong 52:25 54:24 83:3 110:21 wrote 21:18 22:9	30:17 x x1 112:13 x2 112:13 xy 70:10, 12 89:21 y yeah 13:10 16:20 18:22 19:17 23:4 25:3 63:12 64:16 80:8, 16 83:12 87:4 89:23 93:25 96:11 104:22, 25 106:7 110:24 112:17, 18 114:7 116:17 year 7:8 9:23 years 10:21 13:14 15:3 18:2 23:1 z Zoom 6:3, 7, 17
---	--	--	--