

Page 1		Page 3	
1	UNITED STATES PATENT AND TRADEMARK OFFICE	1	INDEX
2	BEFORE THE PATENT TRIAL AND APPEAL BOARD	2	PAGE
3	X CORPORATION,)	3	Appearances..... 2
4	Petitioner,)	4	Exhibits..... 4
5	VS.) CASE NO.: IPR2025-00299	5	Stipulations..... 5
6	STERLING COMPUTERS) U.S. Patent No. 7,716,217	6	DR. LATIFUR KHAN
7	CORPORATION,)	7	Examination by Mr. Plail..... 5
8	Patent Owner,)	8	Corrections Page..... 255
9		9	Reporter's Certificate..... 257
10	*****	10	
11	ORAL DEPOSITION OF	11	
12	DR. LATIFUR KHAN	12	
13	NOVEMBER 13, 2025	13	
14	*****	14	
15		15	
16	ORAL DEPOSITION OF DR. LATIFUR KHAN, produced as a	16	
17	witness at the instance of the Petitioner, and duly	17	
18	sworn, was taken in the above-styled and numbered cause	18	
19	on November 13, 2025, from 9:08 a.m. to 5:09 p.m.,	19	
20	before Lisa F. DeMoe, CSR, RPR in and for the State of	20	
21	Texas, reported by machine shorthand, at the offices of	21	
22	Regus, located at 1220 River Bend Drive, Suite 250,	22	
23	Dallas, Texas, in accordance with the U.S. Patent and	23	
24	Trademark Office Rules of Civil Procedure and the	24	
25	provisions stated on the record or attached hereto.	25	

Page 2		Page 4	
1	A P P E A R A N C E S	1	EXHIBITS
2	FOR THE PETITIONER:	2	NO. DESCRIPTION PAGE
3	Mr. Ethan Plail	3	Exhibit 8 "Emergency-Driven Assured Information
4	WHITE & CASE	4	Sharing in Secure Online Social
5	701 Thirteenth Street, NW	5	Networks: A Position Paper".....132
6	Washington, D.C. 20005	6	Exhibit 9 "Estimating Twitter User Location Using
7	202.626.3586	7	Social Interactions - A Content Based
8	202.557.6025 (Fax)	8	Approach".....136
9	Ethan.plail@whitecase.com	9	Exhibit 10 "Tweets Mining Using Wikipedia and
10	FOR THE PATENT OWNER:	10	Impurity Cluster Management".....141
11	Mr. Devan Padmanabhan	11	
12	PADMANABHAN & DAWSON	12	
13	9800 Shelard Parkway	13	
14	Suite 120	14	
15	Plymouth, Minnesota 55441	15	
16	866.804.8678	16	
17		17	
18		18	
19		19	
20		20	
21		21	
22		22	
23		23	
24		24	
25		25	

Page 5 1 PROCEEDINGS 2 DR. LATIFUR KHAN, 3 having been first duly sworn, testified as follows: 4 EXAMINATION 5 BY MR. PLAIL: 6 Q. Good morning, Dr. Khan. 7 A. Good morning. 8 Q. Have you ever been deposed before? 9 A. Sorry? 10 Q. Have you ever been deposed before? 11 A. No. 12 Q. So I'll go over some of the rules of the road. 13 So I'm going to ask you questions and you'll answer 14 them. If you ever don't understand one of my questions, 15 just let me know and we can work through it together. 16 From time to time, your counsel may 17 object. Unless you're specifically instructed not to 18 answer, you must still answer. 19 Does that all make sense? 20 A. Sure, yeah. 21 Q. One other thing is, just, you always need to 22 provide a verbal answer. I know it's common to shake or 23 nod your head, but for the court reporter's benefit, 24 it's -- it's good to always provide a verbal answer. 25 A. Okay.	Page 7 1 A. No. 2 Q. Did you speak with anyone else other than your 3 counsel to prepare for today's deposition? 4 A. I talked to the one in the lawsuit. 5 Q. Okay. But no one else? 6 A. No. No. 7 Q. All right. So I'm going to go ahead and hand 8 you a copy of your declaration. And this has already 9 been marked as Exhibit 2029. This is your declaration, 10 right? 11 A. [Nods head.] 12 MR. PADMANABHAN: You have to say "yes" or 13 "no." 14 A. Yes. 15 (Sotto voce conversation.) 16 A. Yes. 17 Q. (BY MR. PLAIL) All right. I'm going to ask 18 you to turn to paragraph 21, please. 19 A. Yeah. 20 Q. My question is -- 21 MR. PADMANABHAN: He said paragraph 21. 22 Paragraph. 23 A. Paragraph. I went to the page. Sorry. 24 Q. (BY MR. PLAIL) At the end of the paragraph, 25 you say, "Person having ordinary skill in the art to
Page 6 1 Q. Can you -- sorry, what is your current 2 address? 3 A. Home address? 2229 Homestead Lane, Plano, 4 Texas, 75025. 5 Q. Okay. Did you speak with Justin Marston in 6 the process of preparing for your deposition? 7 A. No. 8 Q. Did you review Mr. Marston's declaration? 9 A. Declaration? You mean the patent or -- 10 Q. No. Mr. Marston submitted a declaration in 11 this action. Have you read that? 12 A. Can you show me? 13 Q. Well, if you haven't reviewed it, I wouldn't 14 want to show it to you. But do you have any 15 recollection of seeing a declaration similar to your 16 declaration that was submitted in this action from 17 Justin Marston? 18 A. No. 19 Q. Okay. Did you review the deposition 20 transcript for Mr. Marston? 21 A. Deposition transcript? No. 22 Q. Did you speak with a Mr. Paul Marston? 23 A. No. 24 Q. Did you review a declaration from Mr. Paul 25 Marston?	Page 8 1 which said subject matter pertains" [as read]. 2 Do you see that? 3 A. In 21? 4 Q. Yeah. The end of 21. 5 A. Subject matter as a whole would have been 6 obvious at the time. 21, right, paragraph? 7 Q. 21, at the end of 21 -- 8 A. Uh-huh. 9 Q. -- you say there, the last sentence, "A person 10 having ordinary skill in the art to which said subject 11 matter pertains" [as read]. 12 A. A person having ordinary skill? Are we in the 13 same paragraph? 14 Q. Yes. "A person having ordinary skill in the 15 art to which said subject matter pertains" [as read]. 16 A. Yes. 17 Q. Do you see that? 18 A. Uh-huh. 19 Q. What are you referring as the subject matter 20 there? 21 A. Okay. Give me one or two minutes to answer 22 this. 23 (Witness reviewed document.) 24 A. Okay. So subject matter in this case need to 25 understand how the e-mail messaging system works.

Page 9 1 That's one. 2 Second is how the search term works and 3 what is calibrated. 4 If you're doing -- third, and -- and then 5 the ranking process, how does it work. So some of the 6 concepts a little bit advance, also. 7 THE REPORTER: I'm sorry, some of the 8 concepts what? 9 A. Advance level. It's not very basic. So that, 10 I tried to emphasize it here. 11 Q. (BY MR. PLAIL) So you're saying the subject 12 matter of the patents is somewhat at an advanced level? 13 A. You mean the patent '217, right? 14 Q. Yes. 15 A. Yes. Yes, some part, yeah. 16 Q. You mention they would need to understand how 17 search terms worked and are calibrated. Is that right? 18 MR. PADMANABHAN: Objection; 611. 19 You can answer. 20 A. So can you say one more time, that question? 21 Q. (BY MR. PLAIL) In your previous answer, you 22 mentioned that the person having ordinary skill in the 23 art would need to understand how the search term works 24 and is calibrated. Is that right? 25 A. So that's one -- that -- many topics that --	Page 10 1 there are many things will work together to make it 2 functional, the whole system. So it's not necessarily 3 only the search, yeah. Search is one important 4 component. 5 Q. Okay. And you mentioned that the subject 6 matter in the case also includes e-mail messaging 7 systems. Is that right? 8 A. Yeah. 9 Q. So a person of ordinary skill in the art would 10 understand how e-mail messaging systems works? 11 A. Uh-huh, yes. 12 Q. Can you go to paragraph 22 of your 13 declaration? 14 A. Paragraph 22, yeah. 15 Q. Next paragraph. 16 A. Uh-huh. 17 Q. If you go on the next page, in the middle of 18 the paragraph, you say, "My obviousness analysis 19 relating to Dumais reference would be the same whether 20 the relevant date is June" -- 21 A. Hold on. In the middle? 22 Q. In the middle. 23 MR. PADMANABHAN: Right here [indicating]. 24 A. "My obvious" -- okay, yeah. 25 Q. (BY MR. PLAIL) Okay. So you're saying, "My	Page 11 1 obviousness analysis relating to Dumais reference would 2 be the same whether the relevant date is June 30, 2005, 3 or January 13, 2006" [as read]. 4 Do you see that? 5 A. Yeah. 6 Q. So you do not provide an opinion about what 7 the correct priority date is for this patent? 8 A. I'm saying whether it is on June 30th -- 9 whether it is in 2005 or 2006, my opinion will be the 10 same. 11 Q. I understand that. 12 My question is: You don't provide a 13 substantive opinion for which of those two priority 14 dates to use here? 15 A. Yes; I do not provide that. 16 Q. At the end of the paragraph -- 17 A. Uh-huh. 18 Q. -- you say, "My obviousness analysis relating 19 to the Kircher and Krug references would be the same 20 whether the relevant date is June 7, 2005, or 21 January 13, 2006" [as read]. 22 Do you see that? 23 A. Uh-huh, yes. 24 Q. Do you understand that both Kircher and Krug 25 predate June 7, 2005?	Page 12 1 A. Yeah. 2 Q. Do you understand that Kircher was filed on 3 April 16, 2002? 4 A. Uh-huh. 5 MR. PADMANABHAN: You have to say "yes" or 6 "no." 7 A. Yes. 8 Q. (BY MR. PLAIL) Do you understand that Krug 9 has a priority date of September 7, 2001? 10 A. Yes. 11 Q. Can you go to paragraph 23 of your 12 declaration? 13 A. Uh-huh. Paragraph 23? 14 Q. Yes. You say there that, "As part of the 15 obviousness analysis, one must consider whether the 16 prior art teaches away from the claimed invention" [as 17 read]. 18 Is that right? 19 A. Yeah; give me one minute to understand first. 20 (Witness reviewed document.) 21 A. Yes, I understand. 22 Q. What is your understanding of "teaching away"? 23 A. So I'm going to answer it, just give me a 24 couple of minutes so that I can say precisely what I 25 meant.
--	---	---	--

Page 13 1 (Witness reviewed document.) 2 A. So in a plain term, my understanding is, if 3 the prior art discloses it wholly, we have the claim. 4 If it already disclose it, then the -- then that will 5 teach us away from the claimed invention, right? 6 So in the claim, we claim certain items or 7 certain concepts. And if we are claiming, let's say, 8 and then somebody already disclose it earlier, the whole 9 thing, as a whole thing, then it will -- it will be 10 invalid art. 11 Q. So that's your understanding of "teaching 12 away"? 13 A. Right. 14 Q. Are you arguing that any of the references, 15 Dumais, Kircher, or Krug teach away from the claimed 16 inventions? 17 A. Sorry, can you say one more time, the 18 question? 19 Q. Are you arguing that any of the references, 20 Dumais, Kircher, or Krug, teach away from the claimed 21 invention? 22 A. So I'm saying the claim is that we're saying 23 the patent '217 interviews the concept, which are not 24 covered by Dumais, Krug, or Kircher, so, therefore, the 25 patent has been already researched and that should hold.	Page 15 1 Do you understand that? 2 A. Give me one minute. Let me understand the... 3 (Witness reviewed document.) 4 Q. Dr. Khan? 5 A. Yeah. 6 Q. Is that what that paragraph says? 7 A. So sorry, I forgot what you said. 8 Q. I was reading the paragraph. You say here, "I 9 understand when an obviousness challenge is based on a 10 combination of references, one must consider whether 11 there is a motivation to combine the teaching 12 references" [as read]. 13 Is that what that sentence says? 14 A. Yes. 15 Q. Okay. What is your understanding for the 16 types of activities that can motivate a person of skill 17 to combine references? 18 A. What is that -- sorry, what is that? 19 Q. What is your understanding of the types of 20 things that can motivate a person of skill to combine 21 references? 22 A. So you mean what type of degree or what type 23 of skill set, right? 24 Q. No. I'm asking what information, what 25 motivations would a person of skill in the art have?
Page 14 1 Q. I understand that that's your position. I'm 2 asking a more specific question. 3 A. Okay. 4 Q. Are you arguing that any of the references, 5 Dumais, Kircher, or Krug, teach away from the claimed 6 inventions? 7 A. Can you rephrase that sentence a little bit? 8 Q. Let me break it down. You have this paragraph 9 in your declaration referring to teaching away? 10 A. Uh-huh. 11 Q. Right? 12 A. Yeah. 13 Q. And we've gone over what you understand 14 "teaching away" to mean? 15 A. Yeah; that's my under -- understanding, yeah. 16 Q. And anywhere in your declaration have you 17 argued that one of the prior art references teaches away 18 from the claim? 19 A. The -- as a whole, no. 20 Q. Okay. Let's look at paragraph 24. You say at 21 the beginning of paragraph 24, "I understand that when 22 an obviousness challenge is based on a combination of 23 references, one must consider whether there is a 24 motivation to combine the teachings of those references" 25 [as read].	Page 16 1 What are the types of things that could motivate them to 2 combine references? 3 Let me make this a little simpler. 4 Can a person of skill be motivated to 5 combine references for financial gain? 6 A. Say one more time. Sorry. 7 Q. Can a person of skill be motivated to combine 8 references for financial gain? 9 A. Yes. 10 Q. Would a person of skill be motivated to 11 combine known conventional elements together? 12 A. Yeah; in real life, yes. 13 Q. And especially where those known conventional 14 elements yield a predictable result? 15 A. Yeah, if it's so predictable, yes. And it's 16 not necessarily only one people that do. Many people 17 try to do it. So predictable, yeah. 18 THE REPORTER: Sorry, what was the last 19 thing? 20 A. So predictable. If it is so predictable. 21 Q. (BY MR. PLAIL) You say in the second sentence 22 of this paragraph that, "There must be some motivation, 23 reason, or incentive that would cause one of skill in 24 the art at the relevant time to combine the prior art in 25 the way embodied by the patent" [as read].

Page 17 1 A. Uh-huh. 2 Q. That word "incentive," what are the 3 incentives? 4 A. Yeah, as we mentioned, the motivation, reason, 5 incentive. So -- so you are asking what is the 6 incentive here? 7 Q. What are the types of incentives? 8 A. Okay. One is the e-mail messaging system, 9 the -- the ranking system needs to be improved. That's 10 one of the motivations, so that when you log into the 11 system, you should get the correct e-mail listing or the 12 appropriate e-mail listing. That way, user will be 13 happy. 14 And in the long-term, this is some company 15 product, so probably many people benefitted, and then 16 customer will be benefitted, and then the owner will 17 also be benefitted as the user. 18 Q. Do you understand that a person of ordinary 19 skill in the art has creativity? 20 A. Yes; some people have -- are very creative in 21 life. 22 Q. And you understand that a person of ordinary 23 skill in the art can be creative? 24 A. Okay. So -- so you're saying a person of art 25 will -- will be also creative? That's your question?	Page 19 1 teachings of references together like pieces of a 2 puzzle? 3 A. Ordinary skill set, a person can do this, 4 right? You're asking me yes or no in that case, right? 5 Q. I'm asking for your understanding. 6 A. So you're asking me in this context or in 7 general? 8 Q. You have here the definition of a person of 9 ordinary skill in the art. 10 A. Yeah. 11 Q. I'm asking: Do you understand that a person 12 of ordinary skill can fit multiple teachings of 13 references together like pieces of a puzzle? 14 A. In this context, no. 15 Q. Okay. 16 All right. Can we go to paragraph 7 of 17 your declaration? 18 MR. PADMANABHAN: Paragraph what? 19 MR. PLAIL: 7. 20 A. 7, okay. Yeah. 21 Q. (BY MR. PLAIL) All right. Sorry, I meant to 22 direct you to paragraph 19, which is on page 12. You 23 will see that paragraph 19 goes on for some time and 24 onto the next page, and it actually includes multiple 25 paragraphs. If you go to page 13, on the second full
Page 18 1 Q. Yes. 2 A. In general, this is my observation over 3 25 years in academia, I noticed that some people are 4 very creative and some people are not. So I cannot say 5 that all people are creative. 6 Q. Yes. 7 A. Same with that person of skill set is 8 understanding the whole thing, but not necessarily 9 everybody will be able to do the same thing. 10 Q. Understand. 11 So you're saying that a person of ordinary 12 skill in the art may not necessarily be creative? 13 A. Yeah. 14 Q. Do you understand that a person of ordinary 15 skill in the art can fit the multiple teachings of 16 references together like pieces of a puzzle? 17 A. Say one more time slowly, if you don't mind. 18 Q. Do you understand that a person of ordinary 19 skill in the art can fit the multiple teachings of 20 references together like pieces of a puzzle? 21 MR. PADMANABHAN: Objection; 401, 403. 22 You can answer, if you know. 23 A. Say it one more time. Sorry. 24 Q. (BY MR. PLAIL) Do you understand that a 25 person of ordinary skill in the art can fit the multiple	Page 20 1 paragraph, it starts with, "Although the Board's 2 definition of a person of ordinary skill in the art 3 differs from the definition I have proposed, my opinions 4 are the same under both definitions" [as read]. 5 A. Yeah. 6 Q. So you're saying, regardless of the definition 7 of a person of ordinary skill in the art, your opinions 8 here would not change? 9 A. Yes. 10 Q. So the precise definition of a person of 11 ordinary skill in the art does not affect the overall 12 analysis of obviousness? 13 A. Yes. 14 Q. If you go further up in paragraph 19 in the 15 second paragraph, under the header of "The level 16 ordinary skill in the art," you say based on my 17 experience, a person of ordinary skill in the art of 18 computer science would have had at least a bachelor's 19 degree in electrical or computer science/engineering or 20 related field, with at least six years of experience in 21 design or implementation," [as read] and it goes on from 22 there. 23 MR. PADMANABHAN: Where are you reading? 24 MR. PLAIL: Paragraph 19. 25 MR. PADMANABHAN: So you're reading the

Page 21 1 Board's definition? 2 MR. PLAIL: Page 12, paragraph 19. 3 MR. PADMANABHAN: Down there, sorry, 4 sorry. 5 A. Okay, second paragraph, right? 6 Q. (BY MR. PLAIL) Yes. 7 A. Okay. Yes, sorry; go ahead. Started based on 8 the experience... 9 (Cell phone rang.) 10 THE WITNESS: Let me silence my phone. 11 MR. PADMANABHAN: Yeah, turn that off. 12 MR. PLAIL: I'd appreciate it if you could 13 turn that off. 14 THE WITNESS: Sure. 15 (Sotto voce conversation.) 16 Q. (BY MR. PLAIL) All right. So you say, "Based 17 on my experience, a person of ordinary skill in the art 18 of computer science would have at least a bachelor's 19 degree in electrical or computer science/engineering or 20 related field" [as read]. 21 A. Uh-huh. 22 Q. My question is: You say a person of ordinary 23 skill in the art of computer science. What do you mean 24 "of computer science"? 25 A. Okay. So computer science is a -- I mean, it	Page 23 1 computer science means if you have a skill set, let's 2 say, information inter alia [phonetic], if you have a 3 skill set in data mining or database data -- related to 4 data, then as long as you have a degree in computer 5 science or computer engineering or electrical 6 engineering, you will survive. 7 Q. (BY MR. PLAIL) Okay. So you're saying a -- 8 A. Plus some experience, yeah. 9 THE REPORTER: I'm sorry? 10 A. Plus some experience. 11 Yeah, sorry; go ahead. 12 Q. (BY MR. PLAIL) So you're saying a person of 13 ordinary skill in the art of computer science would have 14 these skill sets? 15 A. Computer science field, yeah, would have this 16 skill set, plus some experience, what I mentioned six 17 years of experience, yeah. 18 Q. You say "or related field." A related field, 19 is that data science that you were discussing? 20 A. Yeah. Now it -- at that time, there's no data 21 science, if you remember, at that time. But, yes; 22 nowadays, yes. 23 Q. What are other related fields? 24 A. From now -- from the -- 25 Q. At the relevant time period.
Page 22 1 can -- in the engineering field, it can be 2 [unintelligible]. 3 THE REPORTER: I'm sorry, say that again. 4 A. So computer science field, in general, it can 5 be a part of the engineering field, or it can go with 6 the traditional science. 7 And it is a -- so what I meant in this 8 case, ordinary skill in the art of computer science, so 9 computer science has a lot of structure courses. 10 Computer science has data mining. Computer science has 11 information related... 12 So this is the areas I'm focusing on in 13 general. And that -- if somebody has a degree in -- 14 bachelor in computer science, they already know those 15 basics. 16 And, also, if you have electrical 17 engineering background -- so usually the electrical 18 engineers are very good in math and science as compared 19 to computer science. That's my observation at the time. 20 So, in that case, because here in the patent '217, later 21 you'll see a lot of math is involved. So some -- they 22 do some -- answer the question, try to solve it and so 23 on. So that's why electrical engineering background may 24 be useful in this case. 25 So, in general, what I meant in the art of	Page 24 1 A. At that time period or... 2 Q. Uh-huh. 3 A. Okay. That time period, electrical 4 engineering, think about signal processing background 5 would be useful. And -- but what I'm -- if you have a 6 degree in, let's say, civil engineering or construction 7 engineering, it might be difficult, unless if you were 8 20 years in the field, in computer field, there's a 9 possibility, but... 10 Q. So those are the related fields that you're 11 referring to? 12 A. Right. There is a significant overlap in 13 computing -- computer field and computer engineering and 14 electrical engineering, in general, so that's why we put 15 this. 16 (Sotto voce conversation.) 17 MR. PLAIL: Let's take a one-minute break. 18 (Break taken from 9:38 a.m. to 9:40 a.m.) 19 Q. (BY MR. PLAIL) What is a Gauss-Seidel 20 algorithm? 21 A. So if you -- in the patent '217, they talk 22 about the factor -- sorry. They talk about two things. 23 One is the global relevancy. The other one is called 24 local relevancy. And these two are circularly related 25 to solve this equation. There is an algorithm to

Page 25 1 address that issue, and for that the 2 set [unintelligible]. 3 THE REPORTER: The what? The issue and 4 for that the -- the last -- the very last thing you 5 said. 6 A. There's an equation involved. So if you need 7 to solve globally, you need to know the local one, or 8 vice versa. 9 THE REPORTER: You need -- I'm sorry. To 10 solve globally, you need to solve the what? 11 A. There are two -- okay. So there are multiple 12 important components. There are relevancy. For 13 relevancy, we need to consider the local relevancy, 14 global relevancy. 15 And then the third one is the cognitive 16 relevancy and content relevancy. 17 There are four types of things -- 18 components that are there. 19 And now for the local and global, local 20 relevancy and global relevancy, if you want to solve the 21 equations, and the equations that -- there's a -- in 22 order to know the global relevancy, you need to solve 23 the local relevancy first, or vice versa. So there is a 24 significance is there. So in order to solve those 25 equations, there is a -- this algorithm is widely used	Page 27 1 developed by the patent '217. 2 THE REPORTER: I'm sorry, what? 3 MR. PADMANABHAN: It's not proposed or 4 developed. 5 THE REPORTER: Thank you. 6 A. By the patent '217. But the -- however, the 7 local importancy, global importancy, these two concepts 8 are introduced by the -- by the patent owner of '217. 9 Q. (BY MR. PLAIL) You mentioned that the local 10 relevance and the global relevance are a chicken and egg 11 problem. Is that right? 12 A. Okay. Yeah, there are some dependency exists, 13 yes. 14 Q. So you're solving one as an input to the 15 other, and then output for that goes back to the input. 16 Is that right? 17 A. Yeah. 18 Q. So you would need both the local and the 19 global importance to fully solve the equation? 20 A. Right. 21 Q. And both would be necessary for the algorithm 22 to function? 23 A. What -- the way the patent claim is written, 24 so is not -- at the beginning, initial stage, when the 25 algorithm starts to learn. So at that point, some of
Page 26 1 in the industry or in the academia. 2 Q. (BY MR. PLAIL) When you refer to "this 3 algorithm," you're referring to the Gauss-Seidel 4 algorithm? 5 A. Yeah, the -- where did I say, can you show me? 6 Q. Paragraph 129. 7 A. 129? 8 Q. Yeah. 9 A. Yes. So, as I mentioned that, we have a local 10 importancy and the global importancy. Those are the 11 two. For each message, we need to determine some sort 12 of importancy, local importancy and global importancy. 13 And in order to solve -- in the equations, 14 we have to -- describe the equations, but there is some 15 relationship between these two. So in order to solve 16 the equations, we need to find out -- there's 17 chicken/egg problem, which one do you want to solve 18 first. And since there's a -- some dependency exists. 19 So that can be solved by/through this 20 Gauss-Seidel algorithm. And that is the standard 21 algorithm they utilize. And they do mention that, so 22 that I just cited we just mention here. 23 Q. So the Gauss-Seidel algorithm is a standard 24 algorithm? 25 A. Yeah; it is not -- it does not propose or	Page 28 1 the components may not have enough -- may not have 2 balance or neutralized to zero. And over time, the time 3 passes, the algorithm will learn more and more and 4 perform better. 5 So in that case, let's say after a couple 6 of days or a couple of iterations, the local relevancy 7 will have balance, global relevancy will have values, 8 then the content relevancy will have values. And then 9 the fourth one is -- cognitive relevancy will have 10 values. 11 So then all these components will work 12 together and produce the fully functional system that 13 work. 14 Q. So they all work together? 15 A. Right. 16 Q. And it's necessary for all of them to work 17 together for the algorithm to function? 18 MR. PADMANABHAN: Objection; Rule 611. 19 A. No. As I said -- 20 THE WITNESS: I should answer or no? 21 MR. PADMANABHAN: Yeah. 22 A. So I say the -- the way -- if you see the 23 Claim 1 language, it says second relevancy has multiple 24 components, and not all of them needs to present or 25 function. As long as one or all of them function,

Page 29 1 that's fine. 2 So when I read the patent '217, I -- I saw 3 very clearly stated in various places that how the 4 algorithm works. If you see the page, Figure 21 or 22, 5 one of the figures in the patent '217, they mention -- 6 they explain in that figure how the algorithm works 7 steps by steps. 8 And they're sure at the beginning 9 calibrated may not have enough values, because the 10 system is warming up. And -- but, eventually, those -- 11 it will start with the -- you want to know the details 12 without -- I can explain, but if you want to -- 13 Q. (BY MR. PLAIL) I mean, I'm just trying to -- 14 let's break this down a little bit. 15 You mentioned that there's the global 16 importance and the local importance and they work 17 together in the algorithm? 18 A. Yeah, they work together. But I'm saying it's 19 not necessary of -- each of them will have value at the 20 beginning, will have some -- eventually to learn, it 21 will be -- eventually it will have -- the system will 22 have all this -- all this -- each of these components 23 will have the values, yes. 24 Q. So, as a starting point, they can all have a 25 value of zero, for example?	Page 31 1 A. Yes. 2 Q. What is the problem that the '217 patent is 3 trying to solve? 4 A. So I should -- okay. I can say from here, or 5 you just want -- 6 Q. I'm asking generally. 7 A. Okay. So it's the -- the personal e-mail, 8 e-mail messaging system, you -- user -- so in the patent 9 '217, the sender sends e-mail message to a user, and 10 user will get a bunch of messages. And user will 11 provide some feedback, what they call a user action. 12 And based on user actions, we can bring the e-mail list 13 in a certain way that user will be happy. A more 14 relevant one will be shown first. 15 And in this case, the patent '217 16 introduce a very important concept called sender 17 importancy; who is sending the message to the recipient. 18 In this case, the recipient will be the -- in our 19 declaration, we call it first user. And then -- and 20 then we -- the patent also -- patent '217 also 21 identifies at least one other priority of users that is 22 the recipient of the electronic message and cognate -- 23 and that is cognate to the user also. 24 And then we call this as a -- you know, a 25 definition, call it second user. So then the --
Page 30 1 A. Not all. But some. Some of the unknown are 2 zero, yeah. 3 Q. And then as the algorithm is being solved, we 4 develop a value for the importance, the local 5 importance? 6 A. Right; local importance, global importance, 7 yeah. 8 Q. And so both the local importance and the 9 global importance are part of the algorithm? 10 A. Yes. 11 Q. And you need both the local importance and the 12 global importance for the algorithm to function? 13 MR. PADMANABHAN: Objection; Rule 611. 14 A. That part, I don't agree. Not all the parts. 15 Q. (BY MR. PLAIL) I'm not asking about all the 16 parts. I'm asking about the local importance and the 17 global importance. 18 MR. PADMANABHAN: Objection; Rule 611. 19 A. So what -- yeah, say it -- what is the 20 question, the exact wording? 21 Q. (BY MR. PLAIL) Do you need the local 22 importance for the algorithm to function? 23 A. Yes. 24 Q. Do you need the global importance for the 25 algorithm to function?	Page 32 1 there's -- one important point here is the second user 2 needs to be the recipient of the same electronic content 3 of the message, what the first user receives, and also 4 needs to be cognate to the first user. And -- 5 Q. So that's the problem that the '217 patent is 6 trying to solve? 7 A. Right. 8 Q. Okay. So is one of the problems that the '217 9 patent is trying to solve is weeding out junk e-mail 10 from relevant e-mail? 11 MR. PADMANABHAN: Objection -- objection; 12 401 to 403. 13 THE WITNESS: I should answer it or -- 14 MR. PADMANABHAN: Yes, sorry. 15 A. Can you show me, where did I say this? 16 Q. (BY MR. PLAIL) 56, paragraph 56. 17 A. Paragraph 56... 18 (Witness reviewed document.) 19 A. Yes; so -- yes, since I said so. 20 Q. So you agree one of the problems addressed in 21 the '217 patent is the volume of e-mail? 22 A. Yes. 23 Q. And so to break that down, basically, the 24 amount of information available on the internet is 25 always increasing, right?

Page 33 1 A. Can you say it one more time? 2 Q. Do you agree that there was an issue where the 3 volume of content available was always increasing? 4 MR. PADMANABHAN: Objection; 401 to 403. 5 A. So in this case, we're talking about the 6 e-mail messages. And the internet -- you're talking 7 about internet -- with regard to internet -- with regard 8 to the internet or the web, it means the -- at that 9 time, in 2000 -- 2005 or 2006, around that time, when it 10 talk about the search, we are -- the internet, we're 11 dealing with web pages. And that -- 12 Q. (BY MR. PLAIL) So you're saying the patent 13 here is focused on an e-mail system? 14 A. Yes; primarily, yes. 15 Q. And it's not focused on a website? 16 A. The algorithm -- as long as the -- if there's 17 a concept called sender and the recipient are involved, 18 if you have object where somebody will send the object 19 to a -- to a person or to a recipient, then there is a 20 concept called sender and recipient. If that exists, 21 then the algorithm, the whole thing as described, that 22 will also work in that context. 23 Q. So if you were to send a message from a 24 specific person to the user, that is what the '217 25 addressed?	Page 35 1 A. Okay, so -- sorry, can you say one more time? 2 Q. (BY MR. PLAIL) Within that context, one of -- 3 A. Which context? The 56 paragraph? 4 Q. 56 and the issues we were just discussing. 5 A. Sure. 6 Q. Within that context, one of the issues that 7 the '217 patent was trying to solve is to identify 8 useful messages among an ever-increasing number of 9 useless messages? 10 MR. PADMANABHAN: Object -- same 11 objections. 12 A. Identify -- you said identify useful messages 13 and separate them from useless messages? 14 Q. (BY MR. PLAIL) Correct. 15 A. I'm going to answer. Just -- I'm thinking a 16 couple things before going to answer that question. 17 They have a -- the patent '217 has a -- 18 one of the component called search component. So 19 what -- through the search, you can get the relevant 20 messages. And then the question is: How do you want to 21 rank those relevant messages? 22 The user actions and the sender 23 importancy, collaborative filtering, or calibrated 24 relevancy, this will play a role in the ranking process. 25 Q. I see. So the '217 patent includes a search
Page 34 1 A. Right. 2 Q. And within that content, there's an 3 ever-increasing number of these messages, right? 4 MR. PADMANABHAN: Objection; 401 to 403. 5 A. Sorry, say it again, please. 6 Q. (BY MR. PLAIL) Within that context, one of 7 the issues that the '217 patent is trying to address is 8 that there's an ever-increasing number of these 9 messages, and it is difficult to determine which ones 10 are useful and which ones are not? 11 MR. PADMANABHAN: Objection; 401 to 403 12 and 611. 13 THE WITNESS: I should answer? 14 MR. PADMANABHAN: Yeah. 15 Q. (BY MR. PLAIL) Just for context, unless your 16 counsel specifically instructs you not to answer, you 17 will always answer. 18 A. Okay. 19 Q. So just to go over this again, within that 20 context, one of the issues that the '217 patent was 21 trying to solve is that -- is to identify useful 22 messages among an ever-increasing number of useless 23 messages? 24 MR. PADMANABHAN: Objection; 401 to 403, 25 611, and 613.	Page 36 1 component? 2 A. Right. 3 Q. And using that search component, you can 4 identify relevant messages and then rank the relevant 5 messages? 6 A. So -- yeah, there are two steps in that -- in 7 patent '217. One is that before the feedback, they will 8 give you a list based on whatever knowledge they have at 9 that point. And then user -- the first user will give 10 feedback. Then, immediately, that ranking will be 11 updated. And based on the new -- new feedback, the 12 whole list will be updated and shown to the -- to the 13 first user. 14 Q. Okay. I -- I was just referring to your 15 previous answer. You said in your previous answer, and 16 I'm quoting here, "So through the search, you can get 17 the relevant messages, and then the question is how you 18 rank those relevant messages." 19 Is that right? 20 A. Right. So -- yeah, let's say you ask for 21 something "Dallas," they'll give me the messages related 22 to Dallas. 23 Q. And then the question is, how do you rank 24 those messages to Dallas? 25 A. So the content base or the search-based system

Page 37 1 will give you -- search-based system will give you 2 Dallas 100 messages. So now those 100 messages needs to 3 be -- the 100 messages need to be ranked in a certain 4 order, right? 5 So then at that -- then the issue lies how 6 do you want the ranking. So patent '217 has a very 7 unique way to rank it based on the sender importancy, 8 based on the local relevancy, based on the global 9 relevancy, based on the cognitive [phonetic] filtering 10 content. So all of this will be taking into 11 consideration during the ranking process. 12 Q. Okay. And so -- 13 A. Which is very powerful, I believe, as compared 14 to traditional -- other system at that point. 15 Q. And so just to go back to your earlier answer, 16 you're referring to where you said the user actions and 17 the sender importancy, collaborative filtering, or 18 collaborative relevance, this will play a role in the 19 ranking process? 20 MR. PADMANABHAN: Objection; Rule 611. 21 A. Sorry, you said something -- 22 Q. (BY MR. PLAIL) I was quoting your earlier 23 answer. 24 A. Sure, yeah. 25 Q. So quoting your earlier answer, you said, "The	Page 39 1 messages. 2 Q. (BY MR. PLAIL) The subset of e-mail messages 3 returned by the search result? 4 MR. PADMANABHAN: Objection; Rule 611. 5 A. Okay. So I need to add a couple of things. 6 So this is -- 7 Q. (BY MR. PLAIL) I'm asking a simple question. 8 You said earlier that the search will give you a list. 9 These are e-mail messages and they're associated with my 10 search. Then you talked about collaborative filtering 11 and collaborative relevancy. This is a -- 12 A. And -- 13 (Cross talk.) 14 THE REPORTER: Let him finish his 15 question, please. 16 Q. This is a simple question I'm asking. The 17 subset of e-mail messages returned by the search result, 18 that will be ranked using these collaborative relevancy 19 and importance metrics that you're referring to? 20 MR. PADMANABHAN: Objection; Rule 611 and 21 402 -- 401 to 403. 22 Q. (BY MR. PLAIL) Let's break it down. You 23 start with a search, right? You have an e-mail box. 24 You search in that e-mail box for the word "Dallas," 25 right?
Page 38 1 user actions and the sender importancy, collaborative 2 filtering, or collaborative relevance, this will play a 3 role in the ranking process." 4 You're referring to the search ranking 5 process? 6 MR. PADMANABHAN: Objection; Rule 611. 7 A. Okay. The search will give you a list. These 8 are the -- this is -- these are the e-mail messages that 9 are associated with my search. 10 Q. (BY MR. PLAIL) Right. So you have -- 11 A. Basically narrow down, and then you have some 12 sort of filter. Now this -- this set is still big and 13 you need to present it in a certain way, in certain 14 order. Which one will come first, that's the ranking 15 process, right? 16 So in that ranking process, we are using 17 all this various importancy, then content relevancy, 18 then also the collaborative filtering or collaborative 19 relevancy will be taken into consideration at the same 20 time. 21 Q. So the '217 patent uses various importancies 22 and relevancies and collaborative filtering or relevancy 23 in order to rank search results? 24 MR. PADMANABHAN: Objection; Rule 611. 25 A. In order to rank that subset of e-mail	Page 40 1 A. [Nods head.] 2 Q. Correct? 3 A. That's one -- one way to do it. 4 Another way -- 5 Q. One way to do it. 6 That search produces a subset of e-mail 7 results, correct? 8 A. Uh-huh. 9 Q. The '217 patent can then be used to rank those 10 search results, right? 11 MR. PADMANABHAN: Objection; Rule 611. 12 A. Yes. That's one way -- one -- one direction 13 when you utilize such. 14 Another direction is, let's say you get 15 a -- you're just logging into your e-mail box or e-mail 16 messaging system, and then you -- 17 Q. But just to -- just to make sure the record's 18 clear, the '217 can be used to rank the search results, 19 right? 20 A. Search -- search result will give you some 21 output, yes. Then patent '217, the ranking algorithm, 22 will work on it to rank those received e-mail messages 23 for a particular recipient. 24 Q. I'm going to go ahead and hand you the '217 25 patent. This has been previously marked as Exhibit 1 --

Page 41 1 Exhibit 1001. 2 I'm going to ask you to go to Claim 1, 3 which is on page 49. 4 A. Uh-huh. 49. Page 49 or 48? 5 Q. 49. 6 A. Okay, yeah. 7 Q. Starting around line 30, do you see where the 8 claim says, "A computer readable storage medium storing 9 computer program modules"? 10 Do you see that? 11 A. Line 30? 12 Q. Yes. 13 A. Okay. You said, "Computer readable storage 14 medium"? 15 Q. "Storing computer program modules." 16 A. Uh-huh. 17 Q. So you'd agree that the claim is directed to a 18 computer program, right? 19 A. Did I say that in my declaration? 20 Q. I'm asking. Is the claim directed to a 21 computer program? 22 A. "The computer readable storage medium is 23 storing computer program modules configured to execute 24 on the computer processor, the computer program 25 modules..." [as read].	Page 43 1 program? 2 A. So the patent say that or you're asking? 3 Q. I'm asking. 4 A. Oh, okay. 5 Q. So my question is: A person of skill 6 implementing the claims, would they need to understand 7 how to create a computer program? 8 A. Yeah; in general, yes. 9 Q. And you mentioned earlier that the algorithms 10 involved are quite complex? 11 A. Yes. 12 Q. And so one of the problems, then, would be to 13 efficiently solve the algorithm, correct? 14 MR. PADMANABHAN: Objection; 601 -- 401 to 15 403. 16 A. So please say it one more time. What is your 17 question? 18 Q. (BY MR. PLAIL) So one of the problems that a 19 person of skill would face when implementing the claims 20 would be to efficiently solve the algorithm on a 21 computer at that time? 22 MR. PADMANABHAN: Objection; 401 to 403, 23 and 6 -- 24 A. So now the -- 25 THE REPORTER: Sorry, 6 what?
Page 42 1 (Witness reviewed document.) 2 A. So which one are you asking me? 3 Q. (BY MR. PLAIL) I'm asking whether the claim 4 is directed to a computer program. 5 A. The whole sentence or just -- 6 Q. I'm asking whether the claim is directed to a 7 computer program. 8 A. Oh, I see. 9 (Witness reviewed document.) 10 A. So here, we talk about the computer system. 11 System means as a whole the contents, processor, CPU 12 and -- no GPU at that time, but CPU, plus RAM. And then 13 the software program will all work on it and the data 14 itself. So these are the things altogether are part of 15 the system. 16 Q. And an important part of the system is the 17 computer program, correct? 18 A. Yeah, of course. Otherwise, it will not work. 19 Q. And so a person of skill implementing the 20 claims would need to understand how to create a computer 21 program? 22 A. Sorry; what -- so you said the computer -- say 23 it one more time. 24 Q. A person of skill implementing the claims 25 would need to understand how to create a computer	Page 44 1 MR. PADMANABHAN: 613. 2 THE REPORTER: Thank you. 3 A. So what does "efficient" means in this case? 4 When you say "efficient," efficiency means a lot of 5 things. The parts of the algorithm, like the quality of 6 the result you're going to present to the user, the 7 ranking process needs to be good quality. If you -- you 8 come up with a ranking and the user doesn't like it, 9 then it's a useless system. 10 So, in that case, efficiency is a problem. 11 And some people think efficiency means speed. So, in 12 this case, efficiency is a little bit vague, in my 13 opinion. 14 Q. (BY MR. PLAIL) Okay. Can efficiency refer to 15 making the system scaleable on a computer? 16 MR. PADMANABHAN: Objection; Rule 613, 401 17 to 403. 18 A. So we are talking about 2005. So, at that 19 time, I think the efficiency of research or the -- the 20 product designer, product developer engineer, engineer 21 are more concerned with the quality of the result. So 22 when you do the ranking, come up with a rank list, you 23 need to make sure the rank list is relevant to the user. 24 If you give them some junk on the top, 25 some people may not want to use your system, right? So

Page 45 1 then this patent will not be useful at all. So, in that 2 case, I think that efficiency might be -- one of the 3 aspect for the efficiency should be the quality of the 4 result. 5 Q. (BY MR. PLAIL) Okay. 6 A. So I think that this algorithm, the patent 7 '217 algorithms have come up with a very high quality -- 8 high quality ranking process, so that will improve the 9 efficiency significantly. Basically, downstream user 10 will be -- or n user will be very happy. 11 Q. Understand. Understand. 12 Breaking this down, computers in 2005, 13 they were less powerful than computers today, right? 14 MR. PADMANABHAN: Objection; Rule 613. 15 You can answer. 16 A. Yes. 17 Q. (BY MR. PLAIL) And that lack of computing 18 power would be an obstacle to a person of skill 19 attempting to implement a perfect algorithm, correct? 20 MR. PADMANABHAN: Objection; Rule 613, and 21 Rule 401 to 403. 22 A. Okay. So one more time, please. 23 Q. (BY MR. PLAIL) The -- that lack of computer 24 power would be an obstacle to a person of skill 25 attempting to implement an algorithm, correct? Page 46 1 MR. PADMANABHAN: Objection; Rule 613, and 2 401 to 403. 3 A. So this is a -- the e-mail messaging system, 4 we are -- the patent '217 proposing is based on the 5 solver organization. The organization may not have 6 millions of users. So, in that case -- 7 Q. (BY MR. PLAIL) So the patent is focused on a 8 server side implementation? 9 MR. PADMANABHAN: Objection. 10 A. No. I'm not say -- what I'm saying -- 11 Q. (BY MR. PLAIL) So is it -- can it be used on 12 a personal computer? 13 A. Yeah, of course. 14 Q. And personal computers were not that powerful 15 in 2005, correct? 16 MR. PADMANABHAN: Objection; Rule 613. 17 A. Yeah, but -- okay. So there's a -- they talk 18 about cyber side and the client side. So -- 19 Q. (BY MR. PLAIL) Is that required under the 20 claim? 21 A. I have to take a look. Can I take a look? 22 Q. Sure. 23 (Witness reviewed document.) 24 A. What time? What time? 25 Q. It is 10:13.	Page 47 1 A. That's fine. This may take time to answer 2 your discussion, because this is a little bit 3 challenging question. 4 Q. I'm asking whether the claim is limited to a 5 server or -- 6 A. Let me look -- 7 (Cross talk.) 8 Q. I think your answer would be on the claim on 9 page 49. 10 A. Page -- my claim, 49? 11 Q. No. The claim of the patent is on page 49. 12 (Witness reviewed document.) 13 A. Page 49? Where is it? 14 Q. The claim. 15 A. Yeah, which claim? Claim 1? 16 Q. Claim 1 -- is Claim 1 limited to a server? 17 (Witness reviewed document.) 18 MR. PADMANABHAN: Objection; Rule 613. 19 Q. (BY MR. PLAIL) Dr. Khan, do you not know 20 whether the claim is limited to a server? 21 A. Give me -- because here they mention server, 22 so I'm just making sure I'm not saying anything wrong. 23 MR. PADMANABHAN: Again, objection; 24 Rule 613. 25 A. So, okay, you're going to give me a few Page 48 1 minutes, right? 2 Q. (BY MR. PLAIL) I mean, Dr. Khan, we've 3 reviewed the claim. 4 A. So -- 5 Q. Does it say the word "server" in Claim 1? 6 A. No. Here, the diagram shows there's a -- 7 Q. Is that Claim 1? 8 MR. PADMANABHAN: He's asking -- sorry. 9 A. Oh, no, no, not in that. Here, they do 10 mention the server, right? Is that your question? 11 Q. (BY MR. PLAIL) That is my question. 12 A. No, it doesn't say "server" explicitly. 13 Q. So it is not limited to a server? 14 MR. PADMANABHAN: Objection; Rule 613. 15 A. That, I have to take a look. 16 Q. (BY MR. PLAIL) What would you look at? 17 A. Specific definition area, Figure 4. Figure 4, 18 I want to review the text a little bit. 19 Q. So, based on Figure 4, you're concerned that 20 Claim 1 may be limited to a server? 21 MR. PADMANABHAN: Objection; Rule 613. 22 A. No, I'm not saying limited to server. But I'm 23 saying -- 24 Q. (BY MR. PLAIL) Then I'm wondering why you 25 can't answer my question. I'm asking whether Claim 1 is
--	---

Page 49	Page 51
1 limited to a server. 2 MR. PADMANABHAN: Objection; Rule 611 and 3 613. 4 A. Because I have to take a look a little bit 5 before going to tell you exactly. 6 Q. (BY MR. PLAIL) Okay. You've looked at 7 Figure 4? 8 A. Right. 9 Q. You've looked at Claim 1? 10 A. And I'm looking at the text besides the 11 Figure 4. 12 (Witness reviewed document.) 13 Q. Dr. Khan, I'll represent to you that nowhere 14 in your declaration do you use the word "server." 15 A. My declaration, right? 16 Q. Yes. 17 A. Okay. 18 Q. So I'm asking: Do you have an opinion that 19 Claim 1 is limited to a server? 20 MR. PADMANABHAN: Objection; Rule 613, 21 Rule 611. 22 (Witness reviewed document.) 23 A. So -- okay. So you try to tell me that the -- 24 the client or the n user will use the personal computer 25 and the computer may not have that much power, but	1 there are multiple servers mentioned in the '217 2 patent." 3 A. So you asked -- 4 MR. PADMANABHAN: Objection; Rule 611, 5 Rule 613. 6 You can answer. 7 A. So you asked me that the -- that the 8 scalability issue. At that point, I tried to explain 9 why a scalability would not be an issue at that point. 10 Because this is -- a client may use personal computer, 11 that's fine, n users. But to communicate with the 12 organizational server and then the Figure 4 in the 13 patent '217, it talks about various servers, including 14 the relational server and so on. So -- and those 15 servers probably would be very powerful. 16 Q. (BY MR. PLAIL) I see. So you're saying the 17 power of the server means there will not be a 18 scalability issue? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. I'm saying this -- okay. The -- this e-mail 21 messaging system focuses on a -- on a number of 22 messages. And these messages will be tailored to a 23 particular user, n user, recipients, and so on. So, in 24 that case, the way you -- you are -- I -- I think the 25 way you tried to relate it -- my -- this is my
Page 50	Page 52
1 that's the client side, right? And the client needs to 2 communicate with the server. And there are multiple 3 servers are mentioned in the patent '217. So they call 4 it relational server, where the -- the submessages would 5 be stored. 6 And then for each organization, according 7 to Figure 4, it has its own server. And so that way -- 8 they talk about the server, although in my declaration, 9 I -- we did not say explicitly, but in the patent '217, 10 they talk about servers. And the issue is, is that -- 11 Q. (BY MR. PLAIL) So your -- your -- just to 12 understand, your testimony is that Claim 1 requires a 13 client side to communicate with a server? 14 MR. PADMANABHAN: Objection; Rule 611, 15 Rule 613. 16 A. No, I did not say what, but -- 17 Q. (BY MR. PLAIL) You said -- I'm quoting, "The 18 client needs to communicate with a server, and there are 19 multiple servers mentioned in the patent '217." 20 Did you say that? 21 MR. PADMANABHAN: Objection; Rule 611 and 22 Rule 613. 23 A. So say it one more time. 24 Q. (BY MR. PLAIL) I'm quoting you, you said, 25 "The client needs to communicate with the server, and	1 understanding -- related to the internet search or 2 something. 3 Q. (BY MR. PLAIL) I'm not. I'm asking -- 4 (Cross talk.) 5 A. So that's different scalability. 6 Q. I'm asking a simple question. Are you saying 7 that the power of the server means there will not be a 8 scalability issue? 9 MR. PADMANABHAN: Objection; Rule 611 and 10 Rule 613. 11 A. Powerful server will not have a scalability 12 issue at that point -- at that time, right? That's what 13 you're saying? 14 Q. (BY MR. PLAIL) That's my question. 15 A. Yes, that's not an issue. 16 Q. Okay. So if we could go to column 6, line 65, 17 the patent says there, "Still referring to Figure 2, the 18 electronic mail system 250 or any combination of the 19 modules" -- 20 A. One minute. Line 60, right? 21 Q. 65. 22 A. 65, okay. Sorry. 23 Q. It says there, "Still referring to Figure 2, 24 the electronic mail system 250 or any combination of the 25 modules shown therein may run on any type of computer

Page 53 1 system" [as read]. 2 It then goes on to give an example of a 3 client side device, a server side device, a single 4 processor computer, a multi-processor computer. Do you 5 see that? 6 (Witness reviewed document.) 7 Q. Dr. Khan, do you see that statement in the 8 patent? 9 A. Yeah, uh-huh. Yes. 10 Q. Do you agree that the electronic mail system 11 250 or any combination of the modules shown therein may 12 run on any type of computer system? 13 MR. PADMANABHAN: Objection; Rule 613. 14 A. Sorry, what is the question? 15 Q. (BY MR. PLAIL) Do you agree that the 16 electronic mail system 250 or any combination of the 17 modules shown therein may run on any type of computer 18 system? 19 MR. PADMANABHAN: Objection; Rule 613. 20 (Witness reviewed document.) 21 A. Give me -- let me understand. Just give me... 22 (Witness reviewed document.) 23 Q. Dr. Khan, I'm asking whether you agree with 24 the statement directly out of the patent. 25 A. I'm just reading the --	Page 55 1 A. So your -- 2 Q. I -- I asked a question quoting the patent 3 directly, and we've spent 10 minutes. 4 A. Yes, yes. 5 Q. My question, reading column 6, line 65, it 6 says, "The electronic mail system 250 or any combination 7 of the modules shown therein may run on any type of 8 computer system" [as read]. 9 Do you agree with that statement? 10 A. Yes, I agree. 11 Q. Okay. Thank you. 12 Can we please turn back to Claim 1. So 13 we've established that you agree that the computer mail 14 system 250 or any combinations of the modules shown 15 therein may run on any type of computer system. That 16 would include a general purpose personal computer, 17 correct? 18 MR. PADMANABHAN: Objection; Rule 611 and 19 613. 20 You can answer. 21 A. General purpose computer means -- yes, not 22 necessarily the iPad -- I don't know whether the iPad 23 was there at that time. 24 Yeah, general purpose computer means as 25 long as it has a good -- a CPU and then the RAM, disc,
Page 54 1 Q. Have you reviewed this patent previously? 2 A. Yes. 3 Q. Did you review this patent in forming the 4 opinions in your declaration? 5 A. Yes. 6 Q. Okay. So I'm going to ask the question -- 7 (Cross talk.) 8 A. I mean, there are many pages. There are 49. 9 Q. Yes. And this is not your opportunity to read 10 the whole thing cover to cover. 11 A. No, I'm not reading the whole thing. I'm just 12 reading the neighboring paragraph. 13 Q. I'm going to ask again. Do you agree that the 14 electronic mail system 250 or any combination of the 15 modules shown therein may run on any type of computer 16 system? 17 And I will remind you that that is what it 18 says in column 6. 19 A. Right. So column 6, line 65, right? 20 Q. Yes. Do you agree with that statement in the 21 patent? 22 (Witness reviewed document.) 23 Q. Dr. Khan, you can't answer my question? 24 A. No, I can. 25 Q. Then can you please answer it?	Page 56 1 those things, yeah. 2 Q. (BY MR. PLAIL) So in order to run the 3 algorithm, the general purpose computer would need a 4 good CPU and then RAM and discs, correct? 5 A. Yeah. 6 Q. And why does it need a good CPU? 7 MR. PADMANABHAN: Objection; Rule 613. 8 You can answer. 9 A. Unless -- okay. Because the software program 10 needs to run it, right? And the CPU is the main part 11 where it will have instruction and execute the 12 instruction from the memory and produce the results. 13 So if your emission is very slow, it will 14 take time. But here -- the idea here is you -- you -- 15 you log in and you want to see the ranking of the list. 16 If it comes after one hour, the list, then it will not 17 be useful at all. So that's why some reasonable speed 18 would be -- reasonable mission would be 19 [unintelligible]. 20 THE REPORTER: Mission would what? 21 A. Reasonable processing power, CPU processing 22 power. Central processing unit or reasonable -- I mean, 23 if you get the response in a reasonable time. 24 Q. (BY MR. PLAIL) And so in order to make sure 25 that the computer email system 250 can effectively run

Page 57 1 on a general purpose personal computer, you would need 2 to make sure that the CPU is powerful enough to run the 3 program? 4 MR. PADMANABHAN: Objection; Rule 613. 5 A. I -- I think this patent focuses on the 6 quality of the result. And so I assume that at that 7 point, they use reasonable machines to produce the 8 quality result. And -- and some of the computation, you 9 can think about -- they talk about -- or you were 10 worried -- I think you were concerned about that. 11 Q. (BY MR. PLAIL) I was just going back to your 12 previous statement here. You said that we need a 13 powerful enough CPU so that we get the response in a 14 reasonable time? 15 A. Right, okay. 16 Q. And so that -- 17 A. I want to add a couple of things here -- okay, 18 go ahead. 19 Q. You said that we need a powerful enough CPU so 20 that we get a response in a reasonable time. Part of 21 that -- and that is necessary to implement the computer 22 mail system 250 on a general purpose computer? 23 MR. PADMANABHAN: Objection; Rule 611 and 24 613. 25 A. Can you say one more time? You gave a long	Page 58 1 statement. 2 Q. (BY MR. PLAIL) You said we need a powerful 3 enough CPU so that we get a response in a reasonable 4 time. Part of that is that it is necessary to 5 implement -- sorry. I'm going to strike that and start 6 over. 7 You said that a powerful enough -- that we 8 need a powerful enough CPU so that we get a response in 9 a reasonable time. That is necessary to implement the 10 computer mail system 250 on a general purpose computer. 11 MR. PADMANABHAN: Objection; Rule 611 and 12 613. 13 A. Okay. 14 Okay, I want to enter a couple of things. 15 The important part is the ranking or the quality -- the 16 results will be important in a certain order, right? 17 Q. Right. So understanding that the ranking is 18 important -- 19 A. Right. 20 Q. -- can you -- can you please tell me where in 21 the claim that it says the ranking has to be a certain 22 quality? 23 MR. PADMANABHAN: Objection; Rule 613. 24 A. Otherwise, it will not work, because the 25 relevancy mechanism, the relevancy, we mentioned the	Page 59 1 relevancy -- said relevancy configure to determine 2 relevancy score. So relevancy score is nothing but a 3 rank. 4 Q. (BY MR. PLAIL) Okay. And what quality is 5 necessary here? 6 MR. PADMANABHAN: Objection -- 7 A. So -- 8 THE REPORTER: Let him -- I'm sorry. 9 MR. PADMANABHAN: Objection; Rule 613 and 10 611. 11 A. So what is your question? 12 Q. (BY MR. PLAIL) You said the important part is 13 the ranking or the quality. What is the necessary 14 quality here? 15 MR. PADMANABHAN: And, again, objection; 16 Rule 611 and 613. 17 A. So the -- we got the relevancy score, right? 18 Based on that, it will be presented to the users. And 19 if user doesn't like the result, so then in the future, 20 if the frequency you are getting -- as a user you are 21 getting responses from that system and that are not 22 relevant to you in the top of the list, so then the 23 system would not be useful. You may not use it. So 24 that is the quality of the result what I mean. 25 Q. (BY MR. PLAIL) Okay. And how do you test the	Page 60 1 quality of the result? 2 MR. PADMANABHAN: Objection; Rule 613. 3 A. Okay, so that's a very good question. So 4 the -- sometimes capture the user feedback, whether it's 5 relevant or irrelevant, they have, I guess, five -- four 6 or five where you can choose which one you like. Is it 7 this content is relevant or irrelevant, or slightly 8 relevant, something like this. So that way you can 9 capture the feedback. 10 Q. (BY MR. PLAIL) I see. So you use the 11 feedback to determine whether the ranking is of 12 sufficient quality? 13 MR. PADMANABHAN: Objection -- 14 A. That is one -- 15 MR. PADMANABHAN: Objection; Rule 613. 16 Now you can go ahead. 17 A. Sorry, what is your question? 18 Q. (BY MR. PLAIL) So you use the feedback to 19 determine whether the ranking is of sufficient quality? 20 MR. PADMANABHAN: Objection; Rule 613. 21 A. So this -- the concept of this is one set of 22 feedback. They have other set of feedback. Like user 23 actions means that how many times it replies, how many 24 times it saves the messages. So those type of -- 25 Q. (BY MR. PLAIL) Those are like the actions of
--	---	--	---

Page 61 1 the user, right? 2 A. Right. 3 Q. So, I mean, my question is: You're saying an 4 important part of this patent is that the ranking is of 5 a high quality. How do we determine whether a ranking 6 is of a high quality or of a low quality? 7 MR. PADMANABHAN: Objection; Rule 613. 8 A. Okay. So the ranking will be -- will be 9 associated with the user, right? So you may -- I may 10 give one type of ranking, you may give another type of 11 ranking, feedback. So based on the feedback, they will 12 do the -- because is the cognate user a personalization 13 will be done, so that way the quality of the result will 14 improve over time. 15 Q. (BY MR. PLAIL) So you're saying because the 16 ranking is associated with the user, for one person it 17 may be a great ranking, for another person it may not be 18 a great ranking? 19 A. Slightly different, yeah. 20 MR. PADMANABHAN: Objection; Rule 613. 21 Q. (BY MR. PLAIL) And so how -- 22 A. Can I say something? 23 Q. Uh-huh. 24 A. So you talk about the powerful CPU, those 25 things.	Page 63 1 ranking, or the scoring mechanism is unique and very 2 powerful. And -- and that takes into consideration 3 sender importancy. That takes into consideration 4 content importancy. That takes into consideration 5 global importancy of the sender within the organization. 6 And they show some mathematical equations 7 how to solve it, how to incorporate all of this, and 8 then to talk about the collaborative filtering on top of 9 it. So all of this, I believe, will improve the quality 10 of the result of the ranking process. 11 And in terms of -- I -- I believe they 12 probably did some usability study. That's my 13 understanding. But probably it was not mentioned here. 14 I do not see it, but... 15 Q. (BY MR. PLAIL) So you're saying what 16 distinguishes the algorithms here over the algorithms in 17 the prior art is that this is of a higher quality? 18 MR. PADMANABHAN: Objection; Rule 611 and 19 Rule 613. 20 A. Prior art doesn't talk about especially the -- 21 you're talking about the Dumaïs, Kircher, and Krug, 22 right? So they don't focus on the -- this type of 23 system. Kircher might be close, but the other two are 24 not focusing on the electronic messaging system. It's 25 entirely different. So, therefore -- the closest one in
Page 62 1 Q. I mean, we've moved past that. 2 A. Oh, okay. 3 Q. We're talking about the quality. I'm trying 4 to get to the bottom of this quality. You're saying 5 it's an important part of the invention is the quality 6 of the ranking. So when I'm a user and I open up the 7 e-mail system and I look at the ranking, how do I 8 determine that it is of high quality? 9 MR. PADMANABHAN: Objection; Rule 611 and 10 613. 11 A. One more time, please. 12 Q. (BY MR. PLAIL) You're saying an important 13 part of the invention is the quality of the ranking. So 14 when I'm a user and I open up the e-mail system and I 15 look at the ranking, how do I determine that it is of 16 high quality? 17 MR. PADMANABHAN: Objection; Rule 611 and 18 Rule 613. 19 A. Okay, so a standard practice is usability 20 study. So I -- I -- this patent talks about user's 21 feedback will take into consideration, and over time we 22 will improve the ranking and more relevance document 23 will be shown to the user. That's the expectation. 24 So user -- the way the patent is written 25 or discussed, this shows a very powerful way to do the	Page 64 1 terms of the e-mail messaging system is Kircher, but 2 Kircher focuses only on the -- on the one particle of 3 the users and how that -- the -- when the user gets a 4 bunch of e-mail messages and user gives some feedback 5 and they will try to -- they're not talking about any 6 sender importancy -- sender importancy is there, but 7 they're not talking about local relevancy or global 8 relevancy. And then the calibrate, if you're doing 9 entirely -- these are the concepts entirely missing in 10 the case of Kircher. 11 Q. (BY MR. PLAIL) So let me ask a question. You 12 used the word "collaborative filtering." What does that 13 mean? 14 A. Okay. So you know the recommendation system, 15 Amazon, when you go to -- you probably use the Netflix, 16 right? 17 Q. I have used Netflix. 18 A. Yeah. So you see when you -- you watch some 19 movies, and then it -- eventually the system will -- 20 Netflix recommendation system will start to recommend 21 you some additional movies, right? 22 Let's say you watch some movies and -- and 23 that movie has a certain director and actresses and 24 actor, and the system assumes that you probably like it, 25 that's why you watch it. And then next time new movie

Page 65 1 has been released with that actor and actresses, the 2 movie will be -- will be recommended to you. That's 3 called recommendation system. And recommendation -- 4 Q. That's a recommendation system, but not 5 collaborative filtering system? 6 A. So -- yeah. 7 And then there's multiple ways 8 recommendation system works. One is called the 9 content-based recommendation system. The example I gave 10 is more content based. 11 The second one is collaborative. 12 And the latest one now they talk about, 13 latent factor model. 14 Okay. So the collaborative filter -- and 15 you can think about -- let's say there are two person, X 16 and Y, and the collaborative filtering is nothing with 17 the content. It's based on the interest, shared 18 interest. Mr. X and Y both likes certain movies in the 19 past. And then new movie has been released, and Mr. X 20 already likes it. So what is the expectation? That Y 21 will probably like that movie. So the system would 22 recommend that -- that movie to Y. 23 And in the past, also if X and -- X 24 dislikes something, Y also dislikes it. And now new 25 movie has been released and X dislikes it already. So Page 66 1 that's recommendation -- collaborative filtering would 2 not recommend that movie to Y. So it's based on the 3 similar interest, that type of thing. It's nothing with 4 the content. 5 Q. And for recommendation systems, these 6 collaborative filtering techniques are often combined 7 with content filtering, correct? 8 MR. PADMANABHAN: Objection; Rule 613 and 9 611. 10 A. I'm sorry, can you say it? 11 Q. (BY MR. PLAIL) These recommendation systems, 12 collaborative filtering techniques are often combined 13 with content filtering, correct? 14 MR. PADMANABHAN: Objection; Rule 613. 15 A. In a standard recommendation system, right. 16 At that time? 17 Q. (BY MR. PLAIL) Yes. 18 A. That's possible, yes. 19 Q. So if we use your Netflix example, part of the 20 system may look at whether X and Y both enjoyed the same 21 movie, and a second part of the system may look at, for 22 example, the content of that movie, the director -- 23 MR. PADMANABHAN: Objection -- 24 Q. (BY MR. PLAIL) -- correct? 25 MR. PADMANABHAN: Sorry. Objection; Rule	Page 67 1 613, Rule 611, and 701 to 704. 2 A. Sorry, I don't get your question. So you say 3 something first collaborative and then X and Y? 4 Q. (BY MR. PLAIL) So let's go to your Netflix 5 example. 6 A. Sure. 7 Q. One part of the recommendation system for 8 Netflix may look at the collaborative aspects, whether X 9 and Y enjoyed the same movie, right? 10 A. Uh-huh. 11 Q. And then a second part of the recommendation 12 system may look at the content of that movie, correct? 13 MR. PADMANABHAN: Objection; Rule 613, 14 611, 701 through 704. 15 A. So you're saying second case you look for the 16 content? 17 Q. (BY MR. PLAIL) I'm saying the recommendation 18 system would consider both. 19 MR. PADMANABHAN: Objection; Rule 611 -- 20 (Cross talk.) 21 MR. PADMANABHAN: -- 704 and 613. 22 A. When this -- the techniques were proposed 23 around that 2019 time, so people first started to use 24 content base, and then content base has pros and cons. 25 Then collaborative filtering has pros and cons. So they Page 68 1 tried to overcome this, too, by combining this, too, 2 yeah. 3 Q. (BY MR. PLAIL) I see. And you say that was 4 in the 2019 time period? 5 A. No. I said -- I couldn't remember the time 6 period, but around the time of when this patent was 7 filed -- 8 Q. I see. 9 A. -- or a little bit earlier, maybe. 10 Q. Okay. So around 2005, people started using 11 content-based -- 12 A. I think a little bit earlier, probably. 13 Q. Okay. And then around the same time, people 14 started using collaborative filtering? 15 A. Right. 16 Q. All right. 17 A. Collaborative filtering was introduced around 18 2000 or a little bit earlier. 19 Q. Okay. So collaborative filtering was 20 introduced around 2000? 21 A. I don't want to -- under oath, I don't want to 22 say exact date, because I cannot remember exact timing, 23 but -- 24 Q. Let me -- let me rephrase. Collaborative 25 filtering was introduced approximately around the year
---	--

Page 69 1 2000? 2 A. A little bit earlier or -- yeah, at that time. 3 Q. Okay. And people understood that there were 4 pros and cons with collaborative filtering? 5 A. Both methods have a strength and weakness. 6 Q. And by "both methods," you mean -- 7 A. Both content based and collaborative. 8 Q. Okay. And one of the ways they were trying to 9 overcome these pros and cons was by combining the two? 10 MR. PADMANABHAN: Objection; Rule 611 and 11 613. 12 A. Yes. 13 Q. (BY MR. PLAIL) And so just so I understand 14 collaborative filtering in a little more detail, 15 collaborative filtering is basically a technique to use 16 the opinion of peers to predict interests of a user. 17 MR. PADMANABHAN: Objection; Rule 401 to 18 403. 19 A. Sorry, say it one more time. 20 Q. (BY MR. PLAIL) Collaborative filtering is 21 basically a technique to use the opinion of your peers 22 to predict interests of a user? 23 MR. PADMANABHAN: Objection; Rule 611 and 24 401 to 403. 25 A. Okay, I need to know -- okay. So go slowly,	Page 71 1 A. Action is one way to say. 2 Q. So, basically, the actions of one user on a 3 piece of content is used to predict the relevance of 4 that content for another user? 5 A. Okay, please say -- 6 Q. The actions of one user on a piece of content 7 is used to predict the relevance of that content for 8 another user? 9 A. The action of a user is going to predict -- 10 Q. The actions of a user on a piece of content is 11 used to predict the relevance of that content for 12 another user? 13 A. Action of a user want to predict the action of 14 that? 15 Q. The actions of a user on a piece of content is 16 used to predict the relevance of that content for 17 another user? 18 A. Yes. 19 THE WITNESS: Can we take a break or 20 something? 21 MR. PLAIL: Yes. We can take a 22 five-minute break or so. 23 (Break taken from 10:51 a.m. to 24 10:58 a.m.) 25 Q. (BY MR. PLAIL) Can you turn to paragraph 158
Page 70 1 please. 2 Q. (BY MR. PLAIL) Collaborative filtering is 3 basically a technique to use the opinion of your peers 4 to predict the interests of a user? 5 MR. PADMANABHAN: Same objections. 6 A. So a user is a part of the peers group? The 7 wording is a little bit difficult to follow. 8 Q. (BY MR. PLAIL) Would that make a difference? 9 MR. PADMANABHAN: Objection; Rule 613 and 10 611, 701 to 704. 11 A. So please say it one more time, your 12 definition. 13 Q. (BY MR. PLAIL) Collaborative filtering is the 14 technique of using peer opinions to predict the 15 interests of others? 16 MR. PADMANABHAN: Objection; Rule 613, 17 611, 701 to 704. 18 A. Collaborative filtering is -- is a technique, 19 too? 20 Q. (BY MR. PLAIL) Using peer opinions to predict 21 the interests of others? 22 A. Peer opinions. So in this case "opinion" 23 means -- okay. Yeah, if you can say "opinion" means 24 actions are -- yes, yes. 25 Q. And you referred to actions?	Page 72 1 of your declaration? 2 A. 158. The Krug? 3 Q. Yes, you say there that "Krug does not 4 incorporate a relational model for objects, whereas the 5 '217 patent emphasizes a relational model" [as read]. 6 What is a relational model? 7 A. Okay, so here in the patent '217, we're 8 talking about the messages, and the message has a 9 submessage. And the sub -- let's say it sends a message 10 to B, and B sends a message to C, and C sends a message 11 to D. So this way, the submessages will be added. They 12 call it -- and they want to keep this in a 13 traditional -- at that time, traditional e-mail 14 messaging system, they keep multiple copies of the same 15 message in the system. Then you will waste storage and 16 so on. 17 This is an issue. So they tried to 18 address this issue, called it relational model. For 19 each message, they will keep only one copy in the 20 system. 21 Q. I see. 22 A. So that way the storage will be saved. So 23 that's -- and for that, they try to use the relational 24 model means in a database you maintain relations or 25 pointers. So one copy is kept, and then you say this

Page 73 1 copy is referenced by this. Another e-mail message is 2 sent and so on. So the reference is points that are 3 maintained. 4 Q. So your point here is that the '217 patent 5 uses that relational system but Krug does not? 6 A. Right; to store the messages, yeah. 7 Q. But Krug does not? 8 A. It doesn't talk about that, yeah, how -- how 9 to storage -- how do you -- how do you store the 10 objects. 11 Q. So you're saying that the relational model is 12 a requirement of the claim? 13 A. I'm sorry, relational? 14 Q. The -- are you saying that the relational 15 model is a requirement of the claim? 16 A. Of which claim? The -- 17 Q. The patent claims. 18 A. Yeah, I saw in the patent '217 that talks 19 about relational model in one of the claim. And I 20 think -- yeah, in the Claim 4. 21 Q. Okay. So you're saying the relational model 22 is required for Claim 4? 23 MR. PADMANABHAN: Objection; Rule -- yeah, 24 objection; Rule 611. 25 (Witness reviewed document.)	Page 75 1 A. I'm just double-checking... 2 (Witness reviewed document.) 3 A. No. 4 Q. So then it doesn't really matter that Krug 5 doesn't have a relational model? 6 MR. PADMANABHAN: Objection; 611. 7 A. So -- but -- but are we talking about only 8 Claim 1? We're not talking about only Claim 1. We're 9 talking about the multiple claims here, right? 10 Q. (BY MR. PLAIL) For Claim 1, it doesn't matter 11 that Krug doesn't have a relational model? 12 MR. PADMANABHAN: Objection; 611. 13 A. Right. 14 Q. (BY MR. PLAIL) I'm going to hand you what has 15 already been marked as Exhibit 1043. Do you recognize 16 this document? 17 A. Yeah. 18 Q. This is another patent assigned -- strike 19 that. 20 This is another patent which lists Justin 21 Marston as a named inventor, correct? 22 A. Uh-huh. 23 Q. Do you see that this patent was filed in 2004? 24 A. Uh-huh. 25 Q. You understand that this patent has also been
Page 74 1 A. So your question is -- can you say one more 2 time the question, please? 3 Q. (BY MR. PLAIL) You're saying the relational 4 model is required for Claim 4? 5 A. Relational model is required for Claim 4... 6 (Witness reviewed document.) 7 A. So in terms of how to store this mail objects, 8 relational model, that's how in Claim 4 they mention 9 that in patent '217. 10 Q. So Claim 4 requires the use of a relational 11 model? 12 A. Yes. 13 Q. Okay. But Claim 1 does not require the use of 14 a relational model? 15 A. But Claim 4 is a dependent claim, right? 16 Q. Correct. 17 A. Yeah. So Claim 1 doesn't talk about 18 relational model, but it -- Claim 4 talks about 19 relational model. 20 Q. So does Claim 1 require a relational model? 21 MR. PADMANABHAN: Objection; Rule 611. 22 (Witness reviewed document.) 23 A. So your question is Claim 1 is -- requires a 24 relational model or not, right? 25 Q. (BY MR. PLAIL) [Nods head.]	Page 76 1 asserted as prior art against the '217 patent? 2 A. Uh-huh. 3 MR. PADMANABHAN: You have to say "yes" or 4 "no." 5 A. Sorry, can you say one... 6 Q. (BY MR. PLAIL) Do you see that this patent 7 was filed in 2004? 8 A. Yes. 9 Q. Do you understand that this patent has been 10 asserted as prior art against the '217 patent? 11 A. Yes. 12 Q. Do you see in the abstract, it says, "A 13 messaging system uses a relational model to represent 14 messages exchanged among n users of the system" [as 15 read]? 16 A. Uh-huh. 17 Q. Can you say "yes" or "no"? 18 A. "Yes" or "no" for what? The messaging system 19 uses a relational model. 20 MR. PADMANABHAN: He's reading that first 21 sentence. 22 Q. (BY MR. PLAIL) Yes, I'm reading the first 23 sentence of the abstract. I'll ask the question again. 24 The abstract of this patent says, "A 25 messaging system uses a relational model to represent

Page 77 1 messages exchanged among n users of the system" [as 2 read]. 3 Is that correct? 4 A. So you're asking me in general or this -- for 5 this patent? 6 Q. I'm asking whether this patent says that 7 statement. 8 A. Yeah; that's correct, yeah. 9 Q. Okay. So this patent discloses a relational 10 model to represent messages exchanged among n users, 11 correct? 12 A. That's correct. 13 Q. And you understand that this patent is 14 asserted as prior art for the relational aspects of the 15 claim? 16 MR. PADMANABHAN: Objection; Rule 611. 17 A. Okay, what is -- can you say one more time? 18 Q. (BY MR. PLAIL) You understand that this 19 patent has been asserted in this IPR as prior art 20 against the relational aspects of the claim? 21 MR. PADMANABHAN: Objection; Rule 611. 22 A. The patent '217 and this patent have the same 23 inventors, right? Same inventors? 24 Q. (BY MR. PLAIL) No, no. 25 A. No? At least one of them.	Page 79 1 '217 patent that the term "relational model" as used 2 here is the same as how "relational model" is used in 3 the '217 patent? 4 MR. PADMANABHAN: Objection; Rule 611. 5 A. But patent '217, the focus is different. As 6 a more improved ranking or the quality of the result. 7 Q. (BY MR. PLAIL) Right. The focus of the '217 8 is not on the relational model? 9 A. No; underneath that to provide the 10 infrastructure support of where the messages will be 11 stored, they use the relational model. 12 Q. But it's not required to use the relational 13 model; we've established that? 14 A. Is -- the way the -- if you read the Claim 1, 15 it's not required for Claim 1. 16 Q. Uh-huh. 17 A. But if you read the Claim 4, there, they talk 18 about which is the Claim 4 is a dependent claim that 19 talks about the relational system, yeah, relational 20 model we need to take into consideration. 21 Q. And this discloses that relational model? 22 A. Right. 23 Q. Okay. Looking at the abstract -- 24 A. Uh-huh, which abstract? The -- the -- 25 Q. The abstract of the --
Page 78 1 Q. They have a single overlapping inventor. 2 A. So your question is: Can you treat them as 3 prior art? That's your question? 4 Q. No, that's not my question. 5 My question is: Do you understand that 6 this has been asserted as prior art? 7 A. What does "asserted" means? 8 Q. Do you understand that X Corp. is arguing that 9 this is prior art against the '217 patent? 10 A. Yeah, that, I understand. 11 Q. Yeah. And you understand that this patent 12 discloses a relational model? 13 A. Yes. 14 Q. All right. And you understand that they share 15 a common inventor? 16 A. Yes. 17 Q. And you would understand that, because they 18 share a common inventor, the way the relational model is 19 used in this patent is the same as the way relational 20 model is used in the '217 patent? 21 MR. PADMANABHAN: Objection; Rule 613 and 22 611. 23 A. Say it one more time, that last part. 24 Q. (BY MR. PLAIL) You understand because the 25 same person is an inventor on both this patent and the	Page 80 1 A. The -- 2 Q. The abstract of Exhibit 1043. It's right here 3 on the front page. 4 A. 1043, yeah. 5 Q. It says, "The messaging system stores each 6 object only once" [as read]. 7 Do you see that? 8 A. Where does it say? 9 Q. In the abstract. 10 A. Yeah, I know that, but let me read... 11 (Witness reviewed document.) 12 A. Yeah, uh-huh; I saw that, uh-huh. 13 Q. And so that is one of the benefits of using a 14 relational model, correct? 15 A. Yes. 16 Q. The next sentence says, "The messaging system 17 thus significantly reduces infrastructure costs by 18 removing unnecessary duplicity and providing enterprises 19 with the content granularity they need to enforce 20 regulatory compliance and other policies" [as read]. 21 A. Uh-huh. 22 Q. That's what the next sentence says, right? 23 (Witness reviewed document.) 24 A. Yes. 25 Q. And that is another benefit of a relational

Page 81 1 model? 2 A. Okay, yes. 3 Q. And so a person of skill would have been 4 motivated to use the relational model disclosed in the 5 Marston patent here in order to take advantage of those 6 benefits, correct? 7 MR. PADMANABHAN: Objection; Rule 613 and 8 Rule 611. 9 A. Can you say one more time? 10 Q. (BY MR. PLAIL) A person of ordinary skill 11 would have been motivated to use the relational model 12 disclosed in the Marston patent in order to take 13 advantage of those benefits, correct? 14 MR. PADMANABHAN: Objection; Rule 613. 15 A. Yes. 16 Q. (BY MR. PLAIL) Do you understand that the 17 Marston patent is discussing a messaging system that 18 uses a relational model? 19 A. This one, right? Or the Exhibit 1043? 20 Q. Yes. 21 A. They're using relational system? 22 Q. Do you understand that Exhibit 1043 is 23 discussing a messaging system using a relational model? 24 A. Yes. 25 Q. Can you go to Figure 1? In Figure 1, do you	Page 83 1 web browser module 120, right? 2 MR. PADMANABHAN: Objection; Rule 613. 3 A. Yes; web browser, yeah. 4 Q. (BY MR. PLAIL) And it says that, "The web 5 browser module 120 is a conventional web browser 6 application, such as Internet Explorer from Microsoft 7 Corp" [as read]. 8 A. Uh-huh, right. 9 Q. So this is an example of using a web browser 10 within a client application for a messaging system, 11 correct? 12 MR. PADMANABHAN: Objection; misstates 13 the -- objection; Rule 611. 14 A. Okay. And so -- what -- what are you saying? 15 Q. (BY MR. PLAIL) This is an example of using a 16 web browser within a client application for a messaging 17 system, correct? 18 A. To display the end results for visualization 19 purpose, presentation purpose, this browser will be 20 used. Not for the underneath messaging -- relational 21 model, no. 22 Q. And that's because e-mails are commonly HTML? 23 A. E-mail is -- no, e-mail is a text, a bunch of 24 text, raw text. 25 Q. Which is formatted?
Page 82 1 see the box on the bottom left? 2 A. Uh-huh. 3 Q. Do you see how the client application, which 4 is labeled 112A, and a web browser labeled 120? 5 A. 112A and 120, yeah. I saw it. 6 Q. So if we -- I'm going to direct you to the 7 paragraph that discusses this part of the figure. Go to 8 paragraph 30. 9 A. Okay, the block 30, right? 10 Q. Yes. 11 A. Column 3, okay. Yeah. 12 Q. You see there that is it discussing Figure 1 13 and the client application 112A, right? 14 A. Yeah. I should read it? 15 Q. Sure. You can read it. 16 (Witness reviewed document.) 17 Q. Are you finished reading? 18 A. Just give me one or two minutes. 19 (Witness reviewed document.) 20 Q. Dr. Khan? 21 A. Yeah. 22 Q. I have a pretty simple question. 23 A. Sure, yeah. Sorry. 24 Q. That paragraph, paragraph 30 of Exhibit 1043, 25 is discussing a client application 112 that includes a	Page 84 1 A. Yeah, you can convert it into HTML, XML, any 2 format. But for visualization, you can show it in a 3 browser, yeah. 4 Q. And a common way to format e-mail is with 5 HTML, correct? 6 A. HTML is widely used for presentation purpose. 7 For the web content, that will be -- 8 Q. Correct. And it's also widely used for 9 presentation of e-mails, correct? 10 A. I think at that time, 2005. Nowadays, browser 11 is based together, so the browser is -- the e-mail 12 system is integrated with the browser nowadays. 13 Nowadays. 14 Q. Okay, you can go ahead and put aside 15 Exhibit 1043. 16 A. You're telling me something? 17 Q. I'm just saying -- 18 A. Oh, we don't need it now? 19 Q. I may go back to it later, but... 20 A. Sure. 21 Q. All right. I'm going to direct you to 22 paragraph 25 of your declaration. 23 A. Yeah. 24 Q. This is the section of your report relating to 25 claim construction.

Page 85 1 A. Uh-huh. 2 Q. And I see you have a number of opinions 3 relating to some of the module terms, but I just wanted 4 to confirm -- before we dive in, I just wanted to 5 confirm you did not have any testimony relating to the 6 term "recipient" in the claim construction section? 7 A. So you are saying the recipient is not 8 mentioned here in the claim construction? 9 Q. Yes. I'm asking, do you have any opinions in 10 the claim construction portion of your report relating 11 to the meaning of the term "recipient"? 12 A. I saw in 37, we talk about recipient. "Second 13 relevancy model is coupled to the monitoring model 14 configure to identify at least one other of the 15 plurality of users that is a recipient of the electronic 16 content" [as read]. 17 Q. Okay. And so that's the only place you 18 discuss recipient in this section? 19 A. I have to take a look. 20 (Witness reviewed document.) 21 A. We mentioned in many places the -- the user, 22 but not the recipient explicitly. The recipient is 23 mentioned in one place, 37, but other places we mention 24 the user. 25 Q. But you're not providing any specific	Page 87 1 not provide testimony on that, Dr. Khan? 2 A. Yeah. 3 Q. When you -- what -- when you say "no," you're 4 agreeing that you are not providing specific testimony 5 in the claim construction section on the meaning of the 6 term "cognate user"? 7 A. When it says "specific construction," what 8 does it mean? 9 Q. Dr. Khan, you've already said you agreed. I'm 10 just asking you to confirm your answer here for the 11 record. 12 A. Yeah; so when you say "specific construction" 13 means -- 14 Q. You're not providing specific testimony 15 relating to the meaning of the term "cognate to the 16 user" here in the claim construction section? 17 A. That's correct. 18 Q. Okay. And in the claim construction section, 19 you do -- strike that. 20 In the claim construction section, you do 21 not provide any specific testimony relating to the 22 meaning of the identifying term? 23 A. So please say it one more time. 24 Q. In the claim construction section, you do not 25 provide any specific testimony relating to the meaning
Page 86 1 testimony about the meaning of the word "recipient" 2 here? 3 A. No. Recipient is an important concept. 4 Q. I understand it's an important concept. But 5 you're not providing any specific testimony here about 6 the meaning of the term "recipient"? 7 MR. PADMANABHAN: And "here" being in the 8 claim construction section? 9 MR. PLAIL: Correct. 10 A. So 37 would not be enough? Is that what 11 you're saying? 12 Q. (BY MR. PLAIL) I'm not saying anything. I'm 13 asking you a question whether you're providing any 14 testimony about the meaning of the word "recipient" here 15 in the claim construction section. 16 A. No. 17 Q. Okay. And you're also not providing any 18 specific testimony relating to the meaning of the term 19 "cognate to the user"? 20 A. So you mean the cognate to user we do not 21 define in the claim, that's what you're saying? 22 Q. I'm saying you don't provide testimony about 23 the meaning of that term here? 24 A. No. 25 Q. And when you say "no," you're agreeing you did	Page 88 1 of the identifying term? 2 MR. PADMANABHAN: Objection; 401 to 403. 3 A. So say one more time, the question. 4 Q. (BY MR. PLAIL) In the claim construction 5 section, you do not provide any specific testimony 6 relating to the meaning of the identifying term? 7 A. Identifying terms, or what is -- when you said 8 "terms," what does it mean? 9 Q. The identifying limitation in the claim. 10 A. Oh, okay. 11 MR. PADMANABHAN: Objection; 401 to 403. 12 THE WITNESS: I need to answer? 13 Q. (BY MR. PLAIL) Yes. 14 MR. PADMANABHAN: Yeah, if you -- if you 15 understand it. 16 (Witness reviewed document.) 17 MR. PADMANABHAN: I'm only doing this to 18 speed this up. I don't think he really understands. 19 When you said "identifying term," I don't think he knows 20 what you're talking about. And I'm just telling you 21 that for your own benefit. 22 Q. (BY MR. PLAIL) Okay. Is that fair? 23 A. Yeah. 24 Q. Okay. Can you go to the table of contents of 25 your -- of your report?

Page 89 1 A. Uh-huh. 2 Q. Do you see how on the second page of your 3 report, you say -- you testified, "Dumais does not 4 teach, disclose, or render obvious the limitation of 5 identifying at least one other of the plurality of users 6 that is a recipient of the piece of the electronic 7 content and that is cognate to the user" [as read]. 8 A. Which one, that's page 2? 9 Q. Yes; the bottom of page 2. 10 A. The last one, number 2? 11 Q. The last one, yeah. 12 A. Okay. Yeah. 13 Q. When I'm referring to the "identifying 14 limitation," I'm referring to that limitation, 15 identifying at least one other of the plurality of users 16 that is a recipient of the piece of electronic content 17 and that is cognate to the user. 18 A. Uh-huh. 19 Q. Do you understand? 20 A. Yes. 21 Q. In the claim construction section, you do not 22 provide any specific testimony on the meaning of the 23 identifying limitation. Is that correct? 24 A. That's correct, yeah. 25 Q. Okay. I -- do you know what a MarkKush group	Page 91 1 A. Uh-huh. 2 Q. Let's go to line 46. 3 A. Yeah. 4 Q. Do you see where it starts with "determine a 5 second measure of relevance"? 6 A. Uh-huh. 7 Q. Do you see that? 8 A. Right. 9 Q. "Determine a second measure of relevance of 10 the piece of electronic content as based, at least in 11 part, on one or more measures derived from the group 12 consisting of" [as read]. 13 Do you see that? 14 A. Yeah. 15 Q. Do you understand that when it says "one or 16 more measures," it's not required that the claim used 17 all of the measures? 18 A. Right. 19 Q. It's only required -- strike that. 20 For the prior art to disclose the claim, 21 it is only required that it disclose one of the 22 measures? 23 A. Okay. 24 MR. PADMANABHAN: Objection; Rule 613. 25 But go ahead. You can keep going.
Page 90 1 is? 2 A. The other patent, you mean? 3 Q. No. MarkKush group. Dr. Houh testified about 4 the meaning of a MarkKush group. Do you recall that? 5 A. No. 6 Q. Okay. Can you go to Claim 1 of the '217 7 patent? 8 A. Uh-huh. 9 Q. So just to be clear, you don't understand 10 generally what a MarkKush group is? 11 A. No. I read it, but I could not recall, but if 12 you show me, I can -- 13 Q. I'm just asking, sitting here today, you don't 14 know what a MarkKush group is? 15 A. I read it, I remember. But I -- now I cannot 16 recall that at this point. 17 Q. Okay. Simple question: Since you cannot 18 recall, do you agree that you didn't provide any 19 specific testimony on the construction of the MarkKush 20 group in the claim? 21 A. No; that's not the reason why. 22 Q. Okay. So you did provide specific testimony 23 about the MarkKush group in the claim? 24 Let me make this simple. Let's go to 25 Claim 1.	Page 92 1 Q. (BY MR. PLAIL) Do you understand that for the 2 prior art to disclose the claim, it is only required 3 that it discloses one of the measures? 4 MR. PADMANABHAN: Objection; Rule 613. 5 A. Okay, say one more time, what is your 6 question? 7 Q. (BY MR. PLAIL) Do you understand that under 8 the claim for the prior art to disclose the claim, it is 9 only required that it discloses one of the measures? 10 MR. PADMANABHAN: Objection; Rule 613. 11 A. Yeah, it requests one or more, right? 12 Q. (BY MR. PLAIL) So the prior art only needs to 13 disclose one? 14 A. That -- okay. So the -- the second relevancy 15 means will utilize multiple methods, right? And as 16 the -- but in order to -- because the system will start 17 at the beginning, may not have enough data for various 18 components. I call it components. Let's say they are 19 more than one, local, global, then content, and then the 20 collaborative. Four components, let's say. 21 And some of the components may not have 22 value at the beginning or -- may not make sense to use. 23 But over time, this will contribute in the -- in the 24 calculation and become -- the system becomes more 25 stable.

Page 93 1 So I think in order to -- in order to the 2 system fully functional, we eventually need to utilize 3 all of this -- some of these values. 4 Q. Okay. So it's your opinion that in order for 5 the system to be fully functional, you need to utilize 6 all four of the measures listed there? 7 MR. PADMANABHAN: Objection; Rule 611. 8 A. No, not all four, but I'm saying if -- 9 Q. (BY MR. PLAIL) I mean -- I'm going to quote 10 from your testimony. "In order to the system" -- sorry. 11 "In order for the system to be fully 12 functional, we eventually need to utilize all of this, 13 some of these values" [as read]. 14 What do you mean by that? 15 MR. PADMANABHAN: Objection; Rule 611. 16 A. For example, the local relevancy depends on 17 the -- the individual importancy component or relevancy 18 component. And then -- yeah, okay. So local 19 relevance -- local importancy utilized on the individual 20 importancy component, it relies on the cognate users, 21 and then it also relies on the global relevancy. So 22 these three will contribute on the local relevancy -- 23 local importancy calculation. 24 Q. (BY MR. PLAIL) And so simple question: Do 25 you need all four of them?	Page 95 1 necessarily -- 2 Q. So I'm just confused. Are all of them 3 required? 4 A. No, not all of them are required. 5 Q. Because you keep saying all of them are 6 required. 7 A. Right, okay. I made a wrong statement, yeah. 8 Q. Okay. So are all four of these measures 9 required? 10 A. All four, no. 11 Q. Okay. Which of them are required? 12 A. That, I cannot answer because it requires 13 empirical study. 14 Q. So a person of skill in the art reading the 15 claim would not be able to determine which of these four 16 measures is required? 17 MR. PADMANABHAN: Objection; Rule 611 and 18 Rule 613. 19 A. So you're saying person of ordinary skill set 20 would -- 21 Q. (BY MR. PLAIL) A person of ordinary skill in 22 the art reading the claims would not be able to 23 determine which of the four measures are required? 24 MR. PADMANABHAN: Objection; Rule 611 and 25 613.
Page 94 1 MR. PADMANABHAN: Objection; Rule 611. 2 A. Not necessarily, but -- at the beginning, no. 3 But, eventually, when the system becomes stable, this 4 will contribute and affect positively in that. 5 Q. (BY MR. PLAIL) Okay. So for the system to 6 become stable, you will need all four of them? 7 MR. PADMANABHAN: Objection; misstates -- 8 sorry, Rule 611. 9 A. I'm not saying all four are required, but some 10 of them may be required to produce quality results. 11 THE REPORTER: I'm sorry, some of them may 12 be what? 13 THE WITNESS: May be -- 14 MR. PADMANABHAN: Produce quality results. 15 Q. (BY MR. PLAIL) Which ones are required to 16 produce quality results? 17 MR. PADMANABHAN: Objection; Rule 613. 18 A. That's hard to say at this point, because the 19 system, you have to -- similar do the study, or -- but I 20 think collaborative at the time will play significant 21 role. 22 Q. (BY MR. PLAIL) So you're saying the 23 collaborative filtering measure -- 24 A. No, no, I'm not saying collaborative filter. 25 I'm saying all of them are required, yeah. But it's not	Page 96 1 A. No, they understand that they need to use one 2 of them or some of them, right, for the ranking process. 3 Q. (BY MR. PLAIL) So I asked which of them are 4 required, you answered, that, I cannot answer because it 5 requires an empirical study. 6 So how does a person of ordinary skill in 7 the art figure out which of the measures are required 8 without an empirical study? 9 MR. PADMANABHAN: Objection; Rule 611 and 10 613. 11 A. Then the person of ordinary skill set would 12 run it and do the empirical study. If the time permits, 13 then they will get the results and they can come up with 14 the conclusion. 15 Q. (BY MR. PLAIL) Okay. So a person of ordinary 16 skill in the art would need to run an empirical study to 17 determine which of the four measures is required? 18 MR. PADMANABHAN: Objection; Rules 611 and 19 613. 20 A. Well, it depends on the scenario, also. So 21 from person to person and the results. 22 Q. (BY MR. PLAIL) Okay. Can you turn back to 23 your declaration? Actually, one more question. 24 Earlier when we were talking about the 25 server, you were looking at Figure 4. Why were you

Page 97 1 looking at Figure 4? 2 A. You're asking me -- on the patent or -- 3 Q. Yes, on the patent. 4 A. '217, right? 5 Q. Yes. 6 A. I'm looking for Figure 4? No, you asked me a 7 question about the scalability, that's right. 8 Q. Okay. And what did you need from Figure 4 to 9 answer that question? 10 MR. PADMANABHAN: Objection; Rule 611. 11 A. So you want to know behind -- in my head what 12 I was thinking? 13 Q. (BY MR. PLAIL) Sure. 14 A. I was thinking because usually that nowadays 15 scalability means speed, and -- and that I was thinking 16 maybe you were talking about -- at the time, client 17 server was a popular model, so probably whether they 18 used client server model or not. So that I tried to 19 figure out from Figure 4. 20 Q. Okay. 21 A. But later, you showed me that somewhere it was 22 written. 23 Q. So in order to understand -- so just so I 24 understand, in order for you to understand the scope of 25 Claim 1, you were looking at Figure 4?	Page 99 1 MR. PADMANABHAN: Objection; Rule 611, 2 misstates the record. 3 A. So say it one more time what I say. 4 Q. (BY MR. PLAIL) So when I asked you is it your 5 opinion that Claim 1 is limited to a server, you went to 6 Figure 4, you reviewed Figure 4, and you answered the 7 client needs to communicate with the server and there 8 are multiple servers that are mentioned in the patent 9 '217, so they call it a relational server where the 10 submessages would be stored and then for each 11 organization according to Figure 4? 12 MR. PADMANABHAN: Objection; Rule 611. 13 A. So what is the question you're asking me to 14 say? 15 Q. (BY MR. PLAIL) I'm asking when I -- my -- my 16 question is: In order to determine whether Claim 1 was 17 limited to a server, you needed to look to Figure 4? 18 MR. PADMANABHAN: Objection; Rule 611. 19 A. No. I look for -- Figure 4, due to the 20 address, the scalability question. 21 Q. (BY MR. PLAIL) I didn't ask you a question 22 about scalability. So I'm asking you -- 23 A. Before -- 24 Q. I mean, I'm asking were you just wasting my 25 time? Because I didn't -- in that instance, I didn't
Page 98 1 MR. PADMANABHAN: Objection; 611 and 613. 2 A. No. That's not the right way to say. I was 3 looking for -- I was looking for -- to understand your 4 question, the scalability question, that's why I was 5 looking at Figure 4. 6 Q. (BY MR. PLAIL) So you were specifically 7 trying to answer my question about whether the device 8 could run on a personal computer or a server, correct? 9 A. No. I was looking for client server. 10 Q. So you were looking for the client server? 11 A. Right. 12 Q. So when I was asking whether Claim 1 required 13 a client server, you went to Figure 4 to get the answer? 14 MR. PADMANABHAN: Objection; Rule 611 and 15 613. 16 A. No. I was looking for Figure 4 to address 17 your scalability question. That, I remember, yeah, why 18 I were jumping to Figure 4. 19 Q. (BY MR. PLAIL) So, specifically, the question 20 I had asked was, I'm asking do you have an opinion that 21 Claim 1 is limited to a server, and then you went to 22 Figure 4 and testified that in the '217 patent they 23 called a relational server where the submessages would 24 be stored and then for each organization according to 25 Figure 4?	Page 100 1 ask you a question about scalability. I asked you 2 whether Claim 1 was limited to a server, and you went to 3 Figure 4. 4 MR. PADMANABHAN: Objection; Rule 611. 5 A. Before -- before that, you talked 6 about scalability also. 7 Q. (BY MR. PLAIL) But I didn't ask you a 8 question about scalability. 9 A. You asked some question -- 10 Q. A long time ago, sure. But I'm asking, why 11 did you look to Figure 4 when I asked you that Claim 1 12 is limited to a server? 13 MR. PADMANABHAN: Objection; Rule 611. 14 A. I looked for -- I think the scalability and I 15 looked into Figure 4, and, also, I was looking for the 16 client server on -- 17 Q. (BY MR. PLAIL) So you were trying to figure 18 out whether Claim 1 used a server? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. No; that -- I don't think so. But at that 21 point, you asked me something with the processor and 22 processor is a part of the server or not. 23 Q. (BY MR. PLAIL) I asked you whether a server 24 is required under Claim 1. 25 MR. PADMANABHAN: Objection; Rule 611.

Page 101 1 A. But the reason is not that I jump into the 2 Figure 4, that's why I'm saying no. 3 Q. (BY MR. PLAIL) Then why did you go to 4 Figure 4? 5 MR. PADMANABHAN: Objection; Rule 611 and 6 403 -- 403 and 611. 7 A. Because I -- before coming here, two, three 8 days back, I read the -- I went through those diagrams 9 carefully, and I saw that it talks about client server 10 and then the server. So that's why I was looking 11 for right there where server is. 12 Q. (BY MR. PLAIL) Right. So when you were 13 looking to figure out whether Claim 1 required a server, 14 you went to Figure 4 to determine where the server was? 15 MR. PADMANABHAN: Objection; Rule -- Rule 16 611. 17 A. No, I don't want to say -- say it that way. 18 Q. (BY MR. PLAIL) You don't want to say it or -- 19 I mean, I'm asking the question. 20 A. No, I saw -- I remember -- 21 MR. PADMANABHAN: Hang on. 22 Objection; 611. 23 But you can answer. 24 A. For -- it started -- this question when you 25 started to ask about scalability, at that point, I	Page 103 1 paragraph 7. Do you see that? 2 A. Uh-huh. 3 Q. You say, "The '217 patent teaches why it is 4 desirable to identify a second user that shares these 5 associations with the first user, and the '217 patent 6 teaches the math required in order for the system to 7 identify the second user" [as read]. 8 A. Yes. 9 Q. What is the math required in order for the 10 system to identify the second user? 11 A. Okay. So the second user in this case needs 12 to be -- needs to be somehow related to the first user, 13 cognate to the first user. And, then, also -- and also, 14 we need to make sure that second user will have received 15 the same electronic message that the first user already 16 receive it, right? So these two conditions 17 simultaneously satisfy. 18 And then the question is you're asking me 19 what math required to identify the second user, right? 20 That's your question? 21 Q. I'm asking, in paragraph 7, you say the '217 22 patent teaches the math required in order for the system 23 to identify the second user. 24 A. Right. 25 Q. What is the math required?
Page 102 1 tried to think about this, and I eventually found the 2 Figure 4, yeah. 3 Q. (BY MR. PLAIL) And Figure 4 helped inform 4 whether or not Claim 1 required a server? 5 MR. PADMANABHAN: Objection; Rule 611. 6 A. No. 7 Q. (BY MR. PLAIL) No? 8 A. No. 9 Q. So why did you, on the record, go look at 10 Figure 4 for about 10 minutes? 11 MR. PADMANABHAN: Objection; Rule 611. 12 A. 10 minutes? 13 Q. (BY MR. PLAIL) [Nods head.] 14 A. To answer your questions precisely. Under 15 oath, I cannot say something vague. 16 Q. Right. So when I asked whether Claim 1 was 17 limited to a server, in order to answer my question 18 precisely, you went to Figure 4 to look at the server? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. At that point, I'm not saying I went to 4 -- 21 for that reason, I went to Figure 4. I'm saying I went 22 to Figure 4 for scalability and for other reasons. 23 And thanks for asking. 24 Q. (BY MR. PLAIL) Can you go to paragraph 7 of 25 your declaration? Look at the last sentence of	Page 104 1 A. Okay. So I don't know if I can say it. So 2 here in the -- in -- if you see the Exhibit 1001, 3 column 34, and between 5 and 10, there is an equation, 4 that's a cognate users from sender to receiver, right -- 5 recipient that talks about individual importancy 6 components. And so for cognate users, we tried to 7 determine these values. 8 So that's -- this value would be 9 eventually used in the relevancy calculation. More 10 specifically, it will be used in the local relevancy and 11 also the -- and then the -- since it is using, the local 12 relevancy will have impact on the global relevancy and 13 so on. 14 So that's why described them -- this math, 15 how to calculate that cognate user score that will be 16 added in the relevancy score calculation. 17 Q. Okay. And so that's -- when you're referring 18 to the math required in order for the system to identify 19 the second user -- 20 A. Right. 21 Q. -- you're referring to column 34, lines 5 22 through 10 of the -- 23 A. Yeah. But in order to do that, you need to 24 know what is IIC, that described previous equation, like 25 say in -- in -- because that equation here, user IIC,

Page 105 1 right? 2 Q. I see. So actually, if you go to 3 paragraph 128 of your declaration, and I think -- 4 A. Yeah, in the declaration, the math also, yes. 5 Q. Actually... 6 MR. PADMANABHAN: You said 128? 7 MR. PLAIL: I may have pointed to the 8 wrong one. 9 Q. (BY MR. PLAIL) Paragraph 90. 10 A. Yeah. 11 Q. So this is where you start talking about the 12 global importance and the global relevance. So if you 13 look at the bottom of this page, you say, "The global 14 importance averages IIC's across the system, and the 15 global relevance averages IRCs by global importance" [as 16 read]. 17 Do you see that? 18 A. Uh-huh. 19 Q. So is that what you're referring to by the IIC 20 and IRC? 21 A. Yeah, IIC is -- yes. IIC -- where's the -- 22 here is the -- you can see where IIC's defined 23 in equation 4 on page 37. 24 Q. Okay. And so the global importance is defined 25 by the average IICs across the system, which itself is	Page 107 1 relevance and that is linked to equation 4 -- sorry, no. 2 We talked about the global relevance and that is linked 3 to equation 7, you said? 4 A. Now which one? Global? 5 Q. Strike that. 6 The global importance, that's defined by 7 equation -- 8 A. 7, yeah. 9 Q. Sorry, the global importance is defined by 10 equation 7? 11 A. Yeah. 12 Q. Okay. And what about the global relevance? 13 A. Okay, so that is a step. So first they 14 calculate the importancy, for all this importancy, local 15 importancy, global importancy, and cognitive importancy. 16 And then from there, they derive the relevancy, local 17 relevancy, global relevancy. If you see the Figure 22 18 in this patent, they describe it in details how this 19 process is done. 20 Q. So Figure 22 details the process of how -- 21 A. The whole calculation is done, the relevancy. 22 Yeah, Figure 22 and 21, when decided how the calculation 23 is done. And Figure 22 shows how the update is taking 24 place. So can you see here -- yeah. 25 Q. So these two together describe how the global
Page 106 1 defined in equation 4? 2 MR. PADMANABHAN: Sorry, where are you 3 reading that? 4 A. Right. So it is -- and then I think we say in 5 equation 7 the global -- percent of global -- global 6 importancy, we define it in equation 7. 7 Q. (BY MR. PLAIL) Okay. So that's the global 8 relevancy is equation 7? 9 A. Right. 10 And then equation 8, we define the 11 cognate -- cognate importancy from the sender to the 12 receiver. 13 Q. I see. So -- 14 A. And there we use the IIC. And IIC was defined 15 in equation 4. That's what I'm trying to say. 16 Q. Sorry, do you mean equation 8 or equation 9? 17 A. Equation -- what is the equation? 18 Q. Are you referring to the equation on page 40? 19 A. Yeah; equation 8 for the cognate, and equation 20 9 takes into consideration the local relevancy. 21 Q. I see. 22 A. That takes into consideration the cognate, 23 plus global, plus the IIC. 24 Q. I see. 25 And we -- we talked about the global	Page 108 1 relevance score -- 2 A. All the relevancy score is calculated and how 3 they're updated, yeah. 4 Q. Okay. 5 A. So you can see on the top, it talks about 6 importancy, and bottom talks about the relevancy in 7 Figure 22. 8 Q. I see. 9 A. And Figure 21, the corresponding text explains 10 each steps in details how the calculation is done. 11 Q. Okay. So let's look at Figure 22 for a 12 second. It seems like the local importance is a pretty 13 important point in the calculation, because everything 14 kind of flows into it over here on the right of the 15 figure. Is that fair? 16 MR. PADMANABHAN: Objection; Rule 611. 17 A. The local importancy, yeah. The concept is 18 global importancy. But, again, the feedback will 19 loop -- is involved here, so... 20 Q. (BY MR. PLAIL) Right. So there's a feedback 21 loop, but -- and all of these boxes at the top kind of 22 feed into local importancy, which then feeds into 23 combination importance, right? 24 MR. PADMANABHAN: Objection; Rule 611. 25 A. Oh, okay. Okay, so you were saying local --

Page 109 1 I'm not saying local -- I'm saying the -- how the 2 calculation is done here. 3 Q. (BY MR. PLAIL) Okay. So 22 is how the 4 calculation's done? 5 A. Right; but I'm not saying which one is 6 important. That, I'm not -- I'm not making any 7 statement here. For which component is important, I'm 8 not making any statement. 9 Q. Which ones are important? 10 A. No, that -- as I told you, that -- I don't 11 know, and it depends on the empirical study. Only the 12 patent owner can tell. 13 Q. So to determine which one is important, you 14 would do an empirical study? 15 MR. PADMANABHAN: Objection; Rule 611 and 16 613. 17 A. It is beyond the scope of my direction, and -- 18 but I think -- 19 Q. (BY MR. PLAIL) I mean, you said it depends on 20 an empirical study. So to determine which one of these 21 is important, you would do an empirical study? 22 MR. PADMANABHAN: Objection; Rule 611 and 23 613. 24 A. Okay, so finally at the end, the ranking 25 process will probably utilize the local relevancy of	Page 110 1 transmitting of the e-mail object from S to R. That's 2 where the ranking process will be -- will utilize the 3 final score. 4 So in that final scoring process, some 5 components may not contribute that much, or may not 6 influence that much. That's possible. 7 And it may vary from person to person. 8 For user, some component may dominate, because you may 9 have a lot of frames for cognate users. And for some, 10 it may not -- certain components may not dominate that 11 much. Other components may be the dominating factor. 12 Q. (BY MR. PLAIL) And so the global importance 13 in Figure 7 that we were discussing earlier is reflected 14 here in Figure 22? 15 MR. PADMANABHAN: Figure -- objection; 16 611. 17 A. Figure 7? 18 Q. (BY MR. PLAIL) I said -- equation 7. 19 So the global importance in equation 7 20 that we were discussing earlier is reflected here in 21 Figure 22? 22 MR. PADMANABHAN: Objection; Rule 611. 23 A. No. Figure 22 shows in which fashion the 24 calculation will be carried out. And also, it shows how 25 the update will be taking place. Because when you get	Page 111 1 the feedback, user actions will be taken into 2 consideration. Some cases, the update of all those 3 values will be updated periodically and then after 4 30 days or something else. Some cases, the update will 5 be taking place immediately in real time. So that they 6 tried to emphasize here. 7 But it doesn't tell you the equation or 8 how the global importance or local importance will be 9 calculated. That -- that -- this figure doesn't talk 10 about that. 11 Q. (BY MR. PLAIL) Okay. So a person of skill 12 would look to Figure 22 to figure out the flow of the 13 calculations and then would look to the equations in 14 order to determine the precise calculations. Is that 15 fair? 16 MR. PADMANABHAN: Objection; Rule 611. 17 A. But ordinary skill set person would take a 18 look at Figure 22 and then...? 19 Q. (BY MR. PLAIL) And then look at the equations 20 and the specification to determine the precise 21 calculations? 22 A. Yes. But whether he or she will be able to 23 solve it, that, I don't know. I don't think so, but... 24 Q. And you said in order to determine which ones 25 are the most important, you would need to do an	Page 112 1 empirical study. Which -- did you do an empirical study 2 in the process of preparing your declaration? 3 MR. PADMANABHAN: Objection; Rule 613 and 4 611. 5 A. I -- I don't think I answered the question in 6 the declaration, but no. 7 Q. (BY MR. PLAIL) Okay. And so you didn't use 8 an empirical study to inform your interpretation of the 9 claims? 10 MR. PADMANABHAN: Objection; Rule 611 and 11 613. 12 A. Say it... 13 Q. (BY MR. PLAIL) You didn't use an empirical 14 study to inform your interpretation of the claims? 15 MR. PADMANABHAN: Objection; Rule 611 and 16 613. 17 A. So I did not study that -- 18 Q. (BY MR. PLAIL) You did not use an empirical 19 study to inform your interpretation of the claims? 20 MR. PADMANABHAN: Objection; Rule 611 and 21 613. 22 A. I -- 23 Q. (BY MR. PLAIL) So right? 24 A. No. Let me explain here. 25 So here, we're talking about the system.
---	--	--	---

Page 113 1 We're not talking about any -- in the patent, usually we 2 don't disclose the numbers. Apart from -- when it comes 3 to the empirical study, it means you have to the report 4 the components of the algorithm. So in this case, it 5 works -- this person says it works very well. This 6 person cases it may fail. So in the patent, usually the 7 patent owner doesn't -- in general, doesn't disclose 8 those numbers. 9 So I think the patent owner, what he 10 did -- he did reasonable work here, so he doesn't need 11 to mention those empirical study here. 12 Q. You didn't use an empirical study? 13 A. No, but I -- 14 Q. That's all I'm asking. You didn't use an 15 empirical study. 16 A. Right. For my case, I don't need an empirical 17 study at all -- 18 Q. Okay. 19 A. -- because I just express my opinion. 20 Q. Okay. And so you did not use an empirical 21 study in the process of forming your opinions? 22 A. Right. 23 Q. Okay. 24 A. And that's the standard practice, I think. 25 Q. Okay. So I think we are --	Page 115 1 A. Uh-huh. 2 Q. So I'm going to be asking some questions about 3 this limitation. So when I refer to the second 4 relevance measurement module limitation, that's what 5 I'll be referring to, okay? 6 A. Uh-huh. 7 Q. Yes? 8 A. Yes. 9 Q. Okay. Can you turn to column 8, lines -- 10 A. Same patent? 11 Q. Same patent. 23 through 25. 12 A. 23 through 25... 13 (Witness reviewed document.) 14 Q. Do you see how it is discussing mail data 15 there? 16 A. Figure 6, let me check. 17 Q. Sorry, I was asking in the passage of the 18 patent. Do you see how it's discussing the mail data? 19 A. Okay. 20 (Sotto voce conversation.) 21 THE REPORTER: I'm sorry, can you either 22 speak up or read to yourself? 23 THE WITNESS: No, no, no, I'm reading by 24 myself. 25 (Witness reviewed document.)
Page 114 1 A. Because -- 2 Q. I mean, there's no question pending. 3 MR. PLAIL: I think probably now is a good 4 time for lunch. 5 THE WITNESS: Sure. 6 (Break taken from 12:05 p.m. to 7 12:40 p.m.) 8 Q. (BY MR. PLAIL) Can you turn back to the 9 claim? 10 A. '217 claim? 11 Q. Yep. Page 49. 12 Do you see starting around line 41, the 13 claim starts discussing a second relevance measurement 14 module coupled to the monitoring module and configure 2? 15 A. Line 41, column 47? 16 Q. Yes. 17 A. Uh-huh. 18 Q. Do you see that? 19 A. Yeah. 20 Q. All right. So I'm going to ask some questions 21 about this particular limitation. And so -- just so 22 we're on the same page, the second relevance measurement 23 module coupled to the monitoring module in Figure 2 has 24 two subsections under it. One is identifying and the 25 other is determining, right?	Page 116 1 A. So you're saying 21 to... 2 Q. 23 to 25 says, "Turning now more specifically 3 to Figure 6, mail data 80 represents properties of each 4 electronic mail" [as read]. 5 (Witness reviewed document.) 6 A. Yeah. 7 Q. And it refers to the current message, as well 8 as both history and future submessages collaborative. 9 Do you see that? 10 A. Uh-huh. 11 Q. Okay. 12 MR. PADMANABHAN: You have to say "yes." 13 A. Yes. 14 Q. (BY MR. PLAIL) Can you go to column 43, 15 lines 30 through 37? 16 MR. PADMANABHAN: Lines 30 to what? 17 MR. PLAIL: 37. 18 A. 30 to 37, 43 column, lines 30 to 37, right? 19 Q. (BY MR. PLAIL) Yes. 20 A. 37, okay. 21 Q. I'm going to read that into the record, but 22 feel free to read on your own. 23 A. Sure. 24 Q. "In regard to how such similarity or 25 identification of the cognate group is determined, one

Page 117 1 or more of the following approaches may be used: Role 2 or group based, collaborative filtering, fingerprinting, 3 cluster models, search-based methods, frequency 4 analysis, and importance value correlation. Each of 5 these different approaches which may be used singly or 6 in any combination will now be described in turn" [as 7 read]. 8 It says that there? Do you see it again 9 is referring to collaborative filtering? 10 A. Uh-huh. 11 Q. So we discussed collaborative filtering 12 earlier, right? 13 A. Right. 14 Q. And so you would agree that collaborative 15 filtering in -- in this context relies on mail actions 16 and mail data? 17 MR. PADMANABHAN: Objection; Rule 611 and 18 401 to 403. 19 A. So your -- what is the question again? 20 Q. (BY MR. PLAIL) Do you see that collaborative 21 filtering in this context relates to mail actions and 22 mail data? 23 MR. PADMANABHAN: Objection; Rule 611 and 24 401 to 403. 25 A. Where do you find mail data? Is that where	Page 119 1 metadata -- present properties of each electronic -- 2 property means what? Property means metadata results. 3 Q. Okay. So then you're saying the metadata and 4 the properties are not part of the mail data? 5 A. No, the mail data has the content. 6 Q. Okay. 7 A. And then it has the content of the e-mail 8 message, the text. And then you have the -- you have 9 the user actions, and that can be a part of the property 10 also of the message, whether you reply, whether you -- 11 Q. Where does it say that the mail data does not 12 include the metadata? 13 A. It says the mail data presents properties. 14 The way the definition mail data 80 presents properties 15 of the electronic message, including -- 16 Q. Okay. So then to go back to my question, the 17 mail data 80 is used with collaborative filtering, 18 correct? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. So you mean the mail data -- the content of 21 the mail data is your question? 22 Q. (BY MR. PLAIL) I'm -- looking at this portion 23 of the patent, it says, "Mail data 80 represents 24 properties of each electronic messages, including" -- it 25 goes on -- "future submessages collaborative" [as read].
Page 118 1 the collaborative filtering will be used? 2 Q. (BY MR. PLAIL) In the first passage we read, 3 it says, "Mail data 80 represents properties of each 4 electronic mail, including, dot, dot, dot, both history 5 and future submessages, collaborative" [as read]. 6 MR. PADMANABHAN: Objection; Rule 611 and 7 613. 8 A. Can I see the Figure 6? 9 Q. (BY MR. PLAIL) Sure. 10 (Witness reviewed document.) 11 Q. Do you understand that collaborative filtering 12 uses mail data 80? 13 MR. PADMANABHAN: Objection; Rule 611. 14 A. Yes. So it doesn't mean that they used the 15 mail data. They used properties of the mail data and 16 the message. And properties can be very distinct. It 17 can be the feedback of user actions and so on. And then 18 they talk about the messages, history of the message, 19 and the -- the collaborative messaging results. 20 So the properties -- they focus on the 21 properties of the message, and not the mail data set. 22 And the properties -- 23 Q. (BY MR. PLAIL) But mail data, you're focusing 24 on the content, not the metadata? 25 A. No. The way I read it, it says it presents	Page 120 1 I'm asking, is the mail data 80 used with 2 collaborative filtering? 3 MR. PADMANABHAN: Objection; misstate -- 4 Rule 611. 5 A. So, in this case, future submessages 6 collaborative means there might be some messages that 7 are relevant to the collaborative user, so that would be 8 the collaborative messages that they mentioned. 9 Q. (BY MR. PLAIL) Okay. So you're saying that 10 this is not using mail data 80? 11 MR. PADMANABHAN: Objection; 401 to 403, 12 Rule 611. 13 A. So what is the question? Which one is not 14 using -- 15 Q. (BY MR. PLAIL) I'm asking is collaborative 16 filtering using mail data or is it not using mail data? 17 It's a yes-or-no question. 18 MR. PADMANABHAN: Objection; Rule 611, 401 19 to 403. 20 A. What is the definition of mail data? 21 Q. (BY MR. PLAIL) It's right there [indicating]. 22 (Witness reviewed document.) 23 Q. I mean, if you look at columns 8, 23 through 24 25, I don't think Figure 6 defines what mail data is, 25 but I originally pointed you to column 8, lines 23

Page 121	Page 123
1 through 25, which says mail data represents, and it goes 2 on to describe it. 3 A. Yeah. 4 MR. PADMANABHAN: Objection; Rule 611 and 5 also Rule 613 and 401, 403. 6 A. Can you read it, this part? What does it say, 7 the last -- 8 Q. (BY MR. PLAIL) You're referring to box 80? 9 A. Yes. 10 Q. On the right side, it says, "Collaborative." 11 And then under that, it says, "History and 12 future submessages." 13 And then under that, it says, "Sender, 14 recipients, date sent, retention date, job code, 15 attachments." 16 A. Attachment. 17 Q. So mail data includes those metadata 18 categories, correct? 19 A. Okay. So think about this. This is a user, 20 and there's another set of collaborative users. And 21 then this user has submessages, and this collaborative 22 user has submessages. And from there, they're saying -- 23 so that -- and then this message has collaborative 24 filtering associated users, their messages has some 25 metadata, right, all these properties, the message	1 401 to 1403. 2 A. It's the same. Sorry, but -- 3 Q. (BY MR. PLAIL) Let's -- let's focus -- so you 4 know how earlier we were talking about the second 5 relevance measurement module? 6 A. Right. 7 Q. And earlier, we were talking about the 8 identifying limitation within that, right? 9 So let's just focus on the identifying 10 limitation. The two portions of the patent we just went 11 over, is that discussing the identifying limitation? 12 A. Which two patent? The -- 13 Q. The two we just went over. So column 8, lines 14 23 through 25, and column 43, 30 through 37. We just 15 went over both of those. Do those refer to the 16 identifying limitation? 17 A. Both of them -- so this is patent '217, right? 18 Q. Yes. 19 A. The address -- yeah, identifying relationship, 20 yeah. 21 Q. So these are relevant to the identifying 22 limitation? 23 MR. PADMANABHAN: Objection -- 24 (Cross talk.) 25 THE REPORTER: Hold on. Let him -- let --
Page 122	Page 124
1 content or the part you just read. So that will be 2 mentioned here. 3 Q. Okay. So mail data 80 is used with 4 collaborative filtering? 5 MR. PADMANABHAN: Objection; Rule 611, 6 613, 401, 403. 7 A. Okay. So I just want to emphasize that 8 mail -- collaborative filtering doesn't rely on the 9 content. It relies on the -- it relies on the user 10 actions or those type of properties. So that -- that 11 type of metadata may be used. So here, the metadata 12 they're mentioning is a little bit broad. 13 Q. (BY MR. PLAIL) Okay. But the metadata can be 14 used with collaborative filtering? 15 MR. PADMANABHAN: Objection; Rule 401 to 16 403, 611 and 613. 17 A. Some part of metadata, yeah. 18 Q. (BY MR. PLAIL) Okay. And so the 19 collaborative filtering referred to in these two 20 portions of the patent, is that an example of the -- 21 A. Sorry, can you say one? Collaborative... 22 Q. The collaborative filtering referred to in 23 these two portions of the patent, is that an example of 24 how the second relevance measurement module works? 25 MR. PADMANABHAN: Objection; Rule 611 and	1 MR. PADMANABHAN: Objection; Rule 611, 2 613, and 401 to 403. 3 A. Okay. What is identifying relationship again? 4 Q. (BY MR. PLAIL) Go to Claim 1. It's the 5 identifying limitation. 6 A. Identified at least one of the -- okay. Yeah, 7 both simultaneously both conditions, right? Again, the 8 electronic content to the user, right? 9 Okay. So 43 and -- under column 43, 10 patent '217, 30 to 37, it talks about collaborative 11 filtering in general, how we can implement. There are 12 various ways you can implement, clustering technique, 13 and other technique. And they describe some approaches 14 very nicely. 15 But we have to make-- they also talk 16 about -- when they talk about the -- the cognate -- the 17 condition is this cognate users condition used to 18 satisfy or collaborative filtering condition, as well as 19 the -- the -- this additional users or second users, 20 they need to be recipient of the same electronic message 21 content, where the -- there's two conditions 22 simultaneously satisfy. 23 Q. Okay. So you're saying -- 24 A. In this patent. 25 Q. You're saying this portion, 43, 30 through 37,

Page 125 1 doesn't disclose both of those ideas? 2 A. Yeah, but, however, there is some place where 3 the -- 4 Q. I'm not -- I'm not -- that's not what I'm 5 trying to -- I'm just asking -- 6 A. You have to discard the collaborative 7 filtering, how you can do it. 8 Q. Right. 9 A. That implementation, there are multiple 10 options, and they combine many options. 11 And then later, they also showed that when 12 you identify the -- the set of users, second users, 13 there, they use collaborative filtering or -- in order 14 to find the cognate user, as well as that second user 15 needs to be the recipient of the same electronic 16 message. 17 Q. Got it. So later -- 18 A. The -- 19 (Cross talk.) 20 Q. Let me ask my questions. 21 A. All right. There's a -- 22 (Cross talk.) 23 Q. Let me ask my questions. 24 A. Sure. Sorry. 25 Q. Later in the patent, outside of column 43,	Page 127 1 A. Sure. 2 (Witness reviewed document.) 3 A. 50 to -- 4 Q. 59. 5 A. Okay. 6 (Witness reviewed document.) 7 MR. PADMANABHAN: So are you starting with 8 "and yet"? 9 MR. PLAIL: Yes. 10 MR. PADMANABHAN: And where are you 11 ending? With "department"? 12 MR. PLAIL: Yes. 13 MR. PADMANABHAN: Okay. 14 (Witness reviewed document.) 15 Q. (BY MR. PLAIL) So, Dr. Khan, my question is: 16 Is this an example of identifying? 17 A. So here, it talks about the relevancy, how to 18 calculate the relevancy, right? 19 Q. So it's not an example of identifying? 20 A. What is identifying? Identifying is the 21 cognate to the second user and -- and then cognate to 22 the first user, and then relevant -- and then the 23 recipient of the same message, that's identifying? 24 Yeah. Okay. 25 Q. So this is not an example of identifying?
Page 126 1 line 30 through 37, they may describe what you're 2 referring to. But this portion, 43, lines 30 through 3 37, does not disclose the full identifying limitation? 4 A. They focus on collaborative filtering on the 5 implementation. 6 Q. Okay. Is the same true for column 8, lines 23 7 through 25? 8 MR. PADMANABHAN: Objection; Rule 611 and 9 401 to 403. 10 A. My understanding is column 8 under -- from 11 row 21 to 25 or -- is -- the focus is different. They 12 don't talk about collaborative filtering, how does it 13 work here, no. 14 Q. (BY MR. PLAIL) Okay. So this -- 15 A. They just talk about collaborative messages or 16 something. 17 Q. So this portion also does not disclose the 18 identifying limitation? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. Yes. 21 Q. (BY MR. PLAIL) Okay. Let's go to column 12, 22 lines 50 through 59. 23 A. Line what? 50, column 12? 24 Q. Yeah, lines 50 through 59. I guess the 25 sentence starts at 48. Can you read that?	Page 128 1 MR. PADMANABHAN: Objection; Rule 611. 2 (Witness reviewed document.) 3 A. If you don't mind, can I take time with it? 4 MR. PADMANABHAN: Yeah. 5 (Witness reviewed document.) 6 A. So I think this paragraph talks about the 7 content relevancy. 8 Q. (BY MR. PLAIL) Right. So this is not an 9 example of identifying? 10 A. The n user, yeah. 11 Q. So this is not an example of identifying? 12 A. So that's not the focus here, yeah. 13 Q. All right. Can you please go to column 14, 14 lines 45 through 55? 15 A. Column 14, line 45? 16 Q. Yes. So 355. 17 MR. PADMANABHAN: When you say that, are 18 you starting at "as described" and finishing at "ongoing 19 basis"? 20 MR. PLAIL: I'm starting as "one 21 approach." 22 MR. PADMANABHAN: Oh, "one approach," 23 okay. 24 MR. PLAIL: And then finishing at -- we'll 25 go, I guess, to 53, "form processing."

Page 129 1 MR. PADMANABHAN: Oh, to "form 2 processing." 3 Q. (BY MR. PLAIL) And I'll have a different 4 question about the rest of that paragraph. 5 A. So what is your question here? 6 Q. Is this an example of identifying? 7 (Witness reviewed document.) 8 A. So this -- your question is this section 9 addressed -- address what? Identifying? 10 Q. Is column 14, lines 45 through 53, an example 11 of identifying? 12 A. Yeah; this is one way you can do it, yes. 13 Q. Okay. And in this example, you can use a tree 14 structure to identify? 15 A. Yes; some sort of role base, yeah. 16 Q. And so using a tree structure would satisfy 17 both parts of the identifying limitation? 18 A. You said tree structure would satisfy? 19 Q. Both parts of the identifying limitation? 20 A. No. It satisfy only the collaborative by 21 cognate user part. So -- but it doesn't satisfy whether 22 the person will receive the same electronic message or 23 not. 24 Q. I see. So column 14, lines 45 through 53, 25 does not disclose the entire identifying limitation?	Page 131 1 define it in the patent? 2 Q. The identifying limitation we've been 3 discussing. 4 A. Before, right? Oh, okay, now I do recall 5 that. 6 (Witness reviewed document.) 7 A. No, it doesn't consider the -- that -- it 8 doesn't address that issue. 9 Q. So column 14, lines 53 through 58, is not an 10 example of the entire identifying limitation, correct? 11 A. Yeah; identifying cognate users and the same 12 electronic message, right? 13 Q. So column 14, lines 53 through 58, is not an 14 example of the entire identifying limitation, correct? 15 A. So identifying means that, right, in this? 16 Q. In the claim. 17 A. Okay. 18 All right, yeah. 19 Q. So column 14, lines 53 through 58, is not an 20 example of the entire identifying limitation, correct? 21 A. Correct. 22 Q. I'm going to mark this as the next exhibit. 23 THE REPORTER: Is it 8 or... 24 MR. PLAIL: 8. 25 THE REPORTER: Okay.
Page 130 1 A. Somewhere they mention both. 2 Q. That's not my question. My question is: 3 Column 14, lines 45 through 53, is that an example of 4 the entire identifying limitation? 5 A. It describes how the collaborative filtering 6 of cognate users can be found through the tree 7 structure. 8 Q. But it does not describe the recipient part, 9 does it? 10 A. Right. Yeah, the second condition -- 11 Q. So column 14, lines 45 through 53, is not an 12 example of the entire identifying limitation, correct? 13 A. Correct. 14 Q. Can you look at the next portion of that 15 paragraph? It says, "Further, it is noted," and then 16 through the end. So that would be column 14, lines 53 17 through 58. 18 (Witness reviewed document.) 19 A. Yeah. 20 Q. Is column 14, lines 53 through 58, an example 21 of the entire identifying limitation? 22 A. Say one more time. 23 Q. Is column 14, lines 53 through 58, an example 24 of the entire identifying limitation? 25 A. What is identifying relationship, the one that	Page 132 1 (Exhibit Number 8 was marked.) 2 Q. (BY MR. PLAIL) Do you recognize Exhibit 8? 3 A. So it's [unintelligible]? 4 THE REPORTER: I'm sorry? 5 A. 1813, right? No. What is this? Exhibit 8? 6 Q. (BY MR. PLAIL) Exhibit 8. 7 A. Okay. 8 Q. Do you recognize Exhibit 8? 9 A. I recognize this. 10 Q. This is one of your old papers, right? 11 A. Yeah. 12 Q. What is the title of the paper? 13 A. "Emergency-driven Assured Information Sharing 14 in Secure Online Social Networks: A Position Paper." 15 Q. And this paper is from roughly 2016? 16 A. Yeah, that, I saw. It was published in some 17 workshop. 18 Q. Blast from the past? 19 A. Hmm? 20 Q. Blast from the past, right? 21 A. [Nods head.] 22 Q. So if you look in the introduction, you say -- 23 you say there that, "Social media has demonstrated 24 exponential growth, making it the most popular activity 25 on the worldwide web" [as read].

Page 133	Page 135
1 A. What did I say? In the introduction? 2 Q. In the introduction. 3 A. Which section? In the beginning or -- 4 Q. Yeah, in the first paragraph. 5 A. First paragraph? 6 Q. Uh-huh. 7 (Witness reviewed document.) 8 A. Yeah. 9 (Sotto voce conversation.) 10 A. Uh-huh. 11 Q. And then you go on to say, "As early as 2010, 12 Twitter has recorded a 1,500 percent increase in the 13 number of registered users and over 70,000 applications 14 have been developed, according to the company" [as 15 read]. 16 Do you see that? 17 A. Yeah. 18 Q. Do you agree with that statement? 19 A. I don't -- but I -- yeah, I'm one of the 20 author, but I'm not -- yeah. 21 Q. But you agree with that statement? 22 A. Okay. Yeah, I agree. 23 Q. So then Twitter had recorded a growth of 24 1,500 percent as early as 2010. Is that right? 25 A. Twitter has a growth of what?	1 A. So social media was -- has become very popular 2 after 2006. And now it's crazy, you have billions of 3 users for Facebook. And I think for the X or the 4 Twitter, that many, many users, even our President, uses 5 Twitter, right? Many countries' president the number 6 one person use social media, especially the Twitter. 7 So -- but therefore -- in the Twitter 8 case -- the Facebook case, it focused primarily on the 9 social media. And in case of Twitter, that would be 10 streaming impression that are continuously producing, 11 and you do trend analysis, those type of things. They, 12 underneath, utilize different technology, like a strong 13 or a spark streaming framework to handle it. 14 Q. (BY MR. PLAIL) All right. So that's one of 15 the reasons that Twitter has been successful? 16 MR. PADMANABHAN: Objection 601, 602, and 17 613. 18 A. Okay, so the objective here is different. If 19 you are asking me with respect to patent '271, the 20 e-mail messaging system. The e-mail messaging system 21 deals with the -- 22 Q. (BY MR. PLAIL) I'm asking you -- I can ask 23 you whatever I want. 24 A. Okay. So -- 25 Q. And my question is: You have this paper here
Page 134	Page 136
1 Q. 1,500 percent. 2 A. Right. According to this writing, yeah. 3 Q. It also says that, "From 500,000 messages per 4 quarter in 2007, the company has grown to 4 billion 5 messages per quarter in 2010, and many more billions in 6 2014" [as read]. 7 Do you see that? 8 A. Uh-huh, yeah. 9 Q. Do you agree with that statement? 10 A. Okay, yeah, I agree. 11 Q. So you agree that Twitter achieved significant 12 growth between 2007 and 2014? 13 A. Yeah. They had many users, yeah. 14 Q. And they grew a lot during that time? 15 A. Yeah. 16 Q. Why did they grow? 17 MR. PADMANABHAN: Objection; lack of 18 foundation -- oh, sorry. 19 A. Why did they grow? 20 Q. (BY MR. PLAIL) Yeah. 21 MR. PADMANABHAN: Objection; Rule 613. 22 THE WITNESS: I should answer? 23 MR. PADMANABHAN: Yeah, you can answer. 24 A. That's a very good question. 25 MR. PADMANABHAN: And Rule 601 and 603.	1 where you say that Twitter has achieved significant 2 growth. 3 A. Right. 4 Q. Right. What was the source of that growth? 5 A. Because -- 6 MR. PADMANABHAN: Object -- 7 Hang on. 8 Objection; Rule 613 and 601 and 602. 9 A. Yeah. Their focus on the sharp messages 10 people post. And usually in the past, the Twitter user 11 post 140 character messages. Now I guess it increases 12 to 280 character or something or more. So -- and it was 13 very popular among the younger generation, because they 14 want to spread the news or articles, stories in a very 15 substantive form. So that's why it was very popular. 16 The data was with the very sharp messages. 17 Q. (BY MR. PLAIL) Yes. 18 A. And social media, all of us -- I guess all of 19 us have a social media account. I don't know whether 20 you have one or not. Right, Facebook. 21 Q. I have social media. 22 (Exhibit Number 9 was marked.) 23 Q. Exhibit 9. 24 A. I don't have X, but I have a social -- 25 Facebook account.

Page 137 1 Q. Do you recognize Exhibit 9? 2 A. Yeah. This is a very good paper with respect 3 to this. Exhibit 9, yeah. 4 Q. Can you look at the introduction there? 5 A. Uh-huh. 6 Q. Sorry. You're an author on this paper, right? 7 A. The first one was my student, yeah. He now 8 works in HP. He was a very good student. 9 Q. So it says here in the first sentence of the 10 introduction that Twitter has seen phenomenal growth in 11 their user bases. 12 A. And that was [unintelligible]. 13 THE REPORTER: I'm sorry, that was what? 14 MR. PADMANABHAN: He's in this 15 introduction. 16 A. Introduction, okay. 17 Yeah. 18 Q. (BY MR. PLAIL) So you agree that Twitter has 19 seen phenomenal growth in their user base? 20 A. [Nods head.] 21 Q. Yes? 22 A. Yes. 23 Q. And you -- there's a citation here, "Java, 24 et al, describes this microblogging phenomenon as early 25 as 2007, noting that users use the service to talk about	Page 139 1 Q. One of the reasons Twitter is and was 2 successful is because they allow users to talk about 3 their daily activity and share information, referring to 4 this portion of your paper? 5 MR. PADMANABHAN: Objection; Rule 613, 601 6 and 602. 7 Q. (BY MR. PLAIL) You said "right"? 8 A. The user express the daily activities, but 9 they want a platform where they can express their 10 opinion in a -- not a long text or, say, a few pages. 11 They want to write, you know, only with a few 12 characters, so 140 characters. Or nowadays, even more, 13 280. So that's why Twitter is very popular among 14 younger users, as well as the powerful people of the -- 15 of the government officials and so on. 16 Q. Okay. 17 A. And it's public, also. Think about this, 18 whatever you post, anybody can see it. 19 Q. Yeah. 20 A. And not like an e-mail messaging system where 21 it's private, you can send messages to X, then Y cannot 22 see it, right? So that -- in the social media, that 23 will not ensure -- Twitter will not ensure that. 24 Q. Do you -- what is your understanding of 25 Wikipedia?
Page 138 1 their daily activity and to seek or share information" 2 [as read]. 3 Do you see that? 4 A. Yeah. 5 Q. Do you agree with that statement? 6 (Witness reviewed document.) 7 A. Yeah. 8 Q. And this kind of goes back to something we 9 were talking about earlier. One of the reasons Twitter 10 is and was successful is because they allow users to 11 talk about their daily activities and share information? 12 MR. PADMANABHAN: Rule 613, Rule 601 and 13 602. 14 A. Sorry, what did you say? You said something 15 before. 16 Q. (BY MR. PLAIL) This kind of goes back to 17 something we were talking about earlier. One of the 18 reasons Twitter is and was successful is because they 19 allow users to talk about their daily activities and 20 share information? 21 MR. PADMANABHAN: Objection; Rule 613, 22 Rule 601 and 602. 23 A. So I objected that or -- 24 Q. (BY MR. PLAIL) No, I'm asking. 25 A. So what is the question? Sorry.	Page 140 1 A. Yeah. It's -- it's some sort of knowledge 2 base where you can put -- say, you can see famous guy's 3 article, talks about his life, somebody posted about the 4 Bill Clintons, their biography might be there. And so 5 it's not based only on the popular people. It goes 6 beyond English articles. It can cover other languages. 7 It's very popular. And many people utilize that to 8 improve or improve the quality of the result for their 9 own task. 10 Q. Right. And so you understand that Wikipedia 11 is a website? 12 A. Yeah, but -- a website, but there is more 13 mentioned by a certain group. 14 Q. I understand. 15 A. And then you can write and then edit it, those 16 types of things. It's voluntary. 17 Q. But it's a website, right? 18 A. Yeah; it's a -- a bunch of web pages, but it's 19 a knowledge base contained. It's not like -- I create 20 an HTML page and I can come up with some fake 21 information and so on. Then nobody would verify it, 22 right? 23 But in this case, in the Wikipedia page, 24 there would be some authority they will check sometimes. 25 They check it. It's not -- and then you have to put

Page 141 1 some citation when disclose some information and so on. 2 And this is very useful information for other purposes. 3 Q. Okay. Exhibit 10. 4 (Exhibit Number 10 was marked.) 5 Q. Do you recognize Exhibit 10? 6 A. Now, I recognize it, but I couldn't -- but 7 anyway, yeah, I can recognize. Interesting you are -- 8 talking about my papers is always interesting. 9 Q. So if you look at the middle paragraph in the 10 introduction, it says that -- it basically seems to be 11 saying that one issue with mining or creating data sets 12 out of tweets is kind of a lack of contextual 13 information. Is that fair? 14 MR. PADMANABHAN: Objection; Rule 613. 15 A. Let me read it, because I -- this is long ago. 16 I read this -- 17 Q. (BY MR. PLAIL) Well, here, I'll direct you to 18 a specific sentence. It says, "Another challenge we 19 face is that tweets are often very short and noisy, 20 which makes them very hard to be categorized" [as read], 21 right? 22 (Witness reviewed document.) 23 A. Yeah; that's correct, yeah. It's not easy to 24 parse the tweets, because it's a shortened text and a 25 lot of shorthand is used.	Page 143 1 words, and collect the entities we believe might be 2 related to the topic" [as read], correct? 3 A. Uh-huh. 4 Q. You have to verbally respond, Dr. Khan. 5 A. Okay. 6 (Witness reviewed document.) 7 A. Yes. So you do -- okay, remove all this 8 stemming -- okay, yeah, that's fine. 9 Q. "And then after that, we do a Wikipedia search 10 based on trend name plus each entity. Then the 11 Wikipedia will return search result list containing 12 hundreds of records. The records at the top of the list 13 are most relevant to our research. And we pull out a 14 fixed number, could be 3, 5, or 7, of record" [as read]. 15 Do you see that? 16 A. Uh-huh. 17 Q. So you take a tweet, right? 18 A. Yes, yes. 19 Q. Remember to verbally respond. 20 A. Sure; yeah, yeah. 21 Q. So in the process described in this paper, you 22 start with a tweet? 23 A. Right, exactly. 24 Q. You remove stop words and you stem the tweet, 25 correct?
Page 142 1 Q. Okay. And if we go to page -- the next page, 2 142, you go into this in a little more detail. There 3 you say, "One major drawback of the tweets' training set 4 is that the tweets are too short to address the full 5 story of a topic" [as read]. 6 MR. PADMANABHAN: Objection; Rule 613. 7 A. Okay, so -- what are you asking here? 8 Q. (BY MR. PLAIL) Do you agree with that? 9 A. So what -- what should -- what is the topic I 10 need to agree? What is the thing? 11 Q. "One major drawback of the tweets' training 12 set is that the tweets are too short to address the full 13 story of a topic" [as read]. 14 MR. PADMANABHAN: Objection; Rule 613. 15 A. Yeah, yeah. 16 Q. (BY MR. PLAIL) And so if you go on to the 17 next paragraph, you say, "To solve this problem, we 18 introduced the Wikipedia search expansion" [as read]. 19 Do you see that? 20 A. Uh-huh, yeah. 21 Q. Do you see that, yes or no? You have to 22 verbally respond. 23 A. I saw it, yeah -- yes. 24 Q. Okay. "For each tweet, we first do a stemming 25 process to filter out stop words, slang words, unknown	Page 144 1 A. Correct. 2 Q. Then you use the information of that tweet to 3 run a Wikipedia search, correct? 4 A. Correct. 5 Q. And then you use the relevance results from 6 that Wikipedia search in order to sort the results, 7 correct? 8 MR. PADMANABHAN: Objection; Rule 401, 9 403, 611, and 613. 10 A. So let me read it, if you don't mind. 11 Although my paper, but -- so give me two minutes. 12 (Witness reviewed document.) 13 A. Okay. 14 Q. (BY MR. PLAIL) So you're using the relevance 15 results from Wikipedia's search in order to sort the 16 results? 17 MR. PADMANABHAN: Objection; Rule 613, 18 611, 401 to 403. 19 A. Yes. 20 MR. PLAIL: This is going to be Exhibit -- 21 THE REPORTER: 11. 22 MR. PLAIL: -- 11. 23 (Exhibit Number 11 was marked.) 24 A. It's interesting, my paper. 25 Q. (BY MR. PLAIL) Do you recognize Exhibit 11?

Page 145	Page 147
1 A. Yeah. 2 Q. Can you read the abstract of Exhibit 11? 3 A. Out loudly or by myself? 4 Q. You can do it by yourself. I will read one 5 portion into the record. 6 (Witness reviewed document.) 7 A. Yeah. 8 Q. So if we look at the second-to-last sentence, 9 it says, "We go one step beyond the previous research by 10 mining Twitter messages, assigning weights to them, and 11 determining keywords that can be added to the search 12 query to act as pointers to the existing search engine 13 algorithms, suggesting to a -- the user is looking for 14 news" [as read]. 15 Do you see that? 16 A. Let me... 17 (Witness reviewed document.) 18 Q. Dr. Khan? 19 A. Yeah. 20 Q. Do you see that? 21 A. Yeah, I see it, but what is the question? 22 Q. So you're talking about mining Twitter 23 messages and then using those messages as keywords for a 24 search query. Do you see that? 25 A. Mining the Twitter messages and then...?	1 added to the search with the original search term, and 2 then go to the search engine so that the search engine 3 may give you a better or more precise result. 4 Q. I see. So you're using Twitter messages to 5 get search terms to use with the search engine? 6 A. Yeah. The idea here is we are doing some -- 7 let's say Twitter or social media captures the more -- 8 more recent event in a realtime basis. 9 So if you remember, there was an 10 earthquake happens in Nepal and it was not in the 11 mainstream media. It was in the social media, Twitter 12 first. And then people know from there. And then all 13 this New York Times started to report that event. 14 So this type of incident or disaster 15 incident or some shooting happens, that Twitter -- or 16 social media is very useful. So here, we're not 17 improving the search engines result. We just 18 utilized the -- in this paper. I'm not talking about 19 any other. This paper, we utilized the Twitter as an 20 additional source. Twitter will give us some additional 21 terms. And using that term, we add it into our original 22 search queries. And then it will be submitted to the 23 search engine, the search engine will give us a more 24 precise... 25 Q. I see. So this is a combination of using
Page 146	Page 148
1 Q. Using the messages as keywords for a search 2 query. Do you see that? 3 A. Uh-huh. 4 Q. Okay. So this is an example of combining 5 message content with the search query, correct? 6 MR. PADMANABHAN: Objection; Rule 613, 7 611, 401 to 403. 8 A. This is -- okay. So what you're saying this 9 is a... 10 Q. (BY MR. PLAIL) Example of combining message 11 content with a search query. 12 MR. PADMANABHAN: Same objections. 13 A. Can you give me two or three minutes to read 14 this, at least the introduction, quickly? 15 Q. (BY MR. PLAIL) I just gave you two or three 16 minutes to read the introduction, Dr. Khan. 17 A. No, the introduction. That was -- so there's 18 a little bit of -- sorry for the trouble. 19 (Witness reviewed document.) 20 A. So here we are changing the -- the search 21 query by adding additional times. 22 Q. Based off of Twitter messages? 23 A. Right; based on the Twitter message. Because 24 Twitter message is sharp, so it gives you additional 25 clue after filtering and removal. Then that will be	1 Twitter messages and search engine? 2 MR. PADMANABHAN: Objection; Rule 613, 3 611, 401 to 403. 4 A. Yes. This paper, yeah. That Exhibit 11 talks 5 about that. 6 So I have more papers to discuss? 7 Q. (BY MR. PLAIL) You have a lot of papers. 8 A. I should have stopped to write paper. 9 Q. Don't worry, I'm not going to give you -- I'm 10 going to give you one of your patents. 11 A. Yeah, I know this patent. I only have two -- 12 four patents, so this is one of them, yeah. 13 (Exhibit Number 12 was marked.) 14 Q. So this is Exhibit 12. Do you recognize 15 Exhibit 12? 16 A. Yes. 17 Q. Exhibit 12 is one of your patents, correct? 18 A. Yes. 19 Q. Can you go to column 1, lines 35 through 38? 20 A. Line 35 through 38. 21 MR. PADMANABHAN: So what word are you 22 starting with on column 1? "Online"? 23 MR. PLAIL: "Online." 24 MR. PADMANABHAN: Okay. 25 Q. (BY MR. PLAIL) It says there, "Online social

Page 149 1 networks such as Twitter, Foursquare, and Facebook have 2 emerged only during the last decade and have since 3 become popular tools for public discourse, as well as 4 political and social commentary" [as read]. 5 A. Yes. 6 Q. Do you agree with that? 7 MR. PADMANABHAN: Objection; Rule 613. 8 A. Yes, I agree. 9 Q. (BY MR. PLAIL) So you agree that Twitter has 10 become popular over the last decade? 11 MR. PADMANABHAN: Objection; Rule 613, 12 601, and 602. 13 A. Yes. 14 Q. (BY MR. PLAIL) And this patent's from 2015, 15 correct? 16 A. Yeah, it was issued. 17 Q. And part of the reason they've become popular 18 is because they allow for public discourse, as well as 19 political and social commentary? 20 MR. PADMANABHAN: Rule 601, Rule 611, and 21 Rule 613; objection. 22 THE WITNESS: I should answer? 23 MR. PADMANABHAN: Yeah, yeah, you can 24 answer. 25 A. So what is your question?	Page 151 1 Q. And so one of the reasons Twitter became 2 popular is because it allowed people to communicate with 3 friends, family, and followers and subscribers around 4 the world? 5 MR. PADMANABHAN: Objection; Rule 613, 6 601, 602. 7 A. But, again, the Twitter message is very short, 8 140 character at that time. And so if you want to -- 9 and this will be publicly available, so anybody can see 10 it when you post it. So that's why it's very popular 11 among the politician, among the celebrities, and among 12 the users that want to be famous. 13 Q. (BY MR. PLAIL) So these are some reasons it 14 became popular. And in addition -- 15 A. But if you have a private message, I don't 16 think this type of -- and if you have a long message 17 from one person to another, then this platform will not 18 work. 19 Q. I see. 20 But an additional reason Twitter became 21 popular is because it allowed people to connect with 22 friends, family, followers, and subscribers around the 23 world? 24 A. Yeah. They have a follow -- 25 MR. PADMANABHAN: Object --
Page 150 1 Q. (BY MR. PLAIL) Part of the reason Twitter 2 became popular is because it allows for public 3 discourse, as well as political and social commentary? 4 MR. PADMANABHAN: Same objections. 5 A. Yeah, it's -- you can express your opinion in 6 a very -- with a shortened form, so that's why it's 7 popular, yeah. 8 Q. (BY MR. PLAIL) Can you go to column 4, lines 9 27 through 39? 10 A. Column 4, line 27 to 39? 11 Q. Yes. 12 MR. PADMANABHAN: Is this the whole 13 paragraph? 14 MR. PLAIL: We can look at the last 15 sentence. 16 MR. PADMANABHAN: Starting with "any 17 social," is that the sentence? 18 Q. (BY MR. PLAIL) "For example, social 19 networking websites like Twitter, Foursquare, LinkedIn, 20 Facebook, Google Plus, et cetera, enable user 102 to 21 communicate with friends, family, and followers, 22 subscribers around the world, as well as make new 23 connections with unknown people based on similar 24 interests or professions" [as read]. 25 A. So are you asking me yes or no, right? Yes.	Page 152 1 Just give me one second. 2 Objection; Rule 613, 601, 602. 3 You can answer. Sorry. 4 THE WITNESS: Sorry. 5 A. They -- they have one of the popular concept 6 they introduced in the Twitter, follower -- so the more 7 followers you have, you have a celebrity status. So 8 this type of thing -- this is where the -- the Twitter 9 is the model. But in case of the e-mail messaging 10 system, that's not the case. 11 Q. (BY MR. PLAIL) Another reason Twitter became 12 popular is because it allows you to make new connections 13 with unknown people based on similar interests or 14 professions? 15 MR. PADMANABHAN: Objection; Rule 613, 16 601, 602. 17 A. I think since it is public, anybody can see 18 it, right? And they can join or follow that person, 19 whoever posts the message and likes it. So that way, 20 new -- new connections with unknown people, that link 21 can be established. 22 Q. (BY MR. PLAIL) And that's one of the reasons 23 Twitter became popular? 24 MR. PADMANABHAN: Objection; Rule -- 25 Rule 613, 601, 602.

Page 153 1 A. Main -- main thing is if you want to converse 2 some -- spread some messages with a very short heading 3 or short content, then Twitter is one way to do it. And 4 it's public. But if you have private or semiprivate 5 messages, then Twitter is not the platform. 6 Q. (BY MR. PLAIL) Can you turn back to your 7 declaration? 8 A. So we're done with my papers? 9 Q. For now. I can't let you off the hook that 10 easily. 11 A. My declaration, right? 12 Q. Yeah, your declaration. 13 Can you go to page 63? 14 A. Uh-huh. 15 Q. So I just want to talk about the structure of 16 the report, and then we'll go through it in a little 17 more detail. 18 So you have this Section 4 here, starting 19 on page 63, right? 20 A. Uh-huh. 21 Q. Verbal answers, Dr. Khan. 22 A. Yeah, what is the question? Section -- 23 Q. Section -- there's Section 4, starting here on 24 page 63, correct? 25 A. Yeah, right.	Page 155 1 paragraphs 168 through -- it goes on for some length -- 2 190, these are your arguments for why Krug, on its own, 3 does not disclose the identifying limitation? 4 A. Yes, that's correct. 5 Q. And so your argument for why the combination 6 does not disclose the -- sorry, strike that. 7 And so your argument for why the 8 combination of Kircher and Krug does not disclose the 9 identifying limitation is because Kircher does not 10 disclose it and Krug does not disclose it? 11 A. That's correct. And also, we pointed out if 12 you combine these two model, there is some issue there 13 you cannot combine it. 14 Q. Right. 15 Okay. So let's go to -- so that one you 16 just referred to, that's down here in a different 17 section, correct? 18 A. That's correct, yeah. Later, I think. 19 Q. Much later. 20 A. Section 5, no? 21 (Witness reviewed document.) 22 Q. I believe that's Section 7. 23 MR. PADMANABHAN: Just before you jump in, 24 we've been going over an hour. Would you mind if we 25 take a little break? I want to run to the restroom.
Page 154 1 Q. Okay. And you then go -- have a subsection 2 (a), right? 3 A. Uh-huh. 4 Q. Which discusses why you allege the Kircher 5 reference does not teach, disclose, or render obvious 6 this limitation? 7 A. Correct. 8 Q. All right. And then if we go to the next 9 page -- actually, the page after that, page 65, you have 10 a separate section for why you allege the Krug reference 11 does not teach, disclose, or render obvious these 12 limitations? 13 A. Okay. 14 Q. Okay. So if we look at paragraphs 66 through 15 67, these are discussing your argument for why Kircher, 16 on its own, does not discuss the identifying limitation? 17 MR. PADMANABHAN: Where are you now? 18 MR. PLAIL: 166 through 167 paragraphs. 19 A. But you're talking about which reference? The 20 paragraph -- 21 Q. (BY MR. PLAIL) Paragraphs 166 through 167. 22 These are your arguments for why Kircher, on its own, 23 does not disclose the identifying limitation, correct? 24 A. Yes, correct. 25 Q. Okay. And then if we go to section (b),	Page 156 1 MR. PLAIL: Yes. 2 Q. (BY MR. PLAIL) If you can -- if you answer 3 the question pending, we can then do the break. 4 A. Sure. 5 Q. So -- 6 A. What was the question? 7 Q. Let me just... 8 A. Do you remember? 9 Q. And so Section 7 is where you refer to your 10 argument that a person of skill would not be motivated 11 to combine Kircher and Krug? 12 A. Section 7? Where is Section 7? Which page? 13 Do you know? 14 Q. 79. 15 (Witness reviewed document.) 16 A. I'm talking about -- yeah, they tried to say 17 when you combine this to what would happen, and 18 Section 8 talks about combining Krug with the Kircher 19 would be inoperable. 20 Q. Okay. So that's a "yes" to my question? 21 A. 82 talks about more, so that -- page 82, 22 Section 8. 23 Q. Okay, I see. You're saying Sections 7 and 8 24 together -- 25 A. Right.

Page 157	Page 159
1 Q. -- is your argument for why a person of 2 skill -- 3 (Cross talk.) 4 Q. -- would not be motivated to combine Kircher 5 and Krug? 6 A. Those two -- yeah, these two would not work 7 to -- to cover -- to replace the patent '217. 8 MR. PLAIL: Okay. Let's take a break. 9 (Break taken from 1:57 p.m. to 2:04 p.m.) 10 Q. (BY MR. PLAIL) This has been previously 11 marked as Exhibit Ex. 1007. Do you recognize this 12 document? 13 A. Yeah; it's Dumais, right? 14 Q. Let's go ahead and look at the cover of 15 Dumais. Do you see that Dumais is assigned to 16 Microsoft? 17 A. Microsoft? 18 Q. Uh-huh. 43 -- it's -- sorry, 73. It says, 19 "Assignee: Microsoft Corporation." 20 A. Where? 73? 21 Q. [Indicating.] 22 A. Oh, okay, yeah. I read one of the authors -- 23 one of the patent inventor's paper in the past, yeah, 24 Susan Dumais. 25 Q. Okay. So you've heard of Susan Dumais?	1 processing data items such as documents, files, e-mail 2 messages, calendar appointments, web pages, subsections 3 within the data items, or across item abstracts, for 4 example" [as read]. 5 Do you see that? 6 A. I see. 7 Q. So do you agree that Dumais can process 8 multiple data types? 9 A. So it can process the web object, HTML pages. 10 It can process images, videos, yeah. 11 Q. And according to paragraph 31, it can also 12 process documents, files, e-mail messages, calendar 13 appointments, correct? 14 A. Okay. So I think that the -- the patent is 15 written in a little bit general language. So the scope, 16 they want to broaden it, so that's why they mention 17 multiple data types. 18 So, in this case -- because if you see 19 later in the patent, that talks about this patent, 20 Dumais, it talks about search engine they will utilize. 21 THE REPORTER: Search engine -- 22 THE WITNESS: Search engine. 23 THE REPORTER: Okay. 24 Q. (BY MR. PLAIL) So you disagree with the 25 statement in Dumais where it says that it can process
Page 158	Page 160
1 A. I read some of her paper, yeah, in the past. 2 Q. And this patent is assigned to Microsoft Corp, 3 correct? 4 A. Yeah, 73. Yeah, from the Microsoft, yes. I 5 remember she used to work in Microsoft. Now I don't 6 know. Probably she is still. 7 Q. Let's look at the abstract of Dumais. The 8 first sentence says, "Various components and processes 9 are provided to enable data processing on multiple data 10 types where aspects of the history of the user 11 activity," [as read] and then it goes on from there. 12 Do you see that? 13 A. Uh-huh. 14 Q. Verbal answers, Dr. Khan. 15 A. Yeah, I see. 16 Q. So you agree that Dumais can operate with 17 multiple data types? 18 A. Multiple data types means -- you mean audio, 19 video, images, that type of thing? 20 Q. If you go to paragraph 31 of Dumais. 21 A. Uh-huh. 22 Q. It says in the first sentence of paragraph 31, 23 "The system and methods described herein support the 24 plurality of data applications." 25 It goes on to say, "This includes	1 data items such as documents, files, and e-mail 2 messages? 3 A. No, I'm not saying -- but I'm saying since 4 they utilized the search engine -- so search engine is 5 well-equipped or well-trained. It works very well from 6 the -- the HTML pages. It works very well for the 7 documents and so on. But when it comes to the e-mail 8 messages, it will be associated with the sender and the 9 recipient. So this will play some role in the ranking 10 process, right? So that part not the main focus of this 11 patent. 12 Q. You agree that Dumais can process data items 13 such as documents, files, and e-mail messages, correct? 14 MR. PADMANABHAN: Objection -- oh, sorry. 15 Objection; asked and answered -- 403, 601. 16 Q. (BY MR. PLAIL) Dr. Khan, does it say "e-mail 17 messages" there in paragraph 31? 18 A. Yes, I agree. 19 Q. And it says that it can process e-mail 20 messages in paragraph 31, correct? 21 A. Correct, yeah. 22 Q. And so do you disagree with the statement in 23 Dumais that it can process e-mail messages? 24 A. Because if you read the whole -- if you see 25 the whole patent, if you read it, the way it was framed,

Page 161 1 they mostly focused on the -- the back end. They 2 utilize the search engine. You can see here search 3 component where they rely on it, and the search 4 component will give you some results back, then they 5 will reorder it and present to the users. 6 Q. So you disagree -- you're saying that Dumais 7 cannot process e-mail messages? 8 A. I'm saying their ranking is entirely 9 different. 10 Q. I am asking, can Dumais process e-mail 11 messages? 12 A. I -- I don't know. They may be able to do it. 13 They may not be able to do it. 14 Q. Okay. So you disagree with paragraph 31 of 15 Dumais? 16 A. In a general case, I agree with that. 17 Q. In the specific case of Dumais, do you agree 18 with paragraph 31 where it says it can process e-mail 19 messages? 20 MR. PADMANABHAN: Objection; 4- -- 611, 21 403. 22 A. Because my concern is there's search engine is 23 involved in the back-end for the Dumais. So search 24 engine are already utilizing the public data and so on 25 to build the index and so on.	Page 163 1 Q. And they also have Outlook? 2 A. Yeah; Outlook, yeah. 3 Q. And they also have Microsoft Exchange? 4 A. Yeah, Microsoft Exchange -- 5 Q. And those are e-mail systems? 6 A. Right, yeah. 7 Q. And those are very popular systems? 8 A. Yeah. But at the time, people use other 9 e-mail systems, but yeah. Because Microsoft doesn't 10 give you a free version. You have to pay. 11 Q. Yeah. 12 Okay. So looking at Figure 1, Figure 1 is 13 a diagram showing the Dumais system? 14 A. Uh-huh -- oh, next page, right? 15 Q. Yes. 16 A. Okay, yeah. 17 Q. Do you see that there's a monitor component 18 110? 19 A. Right. 20 Q. That monitor component tracks the user's 21 interaction with the data items. Is that right? 22 (Witness reviewed document.) 23 A. Okay, yeah. 24 Q. And so if we go to paragraph 22 of Dumais. 25 A. 22 of Dumais. Yeah.
Page 162 1 Q. (BY MR. PLAIL) I'm not asking what usually 2 happens, Dr. Khan. I'm asking whether Dumais can 3 process e-mail messages, which it says it can do in 4 paragraph 31. 5 A. Yeah, the writing said yes. 6 Q. And so -- but you're -- you're disagreeing 7 that it's capable of doing it? 8 A. Yeah, I disagree with the -- eventually the 9 end results may not be good, or it -- what the 10 original -- because it doesn't take into consideration 11 sender concepts, recipient concepts, and all this 12 importancy. So the result may not be that high quality. 13 Q. Okay. But you agree that an e-mail message 14 would have a sender and a receiver? 15 A. Yeah. 16 Q. Can you look at Figure 1 of Dumais -- 17 actually, let's go back to the cover real quick. I just 18 want to ask some questions about Microsoft real quick. 19 In 2005, was Microsoft a major player in 20 e-mail? 21 A. In 2005, Microsoft was a major player in the 22 e-mail business? I don't know. 23 Q. You don't know? 24 A. No. But I know they have a browsing system 25 and they have a large search engine.	Page 164 1 Q. It says referring to Figure 1. And then it 2 says that that's a System 100 that illustrates the data 3 processing architecture. Do you see that? 4 A. Yeah. 5 Q. It says there that, "A monitor component 110 6 observes data and actions over time with one or more 7 databases 120 that store one or more data items 130" [as 8 read]. 9 Do you see that? 10 A. Which one? Monitoring component? 11 Q. Monitoring component 110. 12 A. Yeah. 13 Q. If you go down, it says, "For instance, this 14 can include observing when files are opened, closed, 15 edited, added to, deleted, read, or written to, cut, 16 pasted, last edited, forwarded, replied to, sent to, 17 last viewed, the amount of time viewed, time interacted 18 with over the time horizon" [as read], and it goes on 19 from there. 20 Do you see that? 21 A. Uh-huh. 22 MR. PADMANABHAN: You have to say "yes" or 23 "no." 24 A. Yes, I see it. 25 Q. (BY MR. PLAIL) So you agree, then -- strike

Page 165 1 that. 2 The monitoring component 110 observes 3 actions such as when the files are opened, closed, 4 edited, replied to, sent to, for example? 5 A. Right. But this case, the file is a -- the -- 6 you're not -- Microsoft Word document that you can think 7 about. 8 Q. Right. 9 A. And it can be HTML pages. 10 Q. Right. And -- 11 A. And it can be -- and this file -- this HTML 12 pages are the documents are not attached to the -- no 13 concept is -- the sender is not there. And then no 14 concept for the recipient may not be explicitly 15 mentioned here. And then also -- 16 Q. Let me stop you right there. It says there 17 reply to or sent to? 18 A. Okay, yeah. It says reply to or sent to, 19 okay. 20 Q. So it can track when an e-mail is replied to 21 or sent to, correct? 22 A. Yes. 23 MR. PADMANABHAN: Objection; 611. 24 Q. (BY MR. PLAIL) So you said earlier that 25 there's no concept of a recipient in Dumais. Is that	Page 167 1 say something vague or wrong. 2 (Witness reviewed document.) 3 Q. To put it another way, you're testifying that 4 Dumais wouldn't create a high-quality output? 5 MR. PADMANABHAN: Objection; Rule 611. 6 A. I don't want to answer that. 7 Q. (BY MR. PLAIL) But you have to answer that. 8 A. Oh. 9 MR. PADMANABHAN: Objection; Rule 611 and 10 613. 11 Q. (BY MR. PLAIL) Dr. Khan, your not wanting to 12 answer something is not legitimate. If I ask a 13 question, you have to answer it to the best of your 14 ability. 15 A. Yeah. So you are saying -- what is the 16 question? 17 Q. You're testifying that Dumais would not create 18 a high-quality output? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. No; I said Dumais would produce very -- it is 21 possible that it may work very well for their setting. 22 Their setting is from the search engine, they would pull 23 out the objects and then customize it and present to the 24 users in a certain way that will fulfill the user 25 requirements, because it's more -- they do creative
Page 166 1 your testimony? 2 A. No concept of the send, because an e-mail is 3 with the sender and recipient, right? There's two 4 concepts are important. But here, in this case, the 5 object case, general object case, we focus mostly on 6 the -- we can think about this might be an n user or the 7 recipient. So sender is not important here. If you 8 think about -- if you are looking for some HTML pages. 9 Q. But Dumais can also use e-mail? 10 A. They mention it briefly, but in a very high 11 level -- in a few place they mention it, that's it. But 12 when it comes to the algorithm, I'm not sure whether 13 that talks about -- the algorithm takes into 14 consideration those sender importancy and the -- the 15 recipient factors taken into consideration, the answer 16 is no. 17 Q. Okay. So your testimony is that the algorithm 18 in the '217 patent requires -- is required to take into 19 account sender importancy and recipient factors? 20 MR. PADMANABHAN: Objection; 611. 21 A. Let me -- okay, let me read it from my 22 declaration. 23 Q. (BY MR. PLAIL) I was just quoting your 24 previous statement. 25 A. I want to say it precisely. I don't want to	Page 168 1 writing, and then basically with the help of 2 collaborative filtering, they add additional times 3 there, and then those revised query would be sent to the 4 search engine, and search engine would give you the 5 results back. And then that results, maybe you can 6 customize it or personalize it and present to the users. 7 So in that case, for that type of context, 8 it may work very well. But when the search -- you're 9 looking for search objects for the Dumais patent. 10 Q. (BY MR. PLAIL) And so did you evaluate the 11 quality of the Dumais algorithm when you evaluated it 12 against the '217 patent claims? 13 MR. PADMANABHAN: Objection; to some 14 extent, Rule 613, and then 611. 15 A. All that means some numbers or just -- 16 Q. (BY MR. PLAIL) Analyze, consider, review? 17 A. So if you ask me in terms of the -- because as 18 a researcher, we always -- when you write the paper, you 19 can come up with a theory, but you have to back it up 20 with some numbers. So you do some empirical study, and 21 then you show those results and so on. 22 But in patent application, that is not the 23 case. That's very standard procedure. So -- but the 24 way this patent, '217, the ranking algorithm is very 25 impressive. And then it is very tall, and it considers

Page 169 1 the sender importancy. It considers the local -- the 2 local importancy, global importancy. And then based on 3 that -- and the cognate importancy. And based on that, 4 they come up with a score. 5 And I think for e-mail messaging system, 6 this patent '217 would work very well in the time frame. 7 And an n user should be happy without getting the e-mail 8 messages with that system. But if you consider the 9 other system where you just rely on the search engine 10 and search engine gives you the results, and then you 11 just -- based on the user preference, you just change 12 the order. That's possible. 13 It may -- then you can say it may 14 considers the one factor only, that some sort of 15 collaborating effect might be there. But the other 16 importancy will not be there, my understanding. So in 17 that case, patent '217 will outperform the other ones at 18 that point. 19 Q. And so you were evaluating the relative 20 quality of the algorithms between the '217 patent and 21 the prior art when you were evaluating the claims? 22 MR. PADMANABHAN: Objection; Rule 611. 23 A. Sorry, can you say...? 24 Q. (BY MR. PLAIL) You were evaluating the 25 relative quality between the algorithms for the '217	Page 171 1 Microsoft -- for patent '217. And it's not public. 2 They will not give me the system to evaluate it, right? 3 It's impossible. So no. 4 Q. So you're saying it's impossible to evaluate 5 the system without looking at the source code to -- to 6 figure out exactly how it's done? 7 A. Source code making the idea that the way the 8 patent is written that they describe the equations and 9 they explain it and these are the important components. 10 So based on that, I'm giving my opinion. And the -- the 11 patent '217 are, again, focusing on four -- four 12 different components for the ranking process. So 13 that -- some of this -- some of this components may be 14 presented in one or two patents, but others I have sent. 15 Q. Okay. Can we go back to Claim 1 real quick? 16 A. Sure. 17 Q. In Claim 1, can you tell me which limitation 18 requires a high-quality algorithm? 19 MR. PADMANABHAN: Objection; beyond -- 20 Rule 613 and 611. 21 A. Which limitation? 22 Q. (BY MR. PLAIL) Requires a high-quality 23 algorithm. 24 MR. PADMANABHAN: Objection; Rule 611 and 25 613.
Page 170 1 patent and the algorithms for the prior art when you 2 were forming the analysis of the claims? 3 A. Correct. 4 MR. PADMANABHAN: Objection; Rule 611. 5 A. What -- 6 Q. (BY MR. PLAIL) And -- 7 A. What? 8 Q. And when you were going through that 9 evaluation -- 10 A. Evaluation or just reading those and the 11 patent or -- 12 Q. I mean, I would -- 13 A. Evaluation has -- in the computer science, 14 evaluation means empirical result, sometimes people 15 interpret. 16 Q. Uh-huh. 17 A. So you -- you are not meaning that way, right? 18 Q. Well, I guess my question is: Did you -- did 19 you go -- strike that. 20 Did you create an empirical result -- 21 A. No. 22 Q. -- from your study? 23 A. No. 24 Q. No? Okay. 25 A. It's not -- it's -- it's a full system for	Page 172 1 THE WITNESS: I should answer? 2 MR. PADMANABHAN: Yeah. 3 Q. (BY MR. PLAIL) You must answer. 4 A. Okay. So, first, relevancy means there are -- 5 so your -- which claim or which limitation? Which 6 claim? 7 Q. Within Claim 1, can you point to limitations 8 that require a high-quality algorithm? 9 A. Okay. Yes, so, first of all, first means 10 relevancy takes into consideration the user actions, 11 right? User actions, right, on the -- 12 Q. So you're saying that -- 13 A. No, no. And then second measure of relevancy 14 that talks about four different -- one of the four -- 15 one or some are satisfied, so these are the important 16 components that will contribute the high-quality result. 17 Q. Okay. So you're saying the second measure of 18 relevancy, the four attributes under the second measure 19 of relevancy, are where the high-quality algorithm is 20 required? 21 MR. PADMANABHAN: Objection; misstates -- 22 Rule 611. 23 A. Second -- because second relevancy talks about 24 the -- the two conditions for the -- for the identifying 25 the second set of users or the -- that user needs to be

Page 173 1 cognate to the first user and then needs to be the 2 recipient of the same electronic message, right? So 3 that's one. 4 And then we talk about the local -- we 5 talk about the relevancy means there will be based on 6 the local relevancy, global -- I'm sorry, local 7 importancy, global importancy, content relevancy, and 8 then -- and then collaborative relevancy, and then 9 combine it. 10 Q. (BY MR. PLAIL) Okay. So the claim -- just to 11 recap what you just said, the claim requires a 12 high-quality algorithm in order to identify a cognate 13 user, correct? 14 MR. PADMANABHAN: Objection; Rule 611. 15 A. No. 16 Q. (BY MR. PLAIL) No? 17 A. What did you say? 18 Q. The claim requires a high-quality algorithm in 19 order to identify the cognate user? 20 MR. PADMANABHAN: Objection; Rule 611. 21 A. No. I said the claims come up with a very 22 efficient scoring mechanism, and that efficient scoring 23 mechanism is based on a number of algorithms or 24 approaches, the first relevance -- I'm sorry, the -- the 25 local relevancy, global relevancy, then content and	Page 175 1 A. There is no specific -- 2 Q. Limitation in Claim 1 that requires a 3 high-quality algorithm? 4 MR. PADMANABHAN: I'm just going to object 5 as Rule 611 and 401 and 403. 6 A. I tried to say that the second measure of 7 relevancy is important here. And first measure of 8 relevance, we just take the user actions. And then 9 second relevancy has a bunch of components, right? 10 Q. (BY MR. PLAIL) So the second measure of 11 relevancy, does that require a high-quality algorithm? 12 MR. PADMANABHAN: Objection; Rule 611. 13 A. No. The second measure of relevancy itself is 14 a -- produce high-quality scoring, so that is why that's 15 impressive. 16 Q. (BY MR. PLAIL) So the second measure of 17 relevancy implicitly requires a high-quality output? 18 A. No. It produces -- 19 MR. PADMANABHAN: Objection -- sorry. 20 Objection; 611 and 401 to 403. 21 A. It produces high-quality result. The scoring 22 mechanism is -- the algorithm come up with a scoring 23 mechanism, and that is very satisfactory as compared to 24 other processes, as well. 25 Q. (BY MR. PLAIL) How do you determine whether a
Page 174 1 calibrating. And if you ask me which one is the most 2 important, as I told you, that needs further study. 3 Q. (BY MR. PLAIL) I'm not asking which is more 4 important. I'm asking which claim limitations require a 5 high-quality algorithm? 6 MR. PADMANABHAN: Objection; Rule 611 and 7 613 -- 8 A. Which -- 9 MR. PADMANABHAN: -- and 401 and 403. 10 A. Which ones requires high-quality algorithm, 11 right? 12 Q. (BY MR. PLAIL) Yes. 13 A. That, I cannot answer. I don't know. 14 Q. You don't know which claim limitations require 15 a high-quality algorithm? 16 A. Because of the combination of this would work 17 together -- 18 Q. Okay. 19 A. -- and produce the better quality result. 20 Q. So there's no specific limitation in Claim 1 21 that requires a high-quality algorithm? 22 A. There is -- sorry, what? 23 Q. So your testimony is that there is no specific 24 limitation in Claim 1 that requires a high-quality 25 algorithm?	Page 176 1 specific scoring is satisfactory? 2 A. Because it is used -- it takes into 3 consideration the various factors, not only that one 4 factor, let's say, calibrated for time, like Dumais. 5 And then the Krug focuses on the collaborative -- 6 equivalent calibrated configuring. 7 But there's one important difference I 8 should clarify. The same -- when you do the 9 collaborative filtering, the recipient, whatever the 10 recipient will choose, identify these are the cognate 11 users, that cognate users need to be the recipient of 12 the same electronic message that the original -- or the 13 first user receives it, right? 14 Q. And so that's what makes it a high quality? 15 A. Right. It's -- it's very statistic. So that 16 way, in general, in the informational area, you can get 17 everything -- you can tell everything to the user. That 18 way you give a lot of junk, right? So that will hurt 19 the system performance. You may get 100 percent recall, 20 but the position will be very low, because you're 21 getting a lot of junk. 22 But here, the -- the way that I can 23 process work because we're trying to give the more 24 precise -- in the collaborative filtering, we're 25 choosing the most important users with respect to given

Page 177 1 user. And then that user's -- 2 Q. Let me -- let me short-cut this a little bit. 3 Dr. Khan, are you saying that Dumais does 4 not have a high-quality algorithm? 5 A. No, I'm not saying that -- Dumais is a very 6 good algorithm, and it will work for their setting very 7 well. That is more a personalization and more identify 8 the objects and so on. In general, object setting, you 9 do very good. 10 Q. Okay. But you can't identify specific set of 11 limitations in Claim 1 that requires a high-quality 12 algorithm? 13 MR. PADMANABHAN: Objection; Rule 611, 401 14 to 403. 15 A. I'm saying that -- 16 MR. PADMANABHAN: And sorry -- yeah, I got 17 it all. 18 Go ahead, sir. 19 A. So second measure of relevancy, I think you -- 20 the way it comes up with all this scoring mechanism, 21 that is very powerful and that is the best at the time 22 as compared to other patents. 23 Q. (BY MR. PLAIL) Okay. So you're saying the 24 second measure of relevancy requires a high-quality 25 algorithm?	Page 179 1 with a really bad measure of relevance? 2 MR. PADMANABHAN: Objection; 601 -- sorry, 3 611, 401 to 403, and 701 to 704. 4 A. First of all, then they have to -- okay, so if 5 that's the case that they can implement -- it's not easy 6 to implement, first of all, with an ordinary skill set. 7 And even if they implement this full-fledged system, it 8 requires a lot of time. 9 Once they build it, then they may need 10 to -- one thing they can do, they can run it multiple 11 times and play with the parameters and do some 12 modalities, and then come up with the weights and so on. 13 Change the weight. Because there's a lot weights and 14 parameters involved here, so -- 15 Q. (BY MR. PLAIL) And the weights are not 16 disclosed in the patent? 17 A. Right. But they're mentioned. But usually 18 they don't disclose it. Everybody will start the 19 company, the business. 20 Okay, I want to say one thing -- no, I 21 shouldn't say. 22 Q. Okay. So going back to Dumais, can you go to 23 paragraph 19? 24 A. Yeah. 25 Q. Here it's discussing in the second sentence,
Page 178 1 MR. PADMANABHAN: Objection; mis- -- 2 Rule 611, 401 to 403. 3 A. I'm not saying high quality, but I'm saying it 4 comes up with a scoring mechanism that is the -- that is 5 actually fulfills whatever the user wants to get. 6 Q. (BY MR. PLAIL) So -- I see. 7 So you're looking at this from a result? 8 A. Perspective, yeah. 9 Q. Yeah. 10 So what about the input perspective? What 11 inputs do we need to create a high-quality result? 12 MR. PADMANABHAN: Objection; Rule 611, 401 13 to 403. 14 A. In the messages, and then in the mechanism, 15 you mean? 16 Q. (BY MR. PLAIL) Yes. 17 A. Yeah, user actions you'll capture. In this 18 case, user action -- you will capture a lot of user 19 activities, right? And then we will take into 20 consideration in the -- the sender importancy and global 21 importancy. Then we'll take into consideration those -- 22 the cognate users thing and then the content relevancy. 23 Okay, one important -- 24 Q. So -- so what happens if a person of skill 25 implements every limitation of the claim and they end up	Page 180 1 "For example, the activity or interaction can be 2 monitored and subsequently tagged to a data item, e.g., 3 activity of file interaction design assigned a weight 4 and applied to a column in a database and later employed 5 for searching, indexing, cataloging, ranking, or viewing 6 of various data items residing in that place" [as read]. 7 Do you see that? 8 (Witness reviewed document.) 9 A. So here the -- this -- Dumais heavily relies 10 on the metadata. You are -- well, let's say they want 11 to do with the HTML pages. So you want to -- you are 12 looking for -- so you wanted to go to, let's say, 13 Hungary, and you are saying -- let's say you are looking 14 for a flight for Hungary to go from here to Budapest. 15 So then the system knows from your historical data that 16 the -- the tag is you -- you do a lot of -- in the past, 17 you do a lot of interaction with the travel pages, 18 travel HTML pages. So then that -- this travel keywords 19 will be added with your origin of search term. 20 And then this search term, plus the 21 original search term, plus augment -- additional terms 22 that the -- that the system provides, so that will be -- 23 that will go to the search engine, and search engine, 24 instead of searching only on the Hungary flight, they 25 will search Hungary flight plus the travel. And it

Page 181 1 gives you more -- hopefully more relevant pages search 2 engine. 3 And then based on your interest, it will 4 customize it and sort the results and present it to you. 5 That's the main idea for the Dumais. The rewriting, and 6 then the reranking the results. 7 THE REPORTER: I'm sorry, the what? 8 THE WITNESS: Reranking, reranking. 9 Q. (BY MR. PLAIL) So the actions of the users 10 are tracked and appended to each data item? 11 MR. PADMANABHAN: Objection; Rule 611. 12 A. Action -- okay, action -- 13 Q. (BY MR. PLAIL) Each user -- so the actions of 14 the users are tracked and appended to each data item? 15 A. Not each data item. It will be appended to 16 the user profile. Because in order to -- every time you 17 log in, it will be -- 18 Q. So I'm just going to paragraph 19. It says, 19 "The activity and interaction can be monitored and 20 tagged to a data item" [as read]. 21 A. Activity and interaction can be monitored... 22 (Witness reviewed document.) 23 A. It can be -- yeah, it can be tagged to a 24 particular item, and at the same time, it will keep 25 track information that this -- this data item is Page 182 1 associated with that particular user. It's not a 2 generic way to go, no. 3 Q. (BY MR. PLAIL) Okay. So the actions of the 4 users are tracked and appended to each data item? 5 A. Right. 6 Q. And since one of the data items is e-mail, it 7 will also track actions performed by the users on each 8 e-mail? 9 MR. PADMANABHAN: Objection; Rule 611. 10 A. Where is it? Second -- next sentence or -- 11 Q. (BY MR. PLAIL) I'm asking the question. 12 A. Oh. So go ahead. What is the question? 13 Q. Since one data type of Dumais is e-mail, it 14 would also track actions performed by the users on each 15 e-mail? 16 MR. PADMANABHAN: Objection; Rule 611. 17 A. Okay. So first of all, in case of Dumais, if 18 you want to keep track of for each user and you want to 19 keep track of the user activities, then I suspect you 20 will end up with a huge amount of metadata that may 21 not -- that may be a problem. So either you may need to 22 remove it, some of it, and keep track the most important 23 one. Those things will happen. 24 Q. (BY MR. PLAIL) My question was: Since one 25 data type of Dumais is e-mail, it would also track	Page 183 1 actions performed by the users on each e-mail? 2 MR. PADMANABHAN: Objection; Rule 611 and 3 613. 4 A. So that's your question, not from here, right? 5 Q. (BY MR. PLAIL) In Dumais, one of the data 6 types is e-mail, right? 7 A. Right, yeah; but they mention, yes. 8 Q. And Dumais tracks actions performed by the 9 users on the data types, right? 10 MR. PADMANABHAN: Objection; Rule 611 and 11 613. 12 (Witness reviewed document.) 13 A. Yeah, but -- okay. So -- but that's why I 14 added -- from the beginning, I tried to emphasize that 15 their objective is not at the -- at the e-mail level. 16 Their objective is more at the HTML page or documents at 17 that level. And then is a -- usually the documents are 18 the -- 19 Q. (BY MR. PLAIL) So is your testimony that the 20 claim of the '217 patent cannot be used on documents? 21 MR. PADMANABHAN: Objection; misstates -- 22 A. No, I didn't say that. 23 MR. PADMANABHAN: Objection; Rule 611. 24 A. As long as you have a sender and a recipient, 25 yeah. Page 184 1 Q. (BY MR. PLAIL) And the document has a sender 2 and a receiver? 3 MR. PADMANABHAN: Objection; misstates 4 the -- sorry, Rule 611. 5 A. The document has -- yeah, if you create that 6 document, you might be one -- but as long as it's a 7 communication system, personal communication system, 8 then it should be okay. 9 Q. (BY MR. PLAIL) So you testified that the 10 objective of Dumais was relating to HTML pages or 11 documents. Why does that matter if the claims of the 12 '217 patent can be used for documents? 13 MR. PADMANABHAN: Objection; 611 and 4 -- 14 403. 15 A. So you're saying I'm -- I'm saying -- what is 16 the question? You are saying -- 17 Q. (BY MR. PLAIL) You -- earlier you testified 18 that the emphasis of Dumais is not on the e-mail level. 19 Their objective is of the HTML page or documents. 20 A. Right. 21 Q. But the '217 patent can be used for documents, 22 right? 23 MR. PADMANABHAN: Objection; Rule 611. 24 A. But the -- as long as there's a sender and 25 recipient, yes.
---	--

Page 185 1 Q. (BY MR. PLAIL) And how do you know if a 2 document has a sender and a recipient? 3 MR. PADMANABHAN: Objection; Rule 6- -- 4 A. Think about e-mail messages has attachment, 5 right? 6 Q. (BY MR. PLAIL) So the only time a document 7 can be sorted with '217 is when it's an attachment? 8 MR. PADMANABHAN: Objection; Rule 611. 9 A. That -- that one possibility. And then if you 10 have -- because '217 also considers some messages, 11 right? 12 Q. (BY MR. PLAIL) Do you ever send e-mails to 13 people? 14 A. Yeah. 15 Q. Do you have documents on your computer? 16 A. Sometimes. Sometimes I don't -- sometimes -- 17 Q. Or is every document on your computer an 18 e-mail attachment? 19 A. No; every -- every e-mail doesn't have an 20 attachment, right? 21 Q. Yeah. And so not all documents are 22 interperson communications, right? 23 A. All -- not necessarily. 24 Q. So you agree that documents are not 25 necessarily interperson communications?	Page 187 1 either a single person or a group of people, right? 2 A. Okay, yeah. 3 Q. And the models are created using collaborative 4 filtering techniques? 5 A. Right, yeah. 6 Q. And those collaborative filtering techniques 7 are based on analysis of similarities among individuals 8 or groups of individuals? 9 A. Okay, yeah. But -- 10 Q. Including -- 11 A. Okay. 12 Q. -- similarity computations based on content 13 and/or usage of items? 14 A. Okay. 15 Q. Yes? 16 A. Yeah, they wrote it that way, yes. 17 Q. So Dumais can derive a model that describes a 18 group of similar people based on their usage of items? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. Yes. Now you want I should define from patent 21 '217, or no? 22 Q. (BY MR. PLAIL) I don't think there's anything 23 to differentiate, so let's go to paragraph -- 24 MR. PADMANABHAN: Let him finish his 25 answer. If he needs --
Page 186 1 MR. PADMANABHAN: Objection; Rule 611 and 2 401 to 403. 3 A. Right. 4 Q. (BY MR. PLAIL) Let's go to paragraph 52 of 5 Dumais. It says that, "Models can be derived for 6 individuals or groups of individuals at 570, such as via 7 collaborative filtering techniques that develop profiles 8 by analysis of similarities among individuals or groups 9 of individuals" [as read]. 10 Do you see that? 11 A. Okay. So -- okay, let me see -- can I see 12 570? 13 (Witness reviewed document.) 14 A. Okay, yeah. 15 Q. So you agree -- so Dumais can generate models 16 for either a single person or a group of people, right? 17 MR. PADMANABHAN: Objection -- 18 A. So what is the model here? The model is -- 19 Q. (BY MR. PLAIL) If you look at 43. 20 A. 43, the defined model? 21 Q. The user -- there's, for example, the user 22 model. 23 (Witness reviewed document.) 24 A. Okay. 25 Q. So you -- so Dumais can generate a model for	Page 188 1 MR. PLAIL: He doesn't have -- no question 2 was pending. 3 And that's a speaking objection. Please 4 stop. 5 MR. PADMANABHAN: You can't stop him from 6 finishing his record. 7 If you need to say something, you can -- 8 MR. PLAIL: Yes, I can. 9 MR. PADMANABHAN: No, can't. 10 MR. PLAIL: I can. 11 MR. PADMANABHAN: Absolutely you cannot. 12 MR. PLAIL: There was no question pending. 13 (Cross talk.) 14 THE REPORTER: Guys, guys, one at a time. 15 MR. PADMANABHAN: He was going to -- 16 MR. PLAIL: There was no question pending. 17 (Cross talk.) 18 MR. PLAIL: Let's go off the record. 19 THE REPORTER: Is it okay to go off the 20 record? 21 MR. PADMANABHAN: Yes. 22 (Off the record 2:48 p.m. to 3:02 p.m.) 23 Q. (BY MR. PLAIL) Let's go to paragraph 1 of 24 Dumais. 25 A. Dumais, right?

Page 189 1 Q. Uh-huh. 2 A. Paragraph 1? 3 Q. Paragraph 1, yeah. 4 A. Okay. 5 Q. So it's discussing -- in paragraph 1, it says, 6 "In one specific example, an e-mail inbox can be 7 searched for previously received e-mails based on a 8 keyword that links a search tool to respective e-mails 9 that are associated with the term, where the term is 10 linked to the actual contents of sorted e-mails -- 11 stored e-mails" [as read]. 12 Do you see that? 13 A. Yeah. Okay, so let me read. 14 Q. Okay. 15 (Witness reviewed document.) 16 A. Okay. 17 Q. So here, Dumais is discussing ways to sort 18 junk e-mail out of more relevant e-mails. Is that 19 right? 20 MR. PADMANABHAN: Objection; Rule 611. 21 A. So what are you saying? 22 Q. (BY MR. PLAIL) Here, Dumais is discussing 23 ways of sorting more relevant e-mails out of junk 24 e-mails. Is that right? 25 A. No. Junk -- here, we're looking for the junk,	Page 191 1 Q. Right. So with -- 2 A. Dumais would not be able to get -- give you 3 the e-mail messages. 4 Q. You testified without a query, you cannot do 5 anything? 6 A. With Dumais. 7 Q. Can you look back at Claim 1 of the '217 8 patent? 9 A. Yeah. 10 Q. Can you please show me which limitations 11 indicate that a search query cannot be used with 12 Claim 1? 13 MR. PADMANABHAN: Objection; Rule 611 and 14 613. 15 A. So your question is -- can you show me 16 limitations where search query is not used? 17 Q. (BY MR. PLAIL) Can you show me which 18 limitations indicate that a search query cannot be used 19 with the relevant system in the '217 patent? 20 MR. PADMANABHAN: Objection; Rule 611. 21 A. All the claims or just Claim 1? 22 Q. (BY MR. PLAIL) Let's just focus on Claim 1 23 for right now. 24 (Witness reviewed document.) 25 MR. PADMANABHAN: Objection; Rule 613.
Page 190 1 let's say, in this example. So we just want to retrieve 2 the e-mail messages that are associated with the junk, 3 that's it. So the query needs to be there. Without 4 query -- let's say you are getting e-mail messages 5 where -- and you want to see all the e-mail messages. 6 So this system will not work in that 7 setting. Because you have to submit the query, then you 8 will get the relevant -- relevant messages and so on. 9 So query's an important part for Dumais. Without query, 10 you cannot do anything. 11 Q. Okay. So, in Dumais, you have a query for the 12 term "John," right? And that retrieves e-mails that 13 include the word "John"? 14 A. Yes. 15 Q. Verbal answer. 16 A. That -- that includes John, yeah. 17 Q. And then those e-mails are ranked according to 18 the algorithm in Dumais? 19 A. Yeah, based on the Dumais -- the -- that 20 particular user customization -- based on the 21 customization. That way the e-mail will be present in a 22 certain order. 23 Q. Okay. You said -- 24 A. But I tried to emphasize that if there is no 25 query, then Dumais would not work.	Page 192 1 A. I see that Claim 3 talks about -- which is a 2 dependent claim -- talks about the search model where 3 the search is gray [phonetic]. 4 Q. (BY MR. PLAIL) So you're saying the claim can 5 be used to search -- strike. 6 So you're saying the claim can be used to 7 sort the results of a search query? 8 A. No. I said that -- I said Claim 1 doesn't use 9 the search. 10 Q. So Claim 1 cannot use a search? 11 A. I don't say it cannot use. I'm saying the 12 language they use, there's no search keyword. 13 Q. Okay. So Claim 1 can use a search? 14 A. Claim 1 -- Claim 1 can work without search, 15 with the search, both. 16 Q. Okay. 17 A. That's why they do not explicitly mention 18 here. 19 Q. All right. So that Dumais uses a search is 20 irrelevant? 21 A. For Dumais, yes, search query is required to 22 function. There's one of the -- 23 Q. And for Claim 1, a search query can be used? 24 A. For Claim 1, without search, you can work 25 also. All the claims will be valid without search.

Page 193 1 Q. But for Claim 1, you can also use a search? 2 A. Yes. 3 Q. Can you go to column 2, line 17, of the '217 4 patent? 5 A. Line 2? Column 2 or line -- 6 Q. I'm sorry, column 2, line 17. 7 A. Column 2, line 17? 8 Q. Yes. It says, "Figure 1A shows a traditional 9 prior art e-mail system" [as read]. 10 A. Right. 11 Q. Do you see that? 12 A. [Nods head.] 13 Q. So the '217 patent admits that e-mail systems 14 were known in the prior art? 15 A. Where is Figure 1? Okay. Yeah. Yes -- yeah. 16 Q. Can you go to line -- can you go to your 17 declaration? 18 A. Yeah. 19 Q. Go to 128. 20 A. 120...? 21 Q. -28. It says there that, "Another difference 22 between Dumais and the '217 patent is in the way the 23 groups are formed. In Dumais, the group is not 24 predefined, but formed based on similarity measures, 25 such as correlation coefficients, vector-based	Page 195 1 Q. Okay. 2 A. So that is one of the distinction we tried to 3 make here. 4 And there is -- if you see the patent 5 '217, that is very nice the way they describe it. So in 6 the column 45 and at the end, they have a -- from 45 row 7 to 65, they have a metrics. And they calculate -- from 8 there, they calculate the correlation in column 46 from 9 row 10 to 15. 10 So there, you can see User A's -- if I 11 want to choose top two user cognate user for User A and 12 top two cognate user for User B, what does it say in the 13 correlation metrics? It says User A, that the most 14 related one will be User D and User B. And for User B, 15 the mostly cognate user will be -- will be User D and 16 User C, because we consider only two cognate users. 17 So that's the -- you can see here they're 18 not symmetric in patent '217. 19 Q. So you're saying, then, that in the '217 20 patent claims, when you're identifying the -- 21 A. Cognate. Cognate users. 22 Q. -- you're identifying a cognate User A and a 23 cognate User B? 24 A. For each individual instance, I determine -- 25 with the first user, I determine the cognate users and
Page 194 1 similarity calculations, and statistical Bayesian 2 methods" [as read]. 3 Do you see that? 4 A. [Nods head.] 5 Q. Verbal answer. 6 A. Yes, I saw it. 7 Q. Okay. What do you mean "in Dumais, the group 8 is not predefined but formed based on similarity 9 measures"? 10 A. So -- okay, so in Krug, the -- you can define 11 the group explicitly. Say -- 12 Q. We're talking about Dumais. 13 A. Right. But in Dumais, you can form the -- 14 this groups based on the correlation coefficient, vector 15 similarity calculation, and then some Bayesian method 16 and so on. So this is a standard procedure to form the 17 group or apply the calibrated figure. 18 But the important part that's missing here 19 is, in the patent '217, you -- you -- for each user's 20 collaborative -- cognate user group will be different or 21 distinct. So let's say there are two users, User A and 22 User B, both belong to the same group, according to this 23 correlation analysis and so on. But when you calculate 24 that cognate user for User A, that will be -- that will 25 be maybe entirely different from User B's cognate group.	Page 196 1 that is a very strong user to user. 2 But when you consider the Dumais and the 3 patent Krug, even, they consider some sort of 4 correlation analysis. And then they form a group. And 5 in this group, everybody will be a part of -- correlated 6 or will be cognate users. They don't use cognate user. 7 I should not use, but that way they use the 8 collaborative filtering. 9 Q. And so are you saying that when you're 10 identifying a cognate user in the '217 patent, you can't 11 identify a group of people that you are cognate to? 12 MR. PADMANABHAN: Objection; Rule 611. 13 A. In number of -- in number of users, I can 14 identify. This end usually few. 15 Q. (BY MR. PLAIL) And so this is similar to how 16 a group can be defined using similarity measures in 17 Dumais? 18 MR. PADMANABHAN: Objection. 19 A. Usually -- okay, so the group is usually 20 whoever belongs to the group. If I say user from -- 21 based on the grouping, if I find the cognate user, all 22 of them will be the part of User A's cognate group, 23 User B's cognate group. So, in that case, this will not 24 be distinct. It will be symmetrical, because User A and 25 User B belong to the same group, right?

Page 197 1 But that's a general -- in the Dumais and 2 the group patent, that talks about -- that talk about 3 that way. 4 But in case of patent '217, the user level 5 for each -- for each distinct user, they want to find 6 the cognate users. And they utilize correlation 7 metrics. They show very nicely. They show there for 8 User A, cognate user group will be -- in this case, will 9 be entirely -- will be -- will be different from the 10 User D's -- User B's cognate group. 11 Q. (BY MR. PLAIL) I see. So you're -- 12 A. There might be some overlap, but not 13 necessarily they will be same. 14 Q. You're saying the correlation coefficients 15 here in columns 45 and 46 are how '217 patent goes 16 around determining the cognate -- 17 A. User for each individual user, yeah. Cognate 18 user set for each individual user. 19 Q. Got it. 20 A. That's why -- 21 Q. Let's go on to 137. 22 A. So I -- I really -- that's why I actually give 23 you strength to come up with a better ranking, because 24 that way they figure out a lot of -- selectively choose 25 the cognate users. Page 198 1 Q. What do you mean by "selectively choose the 2 cognate users"? 3 A. Because you're doing -- for each -- each 4 users, I'm doing precisely most relevant cognate users, 5 like most relevant user set. 6 Q. But that can be a group of users? 7 A. Yeah. But this group is not, like, 10, 20 8 people. It will be two or three users. 9 Q. And what is the maximum number of people that 10 can be a group of cognate users? 11 A. It is an e-mail messaging system, so I assume 12 that this case it may not be a -- it may be a moderate 13 number. I don't know that part. 14 Q. But so you're not saying the claim requires a 15 certain amount -- you're not saying the claim requires a 16 certain lower limit on the number of cognate people in a 17 group? 18 MR. PADMANABHAN: Objection; 611. 19 A. The -- the patent -- okay, so the -- the claim 20 said -- yeah, we have to find the cognate users and 21 each -- for each users, the -- this cognate group will 22 be distinct or will be not -- will not be exactly the 23 same, because the multiple -- because the multiple 24 users, those are -- may belong to a particular group. 25 Q. (BY MR. PLAIL) So if there's 10 people who	Page 199 1 are cognate, that's okay? 2 A. That's possible, but the -- the group may be 3 100 people from a group. 4 Q. What about 1,000? 5 A. What about the 1,000 people will form the 6 group? 7 Q. Yeah. 8 A. Yeah, but if you have millions of users, then 9 that case, thousand makes sense. But if you have a 10 personal communication system for organization system, 11 you may only have 100, 200 users, right, e-mail users. 12 So in that case, the cognate group will be number of -- 13 for each distinct user, cognate user set will be 14 smaller, my interpretation. 15 Q. How small does a group need to be, to be a 16 cognate group? 17 A. That study request -- that is not disclosed 18 here. 19 Q. Okay. So you're saying the claim doesn't have 20 any specific limits on the size of a cognate group? 21 A. No, I'm not saying that. I'm saying it 22 depends on the -- the problems, organization, those type 23 of setting also. 24 Q. So the claim -- 25 A. The claim they're trying to solve. Page 200 1 Q. So this is kind -- 2 A. And you cannot assume that the number of user 3 will be -- the number of user will be obvious, it will 4 be larger than the number of groups, number of users, 5 distinct users. 6 Q. Okay. It's -- this is a yes-or-no question, 7 Dr. Khan. 8 A. And then -- 9 Q. And so -- 10 A. Because it depends on the scenario. It's 11 not -- I cannot answer yes, and then -- 12 Q. In the scenario claims of the '217 patent, how 13 many people can be in a cognate group? 14 MR. PADMANABHAN: Objection; 611. 15 A. The group number of -- in the group, number 16 user will be larger than the n cognate -- n. 17 Q. (BY MR. PLAIL) N? 18 A. Uh-huh. And this n depends. 19 Q. All right. So a person of skill would need to 20 do an empirical study to determine how large a cognate 21 group is? 22 MR. PADMANABHAN: Objection; Rule -- Rule 23 611 and 613. 24 A. No. They need to do more experiment -- 25 extensive experiment and play with these numbers and do
--	--

Page 201 1 the -- try to understand all of this statistical methods 2 and then find it the right -- it's not trivial. 3 Q. (BY MR. PLAIL) So it's not trivial to 4 determine how large a cognate group is? 5 MR. PADMANABHAN: Objection; Rule 611. 6 A. How large is the cognate group? 7 MR. PADMANABHAN: And Rule 613. 8 A. So what is the question? How large? It is 9 not? 10 Q. (BY MR. PLAIL) You said they need to do more 11 extensive experiment and play with the numbers and do 12 the -- try to understand all the statistical -- and then 13 find in the -- it's not trivial. I'm asking to confirm 14 it's not trivial to determine how large a cognate group 15 is? 16 MR. PADMANABHAN: Objection; Rule 611 and 17 613. 18 A. I'm saying it depends on the problem setting, 19 first of all. And then -- and then it also depends on 20 the data set, because it's sensitive to the -- this is 21 the parameters you have to play with that. 22 Q. (BY MR. PLAIL) So if we go to Claim 1, can 23 you point me at which claim limitation indicates the 24 parameters that a POSA would need to look at in order to 25 determine the size of the cognate group?	Page 203 1 answered -- Rule 611. 2 A. No. 3 Q. (BY MR. PLAIL) Can we go to paragraph 137 of 4 your report? Starting at the hyphen, "i.e., the 5 desirability of identifying a second user that received 6 the same piece of content as the first user." 7 Do you see that section? 8 A. Uh-huh, yeah. 9 Q. What do you mean by "desirability"? 10 A. So in patents -- in this patent '217, we talk 11 about identifying one of the limitations, right? And so 12 there, I don't see anything about for the second user 13 that received the same piece of content as the first 14 user. 15 That type -- there is no discussion about 16 how to do -- satisfy this condition. The condition is 17 need to satisfy the collaborative filtering condition; 18 that means the same electronic messages. And at the 19 same time, there needs to be -- they need to receive the 20 same electronic message and the cognate to the users. 21 Cognate to the users in some group, to 22 some extent, calibrating can fulfill it, but there's no 23 guarantee that this identifying users -- or the second 24 users would be the -- would be the recipient of the same 25 electronic message content.
Page 202 1 MR. PADMANABHAN: Objection; Rule 611 and 2 401 to 403. 3 (Witness reviewed document.) 4 A. No, Claim 1 doesn't say what is the size of 5 the cognate users. It doesn't say. 6 Q. (BY MR. PLAIL) So there's no specific 7 requirement in Claim 1 as to the size of the cognate 8 users? 9 A. Correct. But in the writing and in the 10 specification it was -- yeah, it was clear they 11 demonstrated how they calculated all of this. 12 Q. But it's not required by the claim? 13 A. Claim 1 doesn't say that, yeah. 14 Q. So it's not required by the Claim 1? 15 A. No. Claim 1 doesn't say that explicitly. 16 That is -- 17 Q. Dr. Khan, you are aware that you provided 18 testimony on the meaning of Claim 1? 19 A. Right. 20 Q. So when I'm asking does Claim 1 require a 21 specific number of people in the cognate group, I need 22 more than "it doesn't say it explicitly." 23 Does Claim 1 require a specific number of 24 people in the cognate group? 25 MR. PADMANABHAN: Objection; asked and	Page 204 1 Q. So you're saying that Dumais needs to express 2 a desirability to identify a second user? 3 (Witness reviewed document.) 4 A. I'm saying Dumais -- as we -- as you pointed 5 out, Dumais talks about collaborative filtering, right, 6 to create the profile and so on. So -- and in this 7 '217, we talk about cognate users for this -- in order 8 to identify the second user, the second user needs to be 9 cognate to the first user. And at the same time, they 10 need to receive the same electronic message content. So 11 these two conditions simultaneously need to satisfy. 12 And calibrate and filter only the 13 condition, not the two conditions together. So that's 14 the identifying the -- that way -- because we want same 15 content as the first user, and then the first -- these 16 two users are cognate to each other, right? The 17 first -- second user is cognate to the first user, 18 right? So that -- we need to satisfy -- these two are 19 not satisfied by the collaborative filtering. 20 Q. (BY MR. PLAIL) Is it your understanding that 21 a reference needs to disclose the desirability of 22 something in order to disclose the invention? 23 MR. PADMANABHAN: Objection; Rule 611. 24 A. Sorry, what did you say? Desirability? 25 Q. (BY MR. PLAIL) You used the word

Page 205 1 "desirability" here. 2 A. Right, yeah. 3 Q. Is it your understanding that the prior art 4 needs to disclose the desirability of a claim element 5 and not just disclose it? 6 A. So I'm trying to emphasize that this is one of 7 the important condition, that two -- two constants needs 8 to satisfy simultaneously. That is absent in Dumais and 9 as well as in the Krug patent. 10 Q. That's nonresponsive to my question. 11 A. Okay. 12 Q. Is it your understanding that the prior art 13 needs to disclose the desirability of a claim element? 14 A. What claim element? The -- 15 Q. Of -- is it your understanding the prior art 16 needs to disclose the desirability of a claim element? 17 A. Okay, let me phrase it... Can you rephrase 18 it, the question? 19 Q. You used the word "desirability." 20 A. Right, yeah. 21 Q. You say Dumais doesn't disclose the 22 desirability. 23 A. Of identifying the second user. 24 Q. Is it your opinion that the prior art, Dumais, 25 needs to disclose the desirability of identifying?	Page 207 1 But the important part is two condition 2 need to satisfy simultaneously. 3 Q. Okay. So you're saying that the '217 patent 4 Claim 1 requires that -- 5 A. The second user -- 6 Q. Hold on, let me finish my question. 7 A. Sorry. 8 Q. You're saying that the '217 patent Claim 1 9 requires two conditions that need to be satisfied? 10 A. Simultaneous. 11 Q. One is that the cognate set is asymmetric and 12 the other is that they are a recipient? 13 MR. PADMANABHAN: Objection; Rule 611. 14 A. They need to be cognate. 15 Q. (BY MR. PLAIL) Okay. 16 A. The first -- second is they need to be cognate 17 to the first user. And then they need to -- the second 18 user need to receive the same electronic message or 19 content. 20 Q. So the '217 patent is more restrictive because 21 it requires both of those things? 22 A. Right. 23 Q. And the collaborative filtering only goes to 24 the cognate part of it? 25 A. Right.
Page 206 1 A. Yes. 2 Q. Let's go to 143. If you look at the third 3 sentence of 143, it says, "This is because cognate users 4 in the '217 patent are more restrictive than generic 5 collaborative filtering" [as read]. 6 Do you see that? 7 A. Yeah. 8 Q. What do you mean by "more restrictive"? 9 A. I'm going to answer... 10 (Witness reviewed document.) 11 A. Okay. So if you see the patent '217, they 12 have multiple claims, and every claim requires the 13 system identify a second cognate user that is a 14 recipient of the piece of electronic content. And at 15 the same time, that is -- that is also the cognate to 16 the first user, right? So two condition needs to 17 satisfy simultaneously. And -- and so that's why the 18 patent '217 is more restrictive. That's what I tried to 19 say here. 20 Q. Okay. So it's more restrictive because it 21 requires a -- 22 A. Two condition need to satisfy. Cognate set, 23 and then inside the cognate set, it has to be asymmetric 24 as I told you before, the end number of users you have 25 to select. But that's not here important.	Page 208 1 Q. All right. So collaborative filtering is -- 2 shows that they're cognate, but not that they're both 3 recipients. Is that right? 4 A. Right. They're not -- there's no condition to 5 receive the same electronic message. 6 Q. And what do you mean, then, when you said that 7 the claim required the cognate users to additionally be 8 asymmetric? 9 MR. PADMANABHAN: Objection; Rule 611. 10 A. Okay. So that -- as I told you, let's say I 11 want to find User A's cognate group and User B's cognate 12 group, right? So I said User A may have -- B and C 13 might be in the cognate group of User A, and User B's 14 cognate group may be C and D, which is different. 15 Q. (BY MR. PLAIL) Okay. And that's required 16 under Claim 1? 17 MR. PADMANABHAN: Objection; Rule 611. 18 A. No. 19 Q. (BY MR. PLAIL) Okay. It's not required under 20 Claim 1? 21 MR. PADMANABHAN: Rule 611. 22 A. It doesn't say very explicitly there, but 23 somewhere in the specification, it was mentioned. 24 Q. (BY MR. PLAIL) Is it required under Claim 1? 25 MR. PADMANABHAN: Rule 611 and Rule 403.

Page 209 1 You've asked -- you've already treaded this ground. 2 MR. PLAIL: Speaking objection. I'm going 3 to note for the record that, again, counsel is coaching 4 the witness. 5 (Witness reviewed document.) 6 A. No; it doesn't say in Claim 1, no. In 7 Claim 1, no. But you want I should take a look in other 8 claims? 9 Q. (BY MR. PLAIL) Claim 1, the asymmetric is not 10 required? That's all that matters here. 11 A. However -- yeah, but in that case, it needs to 12 satisfy two condition in Claim 1. That is very clearly 13 said, cognate and same message. 14 Q. And neither of those conditions is the 15 asymmetric cognate group? 16 A. No, here we don't talk about the cognate 17 group, how -- what will be -- yeah, that symmetrical and 18 asymmetric, we're not talking about that here. 19 Q. Okay. 20 A. But I want to make sure that the two 21 conditions are met. That is clearly said in Claim 1. 22 Q. I'm going to hand you what has already been 23 marked as Exhibit 1007. I'm also going to go ahead and 24 hand you what has already been marked as Exhibit 1008. 25 Do you recognize Exhibit 1007?	Page 211 1 Q. (BY MR. PLAIL) That says "from"? 2 A. Okay. I saw it, yeah. 3 Q. And you understand that these are e-mails that 4 were sent from a sender? 5 A. That's correct. 6 Q. If we go to column 52 of Kircher. 7 MR. PADMANABHAN: Paragraph? 8 MR. PLAIL: Yeah, sorry, paragraph. 9 Q. (BY MR. PLAIL) Here, it's describing part of 10 that figure. It says, "In column 48, the numerical, 11 value corresponds to an expected user action in regard 12 to the e-mail message, while the numbering column in 47 13 indicates the ranking of the e-mail" [as read]. 14 A. Yeah. 15 Q. So Kircher calculates two different types of 16 rankings; one is the numerical value corresponding to 17 the expected user action and the second is the ranking 18 of the e-mail? 19 (Witness reviewed document.) 20 A. Okay. I -- I think the 48 is a user action, 21 right? User -- some categorization or something. Just 22 give me one minute. 23 (Witness reviewed document.) 24 A. "It has four categories. The recipient is 25 expected to read, reply, or save the e-mail, expected to
Page 210 1 A. Yes. 2 Q. It's the Kircher prior art reference, correct? 3 A. Uh-huh, yes. 4 Q. Do you recognize Exhibit 1008? 5 A. Yeah; Krug, right? 6 Q. Yes. It's the Krug prior art reference, 7 correct? 8 A. Uh-huh. 9 Q. Correct? 10 A. Yes, correct. 11 Q. Can you turn to Figure 3B of Kircher? What is 12 shown in Figure 3B? 13 A. So some e-mail messages and the sender lists 14 and then the ranking, those type of things, right? It's 15 a ranking score. 16 Q. And the ranking score is 47, correct? 17 A. The -- I think so, yeah. 18 Q. And this is an e-mail inbox? 19 A. Yeah; for a particular user's e-mail inbox, 20 yes. 21 Q. And it's sorted according to the ranking 22 score? 23 A. Yes, that's correct. 24 Q. And there's a column there, "from," right? 25 MR. PADMANABHAN: Column what?	Page 212 1 read and receive the e-mail. The recipient is expected 2 to only save the e-mail. Recipient is expected to 3 delete the e-mail without reading it" [as read]. 4 Q. And which paragraph of your declaration are 5 you reading from? 6 A. 1 of 6. 7 Q. And so column 48 relates to that action 8 category that you're referring to? 9 A. I have to double-check. Yeah; probably, yeah. 10 And the -- the ranking score comes with the 47, yeah. 11 Q. And so there's a separate ranking score 47? 12 A. No, for -- okay. 13 (Witness reviewed document.) 14 A. Okay. So, yeah, user action, basically, 48. 15 Q. Right. And there's a separate ranking score 16 47? 17 A. 47 is a two-ranking score. 18 Q. Okay. And so those are two different ranking 19 scores -- strike that. 20 Those are two different values that 21 Kircher calculates to determine the relevance of an 22 e-mail? 23 A. Correct. 24 Q. And do you agree that Kircher is an e-mail 25 system?

Page 213	Page 215
1 A. Correct. 2 Q. Can you go to paragraph 2? 3 A. But it focuses on one particular user inbox, 4 though. 5 Q. Can you go to paragraph 2 of Kircher? 6 A. Kircher? Kircher, paragraph 2, okay. 7 Q. Do you see here in paragraph 2 it describes 8 how electronic message system traffic has increased 9 dramatically in the past 20 years? 10 A. You're asking me to -- yes or no, right? 11 Q. Yes. 12 A. Yes. 13 Q. Do you agree with that? 14 A. Yeah, I agree with that. Past idea means from 15 that time, right? 16 Q. 2003. 17 A. Yeah. 18 Q. If you go down to the last two sentences of 19 that same paragraph, Kircher says, "It is not uncommon 20 for individuals in a busy work environment to receive 21 hundreds of e-mail messages each day" [as read]. 22 Do you agree with that? 23 A. I agree. 24 Q. "Unfortunately, many of these messages are 25 spam, unsolicited messages from strangers, or relatively	1 this patent '217. 2 Q. So Kircher and the '217 patent are in the same 3 field? 4 A. Yes. 5 Q. And they address the same types of problems? 6 A. I will -- okay, so Kircher focuses on one 7 particular user's, the recipient inbox, how to manage 8 it, how to order it. 9 And patent '217 talks about for an 10 organization, you have many users NS how to deal with 11 those users, the sender importancy, then the local 12 relevancy, global importancy, those type of things. 13 That's the content relevancy. 14 And Kircher never talks about the 15 collaborative filtering at all here. 16 Q. And just to go back to my question, they are 17 attempting to address the same types of problems, 18 correct? 19 A. Yes. Similar problem, yeah. 20 Q. Can you go to paragraph 40? 21 A. Kircher, right? 22 Q. Yes. It says, "As those of ordinary skill 23 will recognize, the term 'fuzzy logic' refers to a 24 mathematical technique for dealing with imprecise data 25 and problems having multiple acceptable solutions" [as
Page 214	Page 216
1 low priority and of little interest to the recipient" 2 [as read]. 3 Do you agree with that? 4 A. Yes. 5 Q. If you go to paragraph 10, Kircher is 6 describing a method for processing electronic messages 7 to rank messages based on the probable importance to the 8 recipient. Do you see that? 9 A. Yeah, I see it. 10 Q. So Kircher is attempting to solve the problem 11 of having too much unsolicited e-mail messages by 12 ranking the messages according to the probable 13 importance? 14 A. Yeah, for a particular inbox folder, yes. 15 Q. Okay. What is the field of endeavor for the 16 '217 patent? 17 A. Sorry, what is your question? 18 Q. What is the field of endeavor for the '217 19 patent? 20 A. What is endeavor? 21 Q. What is the field of the '217 patent? 22 A. Oh, the field. So it talks about electronic 23 messaging system, personal communication, right, message 24 sent from the sender to the users. So probably both of 25 them address the similar problem, right, Kircher and	1 read]. 2 Do you agree with that? 3 A. So their case, they got the score, and then 4 from there, they want to determine what actions user 5 will take among these four actions. And then they 6 will -- using fuzzy logic, they will come up with 7 this -- basically, it's decertification. That way they 8 will say that either the user will do this action, 9 Action 1, Action 2, Action 3, Action 4. So that will be 10 shown to the user. 11 So, in this case -- so what is your 12 question? Your question is -- 13 Q. It says that, "Those of ordinary skill in the 14 art will recognize the term 'fuzzy logic' refers to a 15 mathematical technique for imprecise data and problems 16 having multiple acceptable solutions" [as read]. 17 Do you agree with that statement? 18 A. Yeah; I'm fine with that, yeah. 19 Q. What is fuzzy logic? 20 A. You know, the logic, usually binary logic 01, 21 right? 22 Q. Yes. 23 A. That's called -- what is it called? Binary 24 logic. But fuzzy logic is where the definition is not 25 straightforward, so you can -- it's imprecise.

Page 217 1 So, in this case, what they're doing in 2 patent -- this Kircher patent, they utilize the content 3 relevancy, they utilize the sender importancy, and then 4 they also utilize the personal importancy. And for each 5 of this, they have a rule, and those rules are defined 6 on, let's say, from the e-mail message contents 100 bad 7 words. They have a bad word distribution list in there. 8 So then they -- they will give some score. That way 9 they come up with a score for -- based on the content, 10 based on the sender importancy, based on the personal 11 information. 12 And then they combine using fuzzy logic. 13 Then they combined together using the fuzzy logic. And 14 then this will be the unified score. And based on that, 15 they will give the recommendation. 16 And then they also determine -- user will 17 give the feedback after that. If the feedback agrees 18 with the -- with the -- feedback agrees with the 19 prediction, then they will be basically happy and then 20 they will not update that much, the fuzzy logic. 21 THE REPORTER: I'm sorry, then they will 22 not...? 23 A. They will not update the fuzzy -- fuzzy logic 24 has a bunch of rules. And then those rules has a 25 weight. So weight will not be updated because you are	Page 219 1 this case, some sort of fuzziness will be taken into 2 consideration if you are in this border area. So then 3 they will give you some answer by saying that your score 4 is 749, you are -- you should get the credit card with a 5 49 percent, probably, and 51 percent probably should not 6 get it. Something like this. 7 Q. So fuzzy logic is -- 8 A. Fuzzy logic has been widely used, and it was 9 developed Dr. Lotfi Zadeh. 10 THE REPORTER: I'm sorry, it was what? 11 A. Some guy professor, he died. 12 THE REPORTER: I'm sorry, I didn't... -- 13 I'm sorry, I -- 14 A. Some guy, some professor from UC Berkeley 15 developed this. Zadeh, Z-A-D-E-H. 16 Q. (BY MR. PLAIL) And so fuzzy logic is used to 17 analyze larger complex data sets, then? 18 A. I don't want to say that way, but if you have 19 a very good rule, fuzzy logic will work very well. If 20 you have a good rule, if you can catch it. 21 But the problem is in real life, when you 22 have a very large organization or medium organization 23 and you have many, many users and -- and if you cannot 24 come up with a very good rule, fuzzy logic may not -- I 25 mean, it may not do very well.
Page 218 1 happy with that. 2 But if there is a -- the feedback they're 3 giving is -- is -- and the prediction is entirely 4 different from your feedback, so then we need to update 5 the weight. That's the main idea of this patent. 6 Q. (BY MR. PLAIL) So going back to my question, 7 what is fuzzy logic? Not what's the main idea of this 8 patent. What is fuzzy logic? 9 A. Fuzzy logic talks about impreciseness. So you 10 want to know an example or something? So let's say you 11 are going to apply for a credit card, right? And credit 12 card company will check your score. And the score is, 13 let's say, 750. Your score is -- the card company has a 14 binary rule. If your credit score is above 750, your 15 credit score is good, you should get a credit card. If 16 below 750, your credit card will be declined. So that's 17 the binary way the -- binary logic of -- binary system, 18 that's the way the system works. 19 But in fuzzy logic -- because this is very 20 rigid. So if your score is 750 or 749 or 740, you will 21 not get the credit card, right? But if somebody has a 22 score 300, still not get the credit card. But you 23 should be considered with a certain angle -- with a 24 certain variation. 25 So fuzzy logic will come up with a -- in	Page 220 1 Q. So does fuzzy logic -- strike that. 2 Is fuzzy logic used to analyze large 3 complex data sets? 4 A. Large complex data sets, right? 5 Q. [Nods head.] 6 A. So if you -- if your -- if your data set has a 7 very clear-cut separation, say from the credit card 8 history type of whether you should get a credit card or 9 not, then in that case, it basically -- your data is not 10 very noisy. It's very clean and medium -- then it will 11 work reasonably well, because you can come up with very 12 good rules. 13 But if you cannot come up with very good 14 rules -- because these rules can be handcrafted, and 15 then the weight will be learned. So this fuzzy logic 16 case, this will work when you can come up with very good 17 rules. But if you cannot come up with very good rules 18 or comprehensive rules, then it may not work. That's 19 what I'm saying. 20 Q. You were discussing earlier how the -- in the 21 Kircher patent, it uses fuzzy logic to combine a number 22 of measures. If you look at Figure 11 of the Kircher 23 patent, is that what you were referring to? 24 A. No. I'm referring to Figure 7, Figure 8. 25 Because here, you see the weight will be adjusted. So

Page 221 1 how this -- how we come up with this weight. So this is 2 a part of the fuzzy. 3 Q. Okay. If you go to Figure 11 for one second, 4 though. 5 A. Sure. 6 Q. You will see at the top it says, "Set fuzzy 7 measure importance factors." 8 A. Uh-huh. 9 Q. Is that referring to fuzzy logic? 10 A. Yeah; it's also part of the fuzzy logic. 11 Q. Okay. And it looks at various factors within 12 the fuzzy logic, including the sender, the 13 personalization, and the content? 14 A. Right. Right, yeah. 15 Q. And so you agree that the fuzzy logic here is 16 being used to analyze multiple variables? 17 A. Yeah, multiple options, sender importance, 18 observation, and content, yes. 19 Q. And Figure 11 is describing the calculation of 20 the ranking number, right? 21 A. Uh-huh, right. 22 Q. So Kircher is describing using fuzzy logic to 23 calculate a numeric value corresponding to the 24 importance of the e-mail message? 25 A. Right.	Page 223 1 A. Generally setting, yes. 2 Q. But not in the setting of the claim? 3 A. This -- so the way the claim language is 4 written, you can send from a sender to a user, yeah. 5 Q. So it cannot be a web page? 6 A. Web page? From a sender to a user. No. 7 Q. Can it be a blog post? 8 A. Yeah. 9 Q. Why can it be a blog post? 10 A. It can be a blog post? Let's say the blogger 11 used something in the blogger system your responsive 12 feedback, then the system can be used. But what I'm 13 saying -- 14 Q. What is responsive feedback? 15 A. No responsive feedback? If there's no 16 feedback -- 17 Q. I'm saying -- I'm asking -- you said the -- 18 let's say -- 19 I'm going to read from the record. Let's 20 say your blogger used something in the blogger system, 21 your responsive feedback? 22 A. Your response? 23 Q. You mentioned responsive feedback in the 24 blogger system. What is responsive feedback? 25 A. Okay, so you can think about a Reddit, you
Page 222 1 Q. And it uses a number of variables to do that, 2 including the importance of the sender, the importance 3 of the content, and the degree of personalization? 4 A. Correct, yeah. 5 Q. Okay. 6 THE WITNESS: So can we take a break 7 sometime? 8 MR. PLAIL: Sure. We can take a break 9 now. 10 (Break taken from 3:57 p.m. to 4:05 p.m.) 11 Q. (BY MR. PLAIL) Can you go back to Claim 1 for 12 a second? Do you see at the very top of Claim 1, it's 13 describing, "A computer-implemented system for 14 determining a relevance score of a piece of electronic 15 content" -- 16 A. Uh-huh. 17 Q. -- "sent from a sender to a user" [as read]. 18 What is a piece of electronic content? 19 A. It can be an e-mail message. 20 Q. What else can it be? 21 A. If an e-mail message has an attachment, it can 22 be in electronic content. 23 Q. Can it be a document? 24 A. Yeah. 25 Q. Can it be a web page?	Page 224 1 post a lot of comment. You describe your travel 2 experience, and then somebody will give you feedback on 3 that, come up with a response, they reply to a message. 4 So that type of thing I meant, the response. 5 Q. I see. So -- 6 A. In that case, you can say -- you have a 7 sender, you have a receiver -- replier. 8 Q. And what about a document? 9 MR. PADMANABHAN: So what's the question? 10 MR. PLAIL: I'm going to say speaking 11 objection. 12 MR. PADMANABHAN: I just don't understand 13 the question. 14 MR. PLAIL: You don't have to understand. 15 A. What is the document here? What do you mean 16 by "document"? 17 Q. (BY MR. PLAIL) Can a document be a piece of 18 electronic content? 19 MR. PADMANABHAN: Objection; 611 and 403. 20 A. Document can be electronic content? If a 21 document is a part of the e-mail attachment, yes, and 22 that type of system, this patent '217 would work very 23 well. 24 Q. (BY MR. PLAIL) But only if it's an e-mail 25 attachment?

Page 225 1 A. Right, e-mail attachment. 2 Q. So a PDF that is not an attachment would not 3 be a piece of electronic content? 4 A. The document can be -- you can think of the 5 doc file. You can think about text file, PDF file, 6 right, all sorts of file. And then if you include those 7 filing in your e-mail attachment, then it's a part of 8 the e-mail system. And then that can be taken -- then 9 the system can take it -- will work very well with those 10 cases. 11 Q. Can you turn to Krug? Will you turn to 12 paragraph 2 of Krug? 13 A. What is the paragraph? 14 Q. 2 of Krug. That's Kircher -- oh, wait, no, 15 that is Krug. Yeah, Sorry. 16 A. Yeah. 17 (Witness reviewed document.) 18 A. Yeah, so -- go ahead, what is your question? 19 Q. It says at the top, "The amount of information 20 available on the internet is constantly increasing" [as 21 read]. 22 Do you see that? 23 A. Uh-huh. 24 Q. Do you agree with that statement? 25 A. Yes, sir.	Page 227 1 A. Right. 2 Q. Do you agree that Krug is using a full text 3 search engine here? 4 A. Yeah; they use multiple search engine in the 5 equation they mention. 6 Q. Specifically in here, it's discussing a full 7 text search engine, correct? 8 A. Yeah; multiple search engine, yes; full text, 9 yeah. Krug, yeah. 10 Q. And it's discussing running text searches on 11 available electronic documents. Do you see that? 12 A. Okay. Yeah, define objects and documents, 13 yeah. 14 Q. So it's discussing running text searches on 15 available electronic documents, right? 16 A. Right. 17 Q. So you would -- you understand that Krug is a 18 content management system? 19 A. I would say it's more an extension of the 20 search engine. 21 Q. That searches and manages content? 22 A. Yeah; for customize for each user, they want 23 to present the result in a better ranked way or a better 24 way. 25 Q. Can you go to paragraph 9?
Page 226 1 Q. At the bottom of the paragraph, it says, "All 2 too often, the simple similarity measure results in the 3 user being presented with a large number of useless 4 documents in the content of which the search term appear 5 more or less randomly, but the topic of which does not 6 match the user expectations" [as read]. 7 Do you see that? 8 A. Let me read it. 9 (Witness reviewed document.) 10 A. Yeah, okay. 11 Q. Do you agree with that statement? 12 A. Yeah, I agree. 13 Q. So one of the problems that Krug is attempting 14 to solve is that a large number of useless documents 15 appear within a search result that don't match the 16 user's expectations? 17 A. Yeah; from that writing, yes. 18 Q. If you look at the second sentence of 19 paragraph 2, it says, "In general, the search for 20 specific content is carried out using a search engine, 21 using a full text method that analyzes the text of the 22 available electronic documents by evaluating the 23 position, format, and number of search terms in the 24 document, and rates the document in terms of the 25 relevance to the search query" [as read].	Page 228 1 A. Uh-huh. 2 Q. It says in the second sentence, "For example, 3 it may be possible that by pressing a button, the user 4 will be sent further information about the object or the 5 article described, or that the seller of the article 6 will contact the user" [as read]. 7 Do you see that? 8 A. Uh-huh. 9 Q. It goes on to say, "Furthermore, an action 10 performed in relation to an object can send a message 11 indicating that the user wishes to purchase such an 12 article described by the object" [as read]. 13 A. Right. 14 Q. Krug is discussing sending a message there? 15 A. Yes, so they're -- if user likes less of 16 certain objects and then Krug -- Krug system will send a 17 message to the -- to the appropriate owner of the object 18 owner by saying that there's some interest. 19 Q. "Specifically an action performed in relation 20 to the object can send a message" [as read]. 21 Do you see that? 22 A. So you are saying this is -- user will give a 23 feedback on the -- or user will give some action or give 24 some rating on the object. And then based on this 25 rating, let's say the system launches that the user is

Page 229 1 liking certain things, and then that information will be 2 sent to the owner, right? That's what you're saying? 3 Q. That's -- I'm asking, does an action performed 4 in relation to the object cause the system of Krug to 5 send a message? 6 A. Action? 7 (Witness reviewed document.) 8 A. Yeah. 9 Q. And that message is sent by the system? 10 A. Yeah, it can be -- say, it can -- yes, it will 11 be sent to -- the system will send that message to 12 the -- to the owner by saying that there's some 13 interest. 14 Let's say there's an online system where 15 the articles will be sold, right? So, first, you need 16 to in that system as an owner of some articles. So then 17 you will publish your articles and then people will 18 comment and do the search. And then if the -- if 19 there's interest from a particular user, then that 20 information will be sent to the owner through that 21 system. So at the back end, they have some mechanism to 22 send that information to them, the owner. 23 Q. Okay. Can you go to Figure 6B? 24 A. Figure...? 25 Q. 6B.	Page 231 1 Q. Intrinsic value. 2 A. Okay. Intrinsic -- two you said. Intrinsic 3 and the other one? Intrinsic value and? 4 Q. My question was: Krug is providing a value 5 for the intrinsic value of each object? 6 A. Who is providing? Sorry. 7 Q. Krug. 8 A. Krug. So this intrinsic value will be 9 provided by the user. The user will give some rating 10 and then how much time spent. Based on that, they will 11 come up with this intrinsic value. So, basically, it's 12 a feedback. 13 User feedback will be taken into 14 consideration. And based on that, they come up with a 15 intrinsic value that you are saying. That is a function 16 of the time spent and the rating. 17 Q. Okay. 18 A. And from there, they calculate the absolute 19 intensity -- intensity values across many users. 20 Q. Okay. And so Box 12 is describing the usage 21 intensity and intrinsic value for an object, but Box 14 22 is describing it for the user, right? 23 A. Uh-huh, yeah. 24 Q. Can we go to Krug 106? 25 A. 106, uh-huh, the equation?
Page 230 1 A. 6-0. 2 Q. 6B. 3 A. In this one [indicating], right? 4 Q. Yes. 5 A. 6B, okay. The last one. 6 Q. Do you see Box 12 on 6B? 7 A. Yes. 8 Q. Do you see that it describes usage 9 intensity/intrinsic value? 10 A. Yes, I see user plus -- I think absolute 11 intensity also, right? Absolute intensity might be a 12 different place, yeah. 13 Q. And so that Box 12 is listing a number of 14 objects within the system of the -- 15 A. Yeah; those -- those are web pages in this 16 case, yes. 17 Q. Okay. And these web pages have HTML content? 18 A. Correct. 19 Q. And here, Krug is providing a value for the 20 usage intensity for each of the objects? 21 A. Uh-huh. 22 Q. And also providing a value for the intrinsic 23 value of each object? 24 A. What is the first one you said? The second 25 one is intrinsic. What is the first one?	Page 232 1 Q. Yeah. So this equation in 106 is used to 2 calculate the comparison value for each object for each 3 user in the system, correct? 4 A. Each object for each user, yeah, for at a 5 certain -- after a certain interaction of talking to 6 each other, yeah. After a certain number of iterations, 7 yeah. 8 Q. What do you mean by "certain number of 9 iterations"? 10 A. Because you consider the feedback from the 11 user, right? So there is -- in the equation -- okay, 12 here, they don't put the time. But if you see the 13 M said [phonetic] system interaction means M times user 14 will have an interaction with the system and group 15 feedback after that. They're estimating the relevancy 16 score. 17 Q. I see. 18 A. And if you see in the previous equations, they 19 talk about this time -- I mean, the interaction will be 20 considered also. In 73, 70, various places you'll find 21 it. 22 THE REPORTER: I'm sorry, in the 70...? 23 THE WITNESS: Sorry. 24 A. So you will find it in 71 and -- yeah, 69 -- 25 starts with the 69.

Page 233 1 Q. (BY MR. FLAIL) Okay. So going back to 106, 2 though, let's focus on this formula. 3 A. Sure. 4 Q. So this formula includes a number of different 5 variables, right? 6 A. Uh-huh. 7 Q. So you would say this is a multi-variant 8 formula? 9 A. I -- I said it considers multiple functions, 10 multiple values together. And I think they do the 11 weighted one -- 12 Q. Okay. 13 A. -- to combine this -- because the computer -- 14 similarity between the user profile and the object 15 profile. That is the middle -- the distance, DUSJ, the 16 second last in the profile versus object similarity. So 17 that's a distance. And then -- so -- 18 Q. And distance is one of the variables in the 19 equation? 20 A. Yeah. And then they plug in multiple 21 intrinsic value, absolute intrinsic value, then they 22 consider also the group and combine all of this together 23 based on the weight -- 24 Q. Okay. 25 A. -- and come up with the one score.	Page 235 1 yeah. 2 Q. And that's based off of the actions of the 3 user and the actions of the group of the users, right? 4 A. Does it say here? 5 Q. Go to paragraph 100 -- sorry, if you go to -- 6 A. The next one? 7 (Witness reviewed document.) 8 A. Yeah, highest user intensity. 9 Q. So it takes into account the actions of the 10 user and the actions of a group of users, right? 11 A. It says -- yeah, the reference group -- I 12 assume the reference group can be a singular or 13 community also, right? Yeah. 14 Q. So if you go to 110, actually, it says there 15 that it can take into account the aggregate usage 16 intensity for objects of any group in the collective 17 action of -- 18 A. 110? 19 Q. Yes. 20 A. Okay, yeah. 21 Q. And so this is describing how Krug accounts 22 for collaborative user actions when calculating the 23 comparison value? 24 A. There's another formula, if you see a WMCK, 25 the intrinsic value of -- of any group -- user group for
Page 234 1 Q. All right. And so this is a 2 multiple-variable equation to determine a singular 3 score? 4 A. Yeah, multiple factors are here, yeah. It 5 focuses on the object, yeah. And the one important 6 point you have to remember here, they utilize the -- the 7 GRm(k). And GRm(k) is the priority of an object. That 8 will come from the multiple search engine. And each 9 search engine will give you some ranking of the object, 10 plus the weight. 11 So this, too, will be combined together. 12 If you extend search engine, you will get 10 scores, 13 plus each has its weight. So you will combine them and 14 come up with a one score and plug in here. So there 15 is -- this approach heavily relies on the search engine, 16 also. 17 Q. So one of the variables involves search 18 engines? 19 A. Right; but doesn't probably -- yeah, okay. 20 Q. So variable HAK is the action equivalence of 21 the object, right? 22 A. [Nods head.] 23 Q. And the action equivalence of the object is 24 based on the user actions, right? 25 A. Yes. You can think of it as popular items,	Page 236 1 the object. 2 Q. I wasn't asking about the intrinsic value. I 3 was asking about the comparison value. This section of 4 Krug is describing -- 5 (Cross talk.) 6 Q. This section of Krug is describing how Krug 7 accounts for the collaborative user actions when 8 calculating the comparison values. 9 A. This comparison value will be equivalent to 10 the collaborative filtering. Is that what you're 11 saying -- asking? 12 Q. No, not equivalent. 13 A. Then what are you asking? 14 Q. Part of it. 15 A. Okay. So this equation, GRm(k), considers 16 WCMK, which is the group intrinsic value, and also 17 action equivalency. So this may contribute -- yeah, may 18 contribute, cover some of the -- 19 Q. So -- 20 A. -- collaborative filtering values, yeah. 21 Q. Okay. So Krug accounts for the collaborative 22 filtering values? 23 A. Yeah. But their collaborative filtering is 24 slightly different, because they go by the -- each 25 group, they come up with one unified score.

Page 237 1 So let's say I have 100 groups, and each 2 group will have a -- let's say Group 1 has 10 users 3 belong to this group. So all of the users will have the 4 same collaborative filtering score. But in case of 5 patent '217, for each users will have a different, 6 different cognate user, so, therefore, their score will 7 be different. 8 Q. Does the claim require the score for the 9 different collaborative users to be different? 10 A. So claim -- so Claim 1, as we discussed, no. 11 It's not explicit. 12 Q. Is it required? 13 A. Claim 1 language doesn't say explicitly, so it 14 doesn't require. 15 Q. Can you go to Figure 2? 16 A. Okay, another important point I want to add. 17 The -- 18 Q. There's no question pending, Dr. Khan. 19 A. I cannot add? 20 Q. There's no question pending. 21 A. Okay. 22 Q. Please go to Figure 2. 23 A. Figure...? 24 Q. 2. 25 A. Yeah.	Page 239 1 (Witness reviewed document.) 2 A. Okay. So -- so you -- Euclidean distance is 3 widely used when you have a vector representation. So 4 you have a user profile presented as a vector, and then 5 the object profile will also be presented as a vector. 6 So then the idea here is in a 7 multi-dimensional space, this user object and the -- I'm 8 sorry, user profile and the object profile should be 9 close together, if they're very similar. So ideal 10 distance should be zero. That's not the case. There 11 should be larger distance is better, that try to say. 12 And then they try to say that you can use the weighted 13 one, then you can use the co-sign similarity, also 14 vector. 15 Q. So -- 16 A. So these are some measurements similarity 17 calculations you can utilize. 18 Q. So a person of skill in the art would 19 understand there's other similarity measures that can be 20 used other than just the Euclidean distance? 21 A. Yeah; from the writing, yes. 22 Q. Can you go to paragraph 31 of Krug? 23 A. 31? 24 Q. Yeah. Here, the system of Krug is describing 25 how he can identify a group of people where, for
Page 238 1 Q. Figure 2 shows the user profile. Is that 2 correct? 3 A. Yes. 4 Q. And the user profile includes static values? 5 A. Uh-huh. 6 Q. And the static values are provided by the user 7 during registration, correct? 8 A. Correct. 9 Q. And the static values are also used within the 10 overall calculation for the comparison value? 11 A. The static -- what did you say? 12 Q. The static values are also used as part of the 13 overall calculation for the comparison value? 14 A. Okay. 15 Q. Can you go to paragraph 22 of Krug? 16 A. Paragraph 22. 17 Q. I believe you were discussing this earlier 18 about the Euclidean distance -- 19 A. Okay. 20 Q. -- between the vector of the object profile 21 and the user profile. 22 A. Uh-huh. 23 Q. If you look at the bottom of paragraph 22, it 24 says that other types of measurements can also be used, 25 correct?	Page 240 1 example, all users have access to a specific object. Do 2 you see that? 3 A. Right, yeah. 4 Q. And so we would agree that all of the users in 5 this group who have access to a specific object have 6 access to the same object? 7 A. Say -- can you say it one more time? All 8 users...? 9 Q. So Krug -- I'm going to break it down. 10 So Krug can identify a group based on 11 users who have access to a specific object. 12 A. Right. So that will be one group, let's say. 13 Q. Yeah. And that group -- 14 A. Same object, yeah. 15 Q. That group has access to the same object? 16 A. Right. 17 Q. Okay. And the system can run searches based 18 on that group, correct? 19 A. So you're saying we have a number of users 20 that will form a group because they access the same 21 object? 22 Q. Yes. 23 A. Okay. And then? Then you're saying -- 24 Q. That the system can use that group to run 25 searches? The system can use that search -- the system

Page 241 1 can use that group to determine a comparison value? 2 A. But the problem is in the -- that -- the value 3 we are calculating, what is it called? 4 Q. Comparison value. 5 A. Yeah, comparison value. So that is -- 6 considers each individual user's rating also, right? 7 Because it's a user's intensity. Then -- then -- then 8 group intensity. Then they consider the profile, 9 profile difference. Then the search engine resolves. 10 So the various factors will play a role in this case. 11 Q. And one of those factors could be this group? 12 A. Yeah, but it doesn't give you a guarantee that 13 the group will be the -- will receive the -- these two 14 group -- there's a possibility that -- that might be 15 another group also, that search same object. 16 Q. I'm asking about this group. This group can 17 be used as part of the calculation of the comparison 18 value? 19 A. So you're saying the group is formed based on 20 the same search, right? Or the -- what is the group 21 based on? Based on what? 22 Q. Having access to the same piece of content. 23 A. Okay. Same piece of content. 24 Q. Krug can then calculate a comparison value 25 based on that group? Page 242 1 A. But where is your cognate user? 2 Q. I'm not asking about the cognate user. I'm 3 asking whether Krug can calculate a comparison value 4 based on that group? 5 A. Because the formula requires some grouping. 6 Based on the grouping, you have to use the -- come up 7 with the value, right? Some group -- group intrinsic 8 value. 9 Q. Are you referring to the '217 patent? 10 A. No. In the TRM, the equation -- where is the 11 equation? 12 (Witness reviewed document.) 13 A. Yeah, this one, 106. They have -- so I -- 14 this will come from the search engine, as I told you, 15 GRM(k). And then GRM(k) will come from the search 16 engine. Then I mentioned that -- then you have to 17 consider the intrinsic value within the user group for 18 the object for the -- so that -- and then -- 19 Q. (BY MR. PLAIL) So the system of Krug can 20 calculate a comparison value using the group? 21 MR. PADMANABHAN: Objection; Rule 611. 22 A. Groups can calculate the GRM(k) for a group, 23 that's what you're saying? 24 Q. (BY MR. PLAIL) Okay. HA is the action 25 equivalence.	Page 243 1 A. Right. 2 Q. If we go to paragraph 32 -- 3 A. 32. 4 Q. -- it says there, "Advantageously, user groups 5 can be used to determine the action equivalence" [as 6 read]. 7 Do you see that? 8 A. [Nods head.] 9 Q. So you agree that user groups can be used to 10 determine the action equivalence? 11 A. So what is your question? 12 Q. Can user groups be used to determine the 13 action equivalence? 14 A. Yeah. 15 Q. And the action equivalence is used to 16 determine the comparison value? 17 A. But action equivalence is a -- one of the part 18 of the -- 19 Q. I didn't say action equivalence alone was used 20 to determine the comparison value. Action equivalence 21 is one part of determining the comparison value, 22 correct? 23 A. Correct. 24 Q. So user groups can be one part of determining 25 the comparison value, correct? Page 244 1 A. User group can be one part of that, oh, okay, 2 yeah. 3 Q. And user groups can be defined, for example, 4 based on having access to the same document? 5 A. So user group can -- okay, so you are 6 saying -- no, I'm not saying yes or no yet. So... 7 Q. You're not answering? 8 A. No, I'm going to answer. So you are saying 9 user -- 10 Q. Groups can be defined, for example -- 11 A. Accessing the same object, so, therefore, this 12 will be same group. 13 Q. I didn't say "therefore." I asked a question. 14 User groups can be defined, for example, 15 based on having access to the same document? 16 A. Yes, same object. Okay, that -- and then? 17 Q. No "and then." 18 A. But you said -- you tried to ask me -- 19 Q. No, I -- that was my whole question. 20 A. Oh, okay. But my response was, it doesn't 21 satisfy the additional condition, right, for the patent 22 '217. 23 Q. I wasn't talking about the '217. 24 A. Okay. That's fine. 25 MR. PLAIL: All right. I think we should
--	---

Page 245 1 take a brief break. 2 THE WITNESS: Sure. 3 (Break taken from 4:42 p.m. to 4:54 p.m.) 4 Q. (BY MR. PLAIL) Can you go back to Claim 1? 5 A. Which one? 6 Q. Of the '217 patent. I just want to make sure 7 we're aligned on one piece, which is, in the identifying 8 limitation, identifying at least one other of a 9 plurality of users that is a recipient of the piece of 10 the electronic content and that is cognate to the user, 11 the claim allows for a group of cognate users to be 12 identified, correct? 13 A. Which claim allows? 14 Q. Claim 1. 15 A. At least one of the other... 16 (Witness reviewed document.) 17 A. So it identifies a number of users that will 18 be -- that will be the recipient of the same piece of 19 electronic content, and that is cognate to the -- that 20 user to set conditions simultaneously. 21 Q. But that identification can be of a group of 22 people? 23 MR. PADMANABHAN: Objection; Rule 611. 24 A. It can be -- as I said, for each -- for each 25 user, there will be a group. For each first user, there	Page 247 1 A. Not necessarily one. It can be two, three. 2 It depends on the end. 3 Q. So when you said earlier that they mention 4 each distinct user, there will be a cognate user, they 5 explain that each user will have a distinct cognate 6 user, what do you mean by that? 7 MR. PADMANABHAN: Objection; Rule 611. 8 A. I think -- okay, so the -- for each distinct 9 user, I will have a set of N number of cognate users. 10 Q. (BY MR. PLAIL) I see. So N number. So going 11 back to my original question, User A can be cognate to 12 the group of users B, C, and D, correct? 13 MR. PADMANABHAN: Objection; Rule 611. 14 A. User A can be a cognate to...? 15 Q. (BY MR. PLAIL) The group of users B, C, 16 and D. 17 A. Group of Users B -- no, it can be -- maybe -- 18 let's say there might be a group where A, B, C, D, E, F, 19 all of them are there. But when you say cognate user 20 for A, then it might be -- and I'm looking for only two 21 users, let's say, from that. So it will be only, as I 22 said, B and C. And for B, it might be C and D. 23 Q. So -- 24 A. Because the similarity is different. They try 25 to emphasize in column 46 that --
Page 246 1 will be a group with respect to patent '217. 2 Q. (BY MR. PLAIL) So User A can be cognate to 3 user -- strike that. 4 User A can be cognate to the group of 5 Users B, C, and D, for example? 6 A. No. 7 Q. No? 8 A. No. 9 Q. Why not? 10 A. Because the way it's described in the 11 specification section, they mention that for each 12 distinct user, there will be a cognate users. And then 13 column 46 and 45, they explain it by an example how, for 14 each user, you will have a distinct cognate user set. 15 Q. So for the cognate user limitation in the 16 claim, we can only have cognate user -- for the cognate 17 user limitation in the claim, we can only have User A as 18 cognate to User B? 19 MR. PADMANABHAN: Objection; Rule 11 -- 20 Rule 611. 21 A. For User A -- say one more time, please. 22 Q. (BY MR. PLAIL) For the cognate user 23 limitation in the claim, we can only have the User A is 24 cognate to User B? 25 MR. PADMANABHAN: Objection; Rule 611.	Page 248 1 Q. In column 46? 2 A. Correlation, yeah. 3 Q. The correlation in column 46 is a requirement 4 for the identifying limitation of the claim? 5 MR. PADMANABHAN: Objection; Rule 611. 6 A. That's one way you determine the cognate 7 users. 8 Q. (BY MR. PLAIL) Is it a limitation for the 9 identifying limitation of the claim? 10 MR. PADMANABHAN: Objection; Rule 611. 11 A. So what is your question in this case? 12 Q. (BY MR. PLAIL) So I'm asking whether User A 13 can be cognate to a group of users and you're saying no? 14 MR. PADMANABHAN: Objection; Rule 611. 15 MR. PLAIL: I'm going to note that counsel 16 for Sterling is giving nonverbal cues to the witness. 17 MR. PADMANABHAN: No. He's been saying it 18 to -- like, he's said three times -- 19 MR. PLAIL: Speaking objection. 20 MR. PADMANABHAN: I'm not giving a 21 speaking objection, because you've asked this question a 22 million times. 23 MR. PLAIL: And he's now admitting that 24 he's giving a speaking objection. 25 MR. PADMANABHAN: And you -- you kept --

Page 249 1 you keep asking the same question. 2 MR. PLAIL: He's now arguing on the record 3 in front of the witness. 4 A. So I'm saying the -- 5 MR. PADMANABHAN: This is outrageous. 6 MR. PLAIL: And is now giving an 7 additional speaking objection. 8 Can we go off the record? 9 (Off the record 5:00 p.m. to 5:01 p.m.) 10 Q. (BY MR. PLAIL) So I'm asking for User A, can 11 they be cognate to a group of other users? 12 MR. PADMANABHAN: Objection; Rule 611. 13 A. No. In this patent '217, I'm not going to say 14 group of other users. A number of other users. 15 Q. (BY MR. PLAIL) If you go to column 33 of the 16 '217 patent, line 60 -- sorry, line 60 through 62, I 17 suppose we can start at the top of that paragraph. "Now 18 turning to a description regarding computing cognate 19 importance" [as read]. 20 Do you see that? 21 A. Right. 22 Q. It says that, "An electronic mail system may 23 store for each user a set of N other users considered to 24 be most similar to the user. This is the user's cognate 25 group" [as read].	Page 251 1 cannot be cognate to a group of users? 2 MR. PADMANABHAN: Objection; Rule 611. 3 (Witness reviewed document.) 4 MR. PADMANABHAN: I'm just going to go see 5 if she'll give you 20 more minutes. 6 MR. PLAIL: Okay. Thank you. 7 (Mr. Padmanabhan left the room.) 8 MR. PADMANABHAN: She's got to go home. 9 MR. PLAIL: Got it. 10 For the record, we did not discuss while 11 opposing counsel was outside the room. 12 A. Yes. 13 Q. (BY MR. PLAIL) I'm going to ask this question 14 one more time, and I'm short on time, so I'm going to 15 move to something else, but I'd appreciate an answer. 16 Is there a limitation in the claim that to 17 you indicates that User A cannot be cognate to a group 18 of users? 19 MR. PADMANABHAN: Objection; Rule 611. 20 A. So in the patent '217, column 47, under 21 Claim 1, they said cognate to the users. They did not 22 use the word "cognate group" or "group of users." 23 Q. (BY MR. PLAIL) So because the claim doesn't 24 specifically use the word "group of users," you're 25 saying --
Page 250 1 A. Right. 2 Q. So the user concerned can be cognate to a 3 group of other users? 4 A. Right. So that will focus on -- let's say 5 this cognate group will be smaller in -- for that user, 6 smaller in size with respect to the -- you have a -- the 7 bunch of users joined based on, let's say, certain 8 characteristics, let's say all women, then they form a 9 group. That's not the cognate group we are talking 10 about here. 11 And this cognate group, it goes with user. 12 For each user, there will be a cognate group, where we 13 will have a few users that are very relevant to this 14 user. 15 Q. So under Claim 1, the user can be cognate to a 16 group of users? 17 MR. PADMANABHAN: Objection; Rule 611. 18 A. Under claim -- under claim...? 19 Q. (BY MR. PLAIL) 1, the user can be cognate to 20 a group of users? 21 MR. PADMANABHAN: Objection; Rule 611. 22 A. We're -- you said to a group of users, right? 23 Q. (BY MR. PLAIL) Yes. 24 A. That, I don't agree. 25 Q. Okay. So why -- what in the claim says they	Page 252 1 A. No. 2 Q. -- that User A cannot be cognate to a group of 3 users? 4 MR. PADMANABHAN: Objection; Rule 611. 5 A. No. The way the specification also discuss, 6 that shows that for each users, there will be a set of 7 cognate users. 8 Q. (BY MR. PLAIL) A set, as in a group? 9 A. But this group usually smaller in size -- or 10 the set size is smaller. That set, a number of -- 11 number of users will be very small. 12 Q. What is an acceptable set size for the claim? 13 MR. PADMANABHAN: Objection; Rule 611. 14 A. That -- that, I cannot -- I don't know. 15 Q. (BY MR. PLAIL) Okay. So you don't have an 16 answer for what is an acceptable set size? 17 MR. PADMANABHAN: Objection; Rule 611. 18 A. Because the empirical experiment is -- 19 empirical experiment is required to say that number. 20 Q. (BY MR. PLAIL) So I'm going to ask you -- 21 A. In general -- 22 Q. I'm going to -- 23 (Cross talk.) 24 Q. I'm sorry, I'm really short on time. 25 A. But let me --

Page 253	Page 255
1 Q. No. I mean, I -- look, I'm being kicked out	1 CHANGES AND SIGNATURE
2 of here in five minutes --	2 WITNESS NAME: DR. LATIFUR KHAN
3 A. Oh, sorry.	3 DATE: NOVEMBER 13, 2025
4 Q. -- and I need to ask some additional	4 PAGE LINE CHANGE REASON
5 questions.	5 _____
6 A. Sure.	6 _____
7 Q. You provide -- do you understand what	7 _____
8 secondary considerations are?	8 _____
9 A. You mean the dependent claim?	9 _____
10 Q. No. You do not provide any opinions relating	10 _____
11 to what are called objective indicia of nonobviousness.	11 _____
12 Is that correct? I'm asking about the opinions in your	12 _____
13 declaration.	13 _____
14 A. In the --	14 _____
15 MR. PADMANABHAN: I can stipulate that for	15 _____
16 you.	16 _____
17 MR. PLAIL: Okay. You will stipulate?	17 _____
18 MR. PADMANABHAN: It's not in his report.	18 _____
19 Yeah, it's not in his report.	19 _____
20 MR. PLAIL: Okay.	20 _____
21 Q. (BY MR. PLAIL) Okay. I'm confirming that you	21 _____
22 have not reviewed any source code for the Twitter	22 _____
23 product?	23 _____
24 A. Twitter?	24 _____
25 Q. Yeah.	25 _____
Page 254	Page 256
1 A. What is the Twitter -- Twitter is here?	1 I, DR. LATIFUR KHAN, have read the foregoing
2 Q. I'm asking, have you ever reviewed any source	2 deposition and hereby affix my signature that same is
3 code for Twitter?	3 true and correct, except as noted above.
4 A. No.	4 _____
5 Q. And you've not made any opinions based off of	5 DR. LATIFUR KHAN
6 any review of any source code for Meta either?	6 _____
7 A. No.	7 _____
8 MR. PLAIL: All right. I'm going to note	8 _____
9 for the record that we have to end this deposition early	9 THE STATE OF _____)
10 because the building is closing. We will reach out to	10 COUNTY OF _____)
11 opposing counsel about logistics later.	11 _____
12 THE REPORTER: Off the record?	12 Before me, _____, on
13 MR. PLAIL: Yeah.	13 this day personally appeared DR. LATIFUR KHAN, known to
14 (Proceedings concluded at 5:09 p.m.)	14 me (or proved to me under oath or through
15 _____	15 _____) (description of identity
16 _____	16 card or other document)) to be the person whose name is
17 _____	17 subscribed to the foregoing instrument and acknowledged
18 _____	18 to me that they executed the same for the purposes and
19 _____	19 consideration therein expressed.
20 _____	20 Given under my hand and seal of office this
21 _____	21 _____ day of _____, 2025.
22 _____	22 _____
23 _____	23 _____
24 _____	24 NOTARY PUBLIC IN AND FOR
25 _____	25 THE STATE OF _____
	COMMISSION EXPIRES:

Page 257 1 STATE OF TEXAS) 2 COUNTY OF DALLAS) 3 I, LISA F. DEMOE, a Certified Shorthand Reporter in 4 and for the State of Texas, hereby certify that, 5 pursuant to the agreement hereinbefore set forth, there 6 came before me on the 17th day of November, 2025, at 7 9:08 a.m., at the office of Regus, located at 1220 River 8 Bend Drive, Suite 250, in the City of Dallas, State of 9 Texas, the following named person, to-wit: DR. LATIFUR 10 KHAN, who was by me duly cautioned and sworn to testify 11 to the truth, the whole truth, and nothing but the truth 12 of his knowledge touching and concerning the matters in 13 controversy in this cause; and that he was thereupon 14 carefully examined upon his oath and his examination 15 reduced to writing under my supervision; that the 16 deposition is a true record of the testimony given by 17 the witness, same to be sworn and subscribed by said 18 witness before any Notary Public, pursuant to the 19 agreement of the parties; and that the amount of time 20 used by each party at the deposition is as follows: 21 Mr. Ethan Plail - 6 hours, 35 minutes, 22 Mr. Devan Padmanabhan - 0 hours, 0 minutes; 23 I further certify that I am neither attorney nor 24 counsel for, nor related to or employed by, any of the 25 parties to the action in which this deposition is taken,	
Page 258 1 and further, that I am not a relative or employee of any 2 attorney or counsel employed by the parties hereto, or 3 financially interested in the action. 4 I further certify that before the completion of the 5 deposition, <u> X </u> the Deponent, and/or <u> </u> the 6 Plaintiff/Defendant, <u> X </u> did <u> </u> did not request 7 to review the transcript. 8 In witness whereof, I have hereunto set my hand and 9 affixed my seal this 17th day of November, 2025. 10 11 12 13  14 15 LISA F. DEMOE, CSR, RPR Texas CSR No. 6533 Expiration Date: 01/31/27 16 17 18 19 20 21 22 23 24 25	

Exhibits				
198417_Dr_ Latifur_Khan_ 111325_EX 8 4:3 132:1,2,5, 6,8	198417_Dr_ Latifur_Khan_ 111325_ EX 1008 209:24 210:4	98:12,21 99:5,16 100:2,11,18, 24 101:13 102:4,16 124:4 148:19, 22 162:16 163:12 164:1 171:15,17 172:7 174:20, 24 175:2 177:11 188:23 189:2, 3,5 191:7,12, 21,22 192:8, 10,13,14,23, 24 193:1,15 201:22 202:4, 7,13,14,15, 18,20,23 207:4,8 208:16,20,24 209:6,7,9,12, 21 212:6 216:9 222:11, 12 237:2,10, 13 245:4,14 250:15,19 251:21	217:6 235:5 237:1 1001 41:1 104:2 1007 157:11 209:23,25 1008 209:24 210:4 102 150:20 1043 75:15 80:2,4 81:19, 22 82:24 84:15 106 231:24,25 232:1 233:1 242:13 10:13 46:25 10:51 71:23 10:58 71:24 11 144:21,22, 23,25 145:2 148:4 220:22 221:3,19 246:19 110 163:18 164:5,11 165:2 235:14, 18 112 82:25 112A 82:4,5, 13 12 19:22 21:2 126:21,23 148:13,14,15, 17 230:6,13 231:20 120 82:4,5 83:1,5 164:7	193:20 128 105:3,6 193:19 129 26:6,7 12:05 114:6 12:40 114:7 13 11:3,21 19:25 130 164:7 137 197:21 203:3 14 128:13,15 129:10,24 130:3,11,16, 20,23 131:9, 13,19 231:21 140 136:11 139:12 151:8 1403 123:1 142 142:2 143 206:2,3 15 195:9 158 71:25 72:2 16 12:3 166 154:18,21 167 154:18,21 168 155:1 17 193:3,6,7 1813 132:5 19 19:22,23 20:14,24 21:2 179:23 181:18 190 155:2
198417_Dr_ Latifur_Khan_ 111325_EX 9 4:5 136:22,23 137:1,3	198417_Dr_ Latifur_Khan_ 111325_ EX 1043 75:15 80:2 81:19,22 82:24 84:15			
198417_Dr_ Latifur_Khan_ 111325_EX 10 4:7 141:3,4,5	198417_Dr_ Latifur_Khan_ 111325_ EX 2029 7:9			
198417_Dr_ Latifur_Khan_ 111325_EX 11 4:8 144:23,25 145:2 148:4	(			
198417_Dr_ Latifur_Khan_ 111325_EX 12 4:10 148:13, 14,15,17	(a) 154:2 (b) 154:25			
198417_Dr_ Latifur_Khan_ 111325_EX 1001 41:1 104:2	-			
198417_Dr_ Latifur_Khan_ 111325_ EX 1006	-28 193:21			
198417_Dr_ Latifur_Khan_ 111325_ EX 1007 209:23,25	0			
	01 216:20	1,000 199:4,5 1,500 133:12, 24 134:1 10 55:3 102:10,12 104:3,22 141:3,4,5 195:9 198:7, 25 214:5 234:12 237:2 100 37:2,3 164:2 176:19 199:3,11		
	1			
	1 28:23 40:25 41:2 47:15,16 48:5,7,20,25 49:9,19 50:12 55:12 74:13, 17,20,23 75:8,10 79:14,15 81:25 82:12 90:6,25 97:25			

1:57 157:9 1A 193:8 2 2 52:17,23 89:8,9,10 114:14,23 193:3,5,6,7 213:2,5,6,7 216:9 225:12, 14 226:19 237:15,22,24 238:1 20 24:8 198:7 213:9 251:5 200 199:11 2000 33:9 68:18,20 69:1 2001 12:9 2002 12:3 2003 213:16 2004 75:23 76:7 2005 11:2,9, 20,25 33:9 44:18 45:12 46:15 68:10 84:10 162:19, 21 2006 11:3,9, 21 33:9 135:2 2007 134:4,12 137:25 2010 133:11, 24 134:5 2014 134:6,12 2015 149:14	2016 132:15 2019 67:23 68:4 2029 7:9 21 7:18,21 8:3,4,6,7 29:4 107:22 108:9 116:1 126:11 217 9:13 13:23 22:20 24:21 27:1,6, 8 29:2,5 31:2, 9,15,20 32:5, 8,21 33:24 34:7,20 35:7, 17,25 36:7 37:6 38:21 40:9,18,21,24 45:7 46:4 50:3,9,19 51:1,13 72:5, 7 73:4,18 74:9 76:1,10 77:22 78:9,20 79:1,3,5,7 90:6 97:4 98:22 99:9 103:3,5,21 114:10 123:17 124:10 157:7 166:18 168:12,24 169:6,17,20, 25 171:1,11 183:20 184:12,21 185:7,10 187:21 191:7, 19 193:3,13, 22 194:19 195:5,18,19	196:10 197:4, 15 200:12 203:10 204:7 206:4,11,18 207:3,8,20 214:16,18,21 215:1,2,9 224:22 237:5 242:9 244:22, 23 245:6 246:1 249:13, 16 251:20 22 10:12,14 29:4 107:17, 20,22,23 108:7,11 109:3 110:14, 21,23 111:12, 18 163:24,25 238:15,16,23 2229 6:3 23 12:11,13 115:11,12 116:2 120:23, 25 123:14 126:6 24 14:20,21 25 18:3 84:22 115:11,12 116:2 120:24 121:1 123:14 126:7,11 250 52:18,24 53:11,16 54:14 55:6,14 56:25 57:22 58:10 27 150:9,10 271 135:19 280 136:12	139:13 2:04 157:9 2:48 188:22 3 3 82:11 143:14 192:1 216:9 30 11:2 41:7, 11 82:8,9,24 111:4 116:15, 16,18 123:14 124:10,25 126:1,2 300 218:22 30th 11:8 31 158:20,22 159:11 160:17,20 161:14,18 162:4 239:22, 23 32 243:2,3 33 249:15 34 104:3,21 35 148:19,20 355 128:16 37 85:12,23 86:10 105:23 116:15,17,18, 20 123:14 124:10,25 126:1,3 38 148:19,20 39 150:9,10 3:02 188:22	3:57 222:10 3B 210:11,12 4 4 48:17,19 49:7,11 50:7 51:12 73:20, 22 74:4,5,8, 10,15,18 79:17,18 96:25 97:1,6, 8,19,25 98:5, 13,16,18,22, 25 99:6,11, 17,19 100:3, 11,15 101:2, 4,14 102:2,3, 10,18,20,21, 22 105:23 106:1,15 107:1 134:4 150:8,10 153:18,23 184:13 216:9 4- 161:20 40 106:18 215:20 401 18:21 32:12 33:4 34:4,11,24 39:21 43:14, 22 44:16 45:21 46:2 69:17,24 88:2,11 117:18,24 120:11,18 121:5 122:6, 15 123:1 124:2 126:9 144:8,18
---	---	---	--	---

146:7 148:3 174:9 175:5, 20 177:13 178:2,12 179:3 186:2 202:2 402 39:21 403 18:21 32:12 33:4 34:4,11,24 39:21 43:15, 22 44:17 45:21 46:2 69:18,24 88:2,11 101:6 117:18,24 120:11,19 121:5 122:6, 16 124:2 126:9 144:9, 18 146:7 148:3 160:15 161:21 174:9 175:5,20 177:14 178:2, 13 179:3 184:14 186:2 202:2 208:25 224:19 41 114:12,15 43 116:14,18 123:14 124:9, 25 125:25 126:2 157:18 186:19,20 45 128:14,15 129:10,24 130:3,11 195:6 197:15 246:13 46 91:2 195:8 197:15	246:13 247:25 248:1, 3 47 114:15 210:16 211:12 212:10,11,16, 17 251:20 48 41:4 126:25 211:10,20 212:7,14 49 41:3,4,5 47:9,10,11,13 54:8 114:11 219:5 4:05 222:10 4:42 245:3 4:54 245:3 5 5 104:3,21 143:14 155:20 50 126:22,23, 24 127:3 500,000 134:3 51 219:5 52 186:4 211:6 53 128:25 129:10,24 130:3,11,16, 20,23 131:9, 13,19 55 128:14 56 32:16,17	35:3,4 570 186:6,12 58 130:17,20, 23 131:9,13, 19 59 126:22,24 127:4 5:00 249:9 5:01 249:9 5:09 254:14 6 6 43:23,25 52:16 54:18, 19 55:5 115:16 116:3 118:8 120:24 212:6 6- 185:3 6-0 230:1 60 52:20 249:16 601 43:14 134:25 135:16 136:8 138:12,22 139:5 149:12, 20 151:6 152:2,16,25 160:15 179:2 602 135:16 136:8 138:13, 22 139:6 149:12 151:6 152:2,16,25 603 134:25 611 9:18	28:18 30:13, 18 34:12,25 37:20 38:6,24 39:4,20 40:11 49:2,21 50:14,21 51:4,19 52:9 55:18 57:23 58:11 59:10, 16 62:9,17 63:18 66:9 67:1,14,19 69:10,23 70:10,17 73:24 74:21 75:6,12 77:16,21 78:22 79:4 81:8 83:13 93:7,15 94:1, 8 95:17,24 96:9,18 97:10 98:1,14 99:1, 12,18 100:4, 13,19,25 101:5,6,16,22 102:5,11,19 108:16,24 109:15,22 110:16,22 111:16 112:4, 10,15,20 117:17,23 118:6,13 119:19 120:4, 12,18 121:4 122:5,16,25 124:1 126:8, 19 128:1 144:9,18 146:7 148:3 149:20 161:20 165:23	166:20 167:5, 9,19 168:14 169:22 170:4 171:20,24 172:22 173:14,20 174:6 175:5, 12,20 177:13 178:2,12 179:3 181:11 182:9,16 183:2,10,23 184:4,13,23 185:8 186:1 187:19 189:20 191:13,20 196:12 198:18 200:14,23 201:5,16 202:1 203:1 204:23 207:13 208:9, 17,21,25 224:19 242:21 245:23 246:20,25 247:7,13 248:5,10,14 249:12 250:17,21 251:2,19 252:4,13,17 613 34:25 44:1,16 45:14,20 46:1,16 47:18,24 48:14,21 49:3,20 50:15,22 51:5 52:10 53:13,
---	--	--	---	---

19 55:19 56:7 57:4,24 58:12,23 59:9,16 60:2, 15,20 61:7,20 62:10,18 63:19 66:8,14 67:1,13,21 69:11 70:9,16 78:21 81:7,14 83:2 91:24 92:4,10 94:17 95:18,25 96:10,19 98:1,15 109:16,23 112:3,11,16, 21 118:7 121:5 122:6, 16 124:2 134:21 135:17 136:8 138:12,21 139:5 141:14 142:6,14 144:9,17 146:6 148:2 149:7,11,21 151:5 152:2, 15,25 167:10 168:14 171:20,25 174:7 183:3, 11 191:14,25 200:23 201:7, 17 62 249:16 63 153:13,19, 24 65 52:16,21, 22 54:19 55:5 154:9 195:7	66 154:14 67 154:15 69 232:24,25 6B 229:23,25 230:2,5,6 7 7 11:20,25 12:9 19:16, 19,20 102:24 103:1,21 106:5,6,8 107:3,8,10 110:13,17,18, 19 143:14 155:22 156:9, 12,23 220:24 70 232:20,22 70,000 133:13 701 67:1,14 70:10,17 179:3 704 67:1,14, 21 70:10,17 179:3 71 232:24 73 157:18,20 158:4 232:20 740 218:20 749 218:20 219:4 750 218:13, 14,16,20 75025 6:4 79 156:14	8 8 106:10,16, 19 115:9 120:23,25 123:13 126:6, 10 131:23,24 132:1,2,5,6,8 156:18,22,23 220:24 80 116:3 118:3,12 119:14,17,23 120:1,10 121:8 122:3 82 156:21 9 9 106:16,20 136:22,23 137:1,3 227:25 90 105:9 9:38 24:18 9:40 24:18 A A's 195:10 196:22 208:11 a.m. 24:18 71:23,24 ability 167:14 able 18:9 95:15,22 111:22 161:12,13	191:2 about 11:6 24:4,22 30:15,16 33:5,7,10 39:10 42:10 44:18 46:18 50:8,10 51:13 57:9,10 61:24 62:3,20 63:8, 20,21 64:5,7 65:12,15 72:8 73:8,19 74:17,18 75:7,8,9 79:18,19 85:12 86:1,5, 14,22 88:20 90:3,23 96:24 97:7,16 98:7 99:22 100:1, 6,8 101:9,25 102:1,10 104:5 105:11 106:25 107:2, 12 108:5,6 111:10 112:25 113:1 114:21 115:2 118:18 121:19 123:4, 7 124:10,16 126:12,15 127:17 128:6 129:4 137:25 138:9,11,17, 19 139:2,17 140:3 141:8 145:22 147:18 148:5 153:15 154:19 156:16,18,21 159:19,20	162:18 165:7 166:6,8,13 172:14,23 173:4,5 178:10 185:4 192:1,2 194:12 197:2 199:4,5 203:11,12,15 204:5,7 209:16,18 214:22 215:9, 14 218:9 223:25 224:8 225:5 228:4 232:19 236:2, 3 238:18 241:16 242:2 244:23 250:10 253:12 254:11 above 218:14 absent 205:8 absolute 230:10,11 231:18 233:21 Absolutely 188:11 abstract 76:12,23,24 79:23,24,25 80:2,9 145:2 158:7 abstracts 159:3 academia 18:3 26:1 acceptable 215:25
--	--	---	---	--

216:16 252:12,16 access 240:1, 5,6,11,15,20 241:22 244:4, 15 Accessing 244:11 according 50:6 98:24 99:11 133:14 134:2 159:11 190:17 194:22 210:21 214:12 account 136:19,25 166:19 235:9, 15 accounts 235:21 236:7, 21 achieved 134:11 136:1 across 105:14,25 159:3 231:19 act 145:12 action 6:11,16 31:11 71:1,9, 13 178:18 181:12 211:11,17,20 212:7,14 216:8,9 228:9,19,23 229:3,6 234:20,23 235:17	236:17 242:24 243:5, 10,13,15,17, 19,20 actions 31:12 35:22 37:16 38:1 60:23,25 70:24,25 71:2,6,10,15 111:1 117:15, 21 118:17 119:9 122:10 164:6 165:3 172:10,11 175:8 178:17 181:9,13 182:3,7,14 183:1,8 216:4,5 234:24 235:2, 3,9,10,22 236:7 activities 15:16 138:11, 19 139:8 178:19 182:19 activity 132:24 138:1 139:3 158:11 180:1,3 181:19,21 actor 64:24 65:1 actresses 64:23 65:1 actual 189:10 actually 19:24 96:23 105:2,5 154:9 162:17 178:5 197:22	235:14 add 39:5 57:17 147:21 168:2 237:16, 19 added 72:11 104:16 145:11 147:1 164:15 180:19 183:14 adding 146:21 addition 151:14 additional 64:21 124:19 146:21,24 147:20 151:20 168:2 180:21 244:21 249:7 253:4 additionally 208:7 address 6:2,3 25:1 34:7 72:18 98:16 99:20 123:19 129:9 131:8 142:4,12 214:25 215:5, 17 addressed 32:20 33:25 129:9 adjusted 220:25 admits 193:13	admitting 248:23 advance 9:6,9 advanced 9:12 advantage 81:5,13 Advantageou sly 243:4 affect 20:11 94:4 after 28:5 56:16 111:3 135:2 143:9 146:25 154:9 217:17 232:5, 6,15 again 22:3 34:5,19 47:23 54:13 59:15 76:23 108:18 117:8,19 124:3,7 151:7 171:11 209:3 against 76:1, 10 77:20 78:9 168:12 aggregate 235:15 ago 100:10 141:15 agree 30:14 32:20 33:2 41:17 53:10, 15,23 54:13, 20 55:9,10,13 90:18 117:14 133:18,21,22 134:9,10,11 137:18 138:5	142:8,10 149:6,8,9 158:16 159:7 160:12,18 161:16,17 162:13 164:25 185:24 186:15 212:24 213:13,14,22, 23 214:3 216:2,17 221:15 225:24 226:11,12 227:2 240:4 243:9 250:24 agreed 87:9 agreeing 86:25 87:4 agrees 217:17,18 ahead 7:7 21:7 23:11 40:24 57:18 60:16 84:14 91:25 157:14 177:18 182:12 209:23 225:18 algorithm 24:20,25 25:25 26:3,4, 20,21,23,24 27:21,25 28:3,17 29:4, 6,17 30:3,9, 12,22,25 33:16,21 40:21 43:13,
---	--	--	---	--

20 44:5 45:6, 19,25 56:3 113:4 166:12, 13,17 168:11, 24 171:18,23 172:8,19 173:12,18 174:5,10,15, 21,25 175:3, 11,22 177:4, 6,12,25 190:18 algorithms 43:9 45:7 63:16 145:13 169:20,25 170:1 173:23 alia 23:2 aligned 245:7 all 5:19 7:7,17 18:5 19:16,21 21:16 28:11, 14,16,24,25 29:22,24 30:1,14,15 37:10 38:17 42:13 45:1 56:17 63:7,9 68:16 78:14 84:21 91:17 93:3,6,8,12, 25 94:6,9,25 95:2,4,5,8,10 107:14 108:2, 21 111:2 113:14,17 114:20 121:25 125:21 128:13 131:18 135:14	136:18 143:7 147:12 154:8 162:11 168:15 172:9 177:17,20 179:4,6 182:17 185:21,23 190:5 191:21 192:19,25 196:21 200:19 201:1, 12,19 202:11 208:1 209:10 215:15 225:6 226:1 233:22 234:1 237:3 240:1,4,7 244:25 247:19 250:8 254:8 allege 154:4, 10 allow 138:10, 19 139:2 149:18 allowed 151:2,21 allows 150:2 152:12 245:11,13 alone 243:19 already 7:8 13:4,8,25 22:14 65:20, 25 75:15 87:9 103:15 161:24 209:1, 22,24 also 9:6 10:6 17:17,25	22:16 31:20, 23 32:3 33:22 38:18 65:23, 24 75:25 84:8 86:17 93:21 96:20 100:6, 15 103:13 104:11 105:4 110:24 119:10 121:5 124:15 125:11 126:17 134:3 139:17 155:11 159:11 163:1, 3 165:15 166:9 182:7, 14,25 185:10 192:25 193:1 199:23 201:19 206:15 209:23 217:4, 16 221:10 230:11,22 232:20 233:22 234:16 235:13 236:16 238:9, 12,24 239:5, 13 241:6,15 252:5 although 20:1 50:8 144:11 altogether 42:14 always 5:21, 24 32:25 33:3 34:17 141:8 168:18	Amazon 64:15 among 34:22 35:8 76:14 77:1,10 136:13 139:13 151:11 186:8 187:7 216:5 amount 32:24 164:17 182:20 198:15 225:19 analysis 10:18 11:1,18 12:15 20:12 117:4 135:11 170:2 186:8 187:7 194:23 196:4 analyze 168:16 219:17 220:2 221:16 analyzes 226:21 and/or 187:13 angle 218:23 another 40:4, 14 61:10,17 71:4,8,12,17 73:1 75:18,20 80:25 121:20 141:18 151:17 152:11 167:3 193:21 235:24 237:16 241:15	answer 5:13, 18,22,24 8:21 9:19,21 12:23 18:22 22:22 28:20 32:13 34:13,16,17 35:15,16 36:15 37:15, 23,25 45:15 47:1,8 48:25 51:6 54:23,25 55:20 56:8 87:10 88:12 95:12 96:4 97:9 98:7,13 101:23 102:14,17 134:22,23 149:22,24 152:3 156:2 166:15 167:6, 7,12,13 172:1,3 174:13 187:25 190:15 194:5 200:11 206:9 219:3 244:8 251:15 252:16 answered 96:4 99:6 112:5 160:15 203:1 answering 244:7 answers 153:21 158:14 any 6:14 13:14,19 14:4 52:18,24,25
--	---	---	--	--

53:11,12,16, 17 54:14,15 55:6,7,14,15 64:5 84:1 85:5,9,25 86:5,13,17 87:21,25 88:5 89:22 90:18 109:6,8 113:1 117:6 147:19 150:16 199:20 235:16,25 253:10,22 254:2,5,6	applied 180:4 apply 194:17 218:11 appointments 159:2,13 appreciate 21:12 251:15 approach 128:21,22 234:15 approaches 117:1,5 124:13 173:24 appropriate 17:12 228:17 approximately 68:25 April 12:3 architecture 164:3 area 48:17 176:16 219:2 areas 22:12 argued 14:17 arguing 13:14,19 14:4 78:8 249:2 argument 154:15 155:5, 7 156:10 157:1 arguments 154:22 155:2 around 33:9 41:7 67:23 68:6,10,13,	17,20,25 114:12 150:22 151:3, 22 197:16 art 7:25 8:10, 15 9:23 10:9 12:16 13:3,10 14:17 15:25 16:24 17:19, 23,24 18:12, 15,19,25 19:9 20:2,7,11,16, 17 21:17,23 22:8,25 23:13 63:17,20 76:1,10 77:14,19 78:3,6,9 91:20 92:2,8, 12 95:14,22 96:7,16 169:21 170:1 193:9,14 205:3,12,15, 24 210:2,6 216:14 239:18 article 140:3 228:5,12 articles 136:14 140:6 229:15,16,17 as 5:3 7:9 8:1, 5,11,15,19 11:3,21 12:14,16 13:9 14:19,25 15:12 16:25 17:4,17 20:4, 21 21:20 22:18 23:4 26:9 27:14	28:19,25 29:24 30:3 31:24 33:16, 21 37:13 40:25 41:25 42:11 53:1 55:8,24,25 59:20 72:5 75:15,21 76:1,10,14 77:1,14,19 78:2,6,19 79:1,2,5 80:6, 20 83:6,7 85:16 89:7 91:10,12 92:15 93:13 103:7 105:15 109:10 116:4, 7,8 117:6 118:5 119:25 124:18 125:14 128:18,20 131:22 132:25 133:11,14,24 134:6 137:24, 25 138:2 139:14 141:20 142:5, 13,18 143:2, 14 145:12,14, 23 146:1 147:19 149:1, 3,4,18 150:3, 22,24 157:11 158:11 159:1, 4 160:1,13 164:7,18 165:3 168:17 174:2 175:5, 23,24 177:22 180:6 181:20	183:24 184:6, 24 186:6,9 189:11 193:9, 25 194:2 202:7 203:6, 13 204:4,15 205:9 206:5, 24 208:10 209:23,24 211:13 212:3 213:21 214:2 215:22,25 216:16 222:17 225:20 226:6, 25 228:6,12, 20 229:16 234:25 237:10 238:12 239:4, 5 241:17 242:14 243:5 245:24 246:17 247:21 249:19,25 252:8 aside 84:14 ask 5:13 7:17 36:20 41:2 54:6,13 64:11 76:23 99:21 100:1,7 101:25 114:20 125:20,23 135:22 162:18 167:12 168:17 174:1 244:18 251:13 252:20 253:4
---	--	--	---	---

asked 51:3,7 55:2 96:3 97:6 98:20 99:4 100:1,9, 11,21,23 102:16 160:15 202:25 209:1 244:13 248:21 asking 14:2 15:24 17:5 19:4,5,6,11 30:15,16 31:6 39:7,16 41:20 42:2,3,6 43:2, 3 47:4 48:8, 25 49:18 52:3,6 53:23 77:4,6 85:9 86:13 87:10 90:13 97:2 98:12,20 99:13,15,22, 24 100:10 101:19 102:23 103:18,21 113:14 115:2, 17 120:1,15 125:5 135:19, 22 138:24 142:7 150:25 161:10 162:1, 2 174:3,4 182:11 201:13 202:20 213:10 223:17 229:3 236:2,3,11,13 241:16 242:2, 3 248:12 249:1,10	253:12 254:2 aspect 45:3 aspects 67:8 77:14,20 158:10 asserted 76:1,10 77:14,19 78:6,7 assigned 75:18 157:15 158:2 180:3 Assignee 157:19 assigning 145:10 associated 38:9 39:9 61:9,16 121:24 160:8 182:1 189:9 190:2 associations 103:5 assume 57:6 198:11 200:2 235:12 assumes 64:24 Assured 132:13 asymmetric 206:23 207:11 208:8 209:9,15,18 at 7:24 8:6,7 9:12 11:16 14:20 16:24 20:18,20	21:18 22:19 23:20,21,25 24:1 27:24,25 29:8,19 31:21 33:8 36:8 37:5,14 38:19 42:12 43:21 44:18 45:1 48:16 49:6,9, 10 51:8,9 52:12 55:23 56:17 57:6 62:7,15 66:16,20,21 67:8,12 69:2 72:13 77:25 79:23 84:10 85:14 89:5,15 90:16 91:10 92:17,22 94:2,18,20 96:25 97:1, 16,25 98:5 100:20 101:25 102:9, 18,20,25 105:13 108:11,21 109:24 111:18,19 113:17 119:22 120:23 124:6 126:25 128:18,24 130:14 137:4 141:9 143:12 145:8 146:14 150:14 151:8 154:14 157:14 158:7 162:16 163:8, 12 169:17 171:5 177:21	178:7 181:24 183:15,16 186:6,19 188:14 191:7 195:6 201:23, 24 203:4,18 204:9 206:2, 14 215:15 220:22 221:6, 11 222:12 225:19 226:1, 18 229:21 232:4 238:23 245:8,15 249:17 254:14 attached 165:12 attachment 121:16 185:4, 7,18,20 222:21 224:21,25 225:1,2,7 attachments 121:15 attempting 45:19,25 214:10 215:17 226:13 attributes 172:18 audio 158:18 augment 180:21 author 133:20 137:6 authority 140:24	authors 157:22 available 32:24 33:3 151:9 225:20 226:22 227:11,15 average 105:25 averages 105:14,15 aware 202:17 away 12:16, 22 13:5,12, 15,20 14:5,9, 14,17 B B's 194:25 196:23 197:10 208:11,13 bachelor 22:14 bachelor's 20:18 21:18 back 27:15 37:15 55:12 57:11 84:19 96:22 101:8 114:8 119:16 138:8,16 153:6 161:1,4 162:17 168:5, 19 171:15 179:22 191:7 215:16 218:6 222:11 229:21 233:1
--	---	---	--	--

245:4 247:11 back-end 161:23 background 22:17,23 24:4 bad 179:1 217:6,7 balance 28:2, 7 base 36:25 67:24 129:15 137:19 140:2, 19 based 14:22 15:9 20:16 21:7,16 31:12 36:8,11 37:7, 8,9 46:4 48:19 59:18 61:11 65:10, 17 66:2 69:7 84:11 91:10 117:2 140:5 143:10 146:22,23 150:23 152:13 169:2, 3,11 171:10 173:5,23 181:3 187:7, 12,18 189:7 190:19,20 193:24 194:8, 14 196:21 214:7 217:9, 10,14 228:24 231:10,14 233:23 234:24 235:2 240:10,17 241:19,21,25 242:4,6	244:4,15 250:7 254:5 bases 137:11 basic 9:9 basically 32:23 38:11 45:9 69:15,21 70:3 71:2 141:10 168:1 212:14 216:7 217:19 220:9 231:11 basics 22:15 basis 128:19 147:8 Bayesian 194:1,15 became 150:2 151:1,14,20 152:11,23 because 22:20 29:9 47:2,21 49:4 51:10 56:9 58:24 61:12, 15 68:22 78:17,24 83:22 92:16 94:18 95:5,12 96:4 97:14 99:25 101:7 104:25 108:13 110:8, 25 113:19 114:1 136:5, 13 138:10,18 139:2 141:15, 24 146:23 149:18 150:2 151:2,21 152:12 155:9	159:18 160:24 161:22 162:10 163:9 166:2 167:25 168:17 172:23 174:16 176:2, 20,23 179:13 181:16 185:10 190:7 195:16 196:24 197:23 198:3, 23 200:10 201:20 204:14 206:3, 20 207:20 217:25 218:19 220:11,14,25 232:10 233:13 236:24 240:20 241:7 242:5 246:10 247:24 248:21 251:23 252:18 254:10 become 92:24 94:6 135:1 149:3,10,17 becomes 92:24 94:3 before 5:8,10 35:16 36:7 49:5 85:4 99:23 100:5 101:7 131:4 138:15 155:23	206:24 beginning 14:21 27:24 29:8,20 92:17,22 94:2 133:3 183:14 behind 97:11 believe 37:13 63:9,11 143:1 155:22 238:17 belong 194:22 196:25 198:24 237:3 belongs 196:20 below 218:16 benefit 5:23 80:25 88:21 benefits 80:13 81:6,13 benefitted 17:15,16,17 Berkeley 219:14 besides 49:10 best 167:13 177:21 better 28:4 147:3 174:19 197:23 227:23 239:11 between 26:15 104:3 134:12 169:20,25	193:22 233:14 238:20 beyond 109:17 140:6 145:9 171:19 big 38:12 Bill 140:4 billion 134:4 billions 134:5 135:2 binary 216:20,23 218:14,17 biography 140:4 bit 9:6 14:7 29:14 44:12 47:2 48:18 49:4 68:9,12, 18 69:2 70:7 122:12 146:18 159:15 177:2 Blast 132:18, 20 block 82:9 blog 223:7,9, 10 blogger 223:10,11,20, 24 Board's 20:1 21:1 border 219:2 both 11:24 20:4 27:18,21 30:8,11 65:18
--	---	--	--	--

66:20 67:18 69:5,6,7 78:25 116:8 118:4 123:15, 17 124:7 125:1 129:17, 19 130:1 192:15 194:22 207:21 208:2 214:24 bottom 62:4 82:1 89:9 105:13 108:6 226:1 238:23 box 39:23,24 40:15 82:1 121:8 230:6, 13 231:20,21 boxes 108:21 break 14:8 24:17,18 29:14 32:23 39:22 71:19, 22,23 114:6 155:25 156:3 157:8,9 222:6,8,10 240:9 245:1,3 Breaking 45:12 brief 245:1 briefly 166:10 bring 31:12 broad 122:12 broaden 159:16 browser 82:4 83:1,3,5,9,16, 19 84:3,10,	11,12 browsing 162:24 Budapest 180:14 build 161:25 179:9 building 254:10 bunch 31:10 64:4 83:23 140:18 175:9 217:24 250:7 business 162:22 179:19 busy 213:20 but 5:23 6:14 7:5 18:8 23:21 24:5,9 26:14 27:6 29:10,12,18 30:1 40:17 42:12 46:17 48:22 49:25 50:9,16 51:11 56:14 59:2 63:13,14,23 64:1,6 65:4 68:6,23 73:5, 7 74:13,15,18 75:7 79:5,12, 17 80:10 84:2,19 85:3, 22,23,25 86:4 90:11,15 91:25 92:16, 23 93:8 94:2, 3,9,19,25 97:21 100:7, 10,20 101:1,	23 104:23 108:18,21 109:5,18 111:7,17,22, 23 112:6 113:13 116:21 118:23 120:25 122:13 123:2 124:15 125:2 126:2 129:21 130:8 133:19, 20,21 135:7 136:24 139:8 140:12,17,18, 23 141:6 144:11 145:21 151:7, 15,20 152:9 153:4 154:19 160:3,7 162:6,13,24 163:8,9 165:5 166:4,9,10,11 167:7 168:8, 19,22,23 169:8,15 171:14 176:7, 20,22 177:10 178:3 179:17 183:7,13 184:6,21,24 187:9 190:24 193:1,24 194:8,13,18, 23 196:2,7 197:1,4,12 198:6,7,14 199:2,8,9 202:9,12 203:22 206:25 207:1 208:2,22	209:7,11,20 213:3 216:24 218:2,19,21, 22 219:18,21 220:13,17 223:2,12 224:24 226:5 231:21 232:12 234:19 236:23 237:4 241:2,12 242:1 243:17 244:18,20 245:21 247:19 251:15 252:9, 25 button 228:3 by 5:5 7:17,24 9:11,21 10:25 12:8 13:24 16:21,25 18:24 19:21 21:6,16 23:7, 12 24:19 26:2 27:1,6,8,9 29:7,13 30:15,21 32:16 33:12 34:6,15 35:2, 14 37:22 38:10 39:2,3, 7,17,22 42:3 43:18 44:14 45:5,17,23 46:7,11,19 47:19 48:2, 11,16,24 49:6 50:11,17,24 51:16 52:3,14 53:15 56:2,24 57:11 58:2	59:4,12,25 60:10,18,25 61:15,21 62:12 63:15 64:11 66:11, 17,24 67:4,17 68:1,3 69:6,9, 13,20 70:2,8, 13,20 71:25 73:1 74:3,25 75:10,14 76:6,22 77:18,24 78:24 79:7 80:17 81:10, 16 83:4,15 86:12 88:4, 13,22 92:1,7, 12 93:9,14,24 94:5,15,22 95:21 96:3, 15,22 97:13 98:6,19 99:4, 15,21 100:7, 17,23 101:3, 12,18 102:3, 7,13,24 105:9,15,19, 25 106:7 107:6,9 108:20 109:3, 19 110:12,18 111:11,19 112:7,13,18, 23 114:8 115:23 116:14,19 117:20 118:2, 9,23 119:22 120:9,15,21 121:8 122:13, 18 123:3 124:4 126:14, 21 127:15
--	--	--	--	---

128:8 129:3, 20 132:2,6 134:20 135:14,22 136:17 137:18 138:16,24 139:7 140:13 141:17 142:8, 16 144:14,25 145:3,4,9 146:10,15,21 148:7,25 149:9,14 150:1,8,18 151:13 152:11,22 153:6 154:21 156:2 157:10 159:24 160:16 162:1 164:25 165:24 166:23 167:7, 11 168:10,16 169:24 170:6 171:22 172:3 173:10,16 174:3,12 175:10,16,25 177:23 178:6, 16 179:15 181:9,13 182:3,7,11, 14,24 183:1, 5,8,19 184:1, 9,17 185:1,6, 12 186:4,8,19 187:22 188:23 189:22 191:17,22 192:4 196:15 197:11 198:1,	25 200:17 201:3,10,22 202:6,12,14 203:3,9 204:19,20,25 206:8 207:15 208:15,19,24 209:9 211:1,9 214:11 218:6 219:3,16 222:11 224:16,17,24 226:22 228:3, 12,18 229:9, 12 231:9 232:8 233:1 236:24 238:6 242:19,24 245:4 246:2, 13,22 247:6, 10,15 248:8, 12 249:10,15 250:19,23 251:13,23 252:8,15,20 253:21 by/through 26:19 C calculate 104:15 107:14 127:18 194:23 195:7, 8 221:23 231:18 232:2 241:24 242:3, 20,22 calculated 108:2 111:9 202:11	calculates 211:15 212:21 calculating 235:22 236:8 241:3 calculation 92:24 93:23 104:9,16 107:21,22 108:10,13 109:2 110:24 194:15 221:19 238:10,13 241:17 calculation's 109:4 calculations 111:13,14,21 194:1 239:17 calendar 159:2,12 calibrate 64:8 204:12 calibrated 9:3,17,24 29:9 35:23 176:4,6 194:17 calibrating 174:1 203:22 call 31:11,19, 24,25 50:3 72:12 92:18 99:9 called 24:23 31:16 33:17, 20 35:18 65:3,8 72:18	98:23 216:23 241:3 253:11 cannot 18:4 68:22 90:15, 17 95:12 96:4 102:15 139:21 155:13 161:7 174:13 183:20 188:11 190:10 191:4, 11,18 192:10, 11 200:2,11 219:23 220:13,17 223:5 237:19 251:1,17 252:2,14 capable 162:7 capture 60:4, 9 178:17,18 captures 147:7 card 218:11, 12,13,15,16, 21,22 219:4 220:7,8 carefully 101:9 carried 110:24 226:20 case 8:24 10:6 19:4 22:8,20,24 28:5 31:15,18 33:5 44:3,10, 12 45:2 46:6 51:24 64:10 67:15 70:22	103:11 113:4, 16 120:5 135:8,9 140:23 152:9, 10 159:18 161:16,17 165:5 166:4,5 168:7,23 169:17 178:18 179:5 182:17 196:23 197:4, 8 198:12 199:9,12 209:11 216:3, 11 217:1 219:1 220:9, 16 224:6 230:16 237:4 239:10 241:10 248:11 cases 111:2,4 113:6 225:10 cataloging 180:5 catch 219:20 categories 121:18 211:24 categorization 211:21 categorized 141:20 category 212:8 cause 16:23 229:4 celebrities 151:11
---	--	--	---	--

celebrity 152:7	chicken 27:10	92:2,8 95:15	claiming 13:7	closing 254:10
cell 21:9	chicken/egg 26:17	97:25 98:12, 21 99:5,16	claims 42:20, 24 43:6,19	clue 146:25
Central 56:22	choose 60:6	100:2,11,18, 24 101:13	73:17 75:9	cluster 117:3
certain 13:6,7	176:10	102:4,16	95:22 112:9, 14,19 168:12	clustering 124:12
31:13 37:3	195:11	114:9,10,13	169:21 170:2	co-sign 239:13
38:13 58:16,	197:24 198:1	124:4 131:16	173:21	coaching 209:3
21 64:23	choosing 176:25	171:15,17	184:11	code 121:14
65:18 110:10	circularly 24:24	172:5,6,7	191:21	171:5,7
140:13	citation 137:23 141:1	173:10,11,18	192:25	253:22 254:3, 6
167:24	cited 26:22	174:4,14,20, 24 175:2	195:20	coefficient 194:14
190:22	civil 24:6	177:11	200:12	coefficients 193:25
198:15,16	claim 13:3,6, 22 14:18	178:25	206:12 209:8	197:14
218:23,24	27:23 28:23	183:20 191:7, 12,21,22	clarify 176:8	cognate 31:22,23 32:4
228:16 229:1	41:2,8,17,20	192:1,2,4,6,8, 10,13,14,23, 24 193:1	clean 220:10	61:12 86:19, 20 87:6,15
232:5,6,8	42:3,6 46:20	198:14,15,19	clear 40:18	89:7,17 93:20
250:7	47:4,8,10,11, 14,15,16,20	199:19,24,25	90:9 202:10	103:13 104:4, 6,15 106:11, 19,22 110:9
cetera 150:20	48:3,5,7,20, 25 49:9,19	201:22,23	clear-cut 220:7	116:25
challenge 14:22 15:9	50:12 55:12	202:4,7,12, 13,14,15,18, 20,23 205:4, 13,14,16	clearly 29:3	124:16,17
141:18	58:21 73:12, 15,16,19,20, 22 74:4,5,8, 10,13,15,17, 18,20,23	206:12 207:4, 8 208:7,16, 20,24 209:6, 7,9,12,21	209:12,21	125:14
challenging 47:3	75:8,10	222:11,12	client 46:18	127:21
change 20:8	77:15,20	223:2,3	49:24 50:1, 13,18,25	129:21 130:6
169:11	79:14,15,17, 18 84:25	237:8,10,13	51:10 53:3	131:11 169:3
179:13	85:6,8,10	245:4,11,13, 14 246:16,17, 23 248:4,9	82:3,13,25	173:1,12,19
changing 146:20	86:8,15,21	250:15,18,25	83:10,16	176:10,11
character 136:11,12	87:5,16,18, 20,24 88:4,9	251:16,21,23	97:16,18	178:22
151:8	89:21 90:6, 20,23,25	252:12 253:9	98:9,10,13	194:20,24,25
characteristic s 250:8	91:16,20	claimed 12:16	99:7 100:16	195:11,12,15, 16,21,22,23, 25 196:6,10,
characters 139:12		13:5,15,20	101:9	
check 115:16		14:5	Clinton 140:4	
140:24,25			close 63:23	
218:12			239:9	
			closed 164:14	
			165:3	
			closest 63:25	

11,21,22,23 197:6,8,10, 16,17,25 198:2,4,10, 16,20,21 199:1,12,13, 16,20 200:13, 16,20 201:4, 6,14,25 202:5,7,21,24 203:20,21 204:7,9,16,17 206:3,13,15, 22,23 207:11, 14,16,24 208:2,7,11, 13,14 209:13, 15,16 237:6 242:1,2 245:10,11,19 246:2,4,12, 14,15,16,18, 22,24 247:4, 5,9,11,14,19 248:6,13 249:11,18,24 250:2,5,9,11, 12,15,19 251:1,17,21, 22 252:2,7 cognitive 25:15 28:9 37:9 107:15 collaborating 169:15 collaborative 35:23 37:17, 18 38:1,2,18, 22 39:10,11, 18 63:8 64:12 65:5,11,14,16 66:1,6,12 67:3,8,25	68:14,17,19, 24 69:4,7,14, 15,20 70:2, 13,18 92:20 94:20,23,24 116:8 117:2, 9,11,14,20 118:1,5,11,19 119:17,25 120:2,6,7,8, 15 121:10,20, 21,23 122:4, 8,14,19,21,22 124:10,18 125:6,13 126:4,12,15 129:20 130:5 168:2 173:8 176:5,9,24 186:7 187:3,6 194:20 196:8 203:17 204:5, 19 206:5 207:23 208:1 215:15 235:22 236:7, 10,20,21,23 237:4,9 collect 143:1 collective 235:16 column 52:16 54:18,19 55:5 82:11 104:3, 21 114:15 115:9 116:14, 18 120:25 123:13,14 124:9 125:25 126:6,10,21, 23 128:13,15 129:10,24 130:3,11,16,	20,23 131:9, 13,19 148:19, 22 150:8,10 180:4 193:3, 5,6,7 195:6,8 210:24,25 211:6,10,12 212:7 246:13 247:25 248:1, 3 249:15 251:20 columns 120:23 197:15 combination 14:22 15:10 52:18,24 53:11,16 54:14 55:6 108:23 117:6 147:25 155:5, 8 174:16 combinations 55:14 combine 14:24 15:11, 17,20 16:2,5, 7,11,24 125:10 155:12,13 156:11,17 157:4 173:9 217:12 220:21 233:13,22 234:13 combined 66:6,12 217:13 234:11 combining 68:1 69:9	146:4,10 156:18 come 38:14 44:8,22 45:7 96:13 140:20 168:19 169:4 173:21 175:22 179:12 197:23 216:6 217:9 218:25 219:24 220:11,13,16, 17 221:1 224:3 231:11, 14 233:25 234:8,14 236:25 242:6, 14,15 comes 56:16 113:2 160:7 166:12 177:20 178:4 212:10 coming 101:7 comment 224:1 229:18 commentary 149:4,19 150:3 common 5:22 78:15,18 84:4 commonly 83:22 communicate 50:2,13,18,25 51:11 99:7 150:21 151:2 communicatio n 184:7	199:10 214:23 communicatio ns 185:22,25 community 235:13 company 17:14 133:14 134:4 179:19 218:12,13 compared 22:18 37:13 175:23 177:22 comparison 232:2 235:23 236:3,8,9 238:10,13 241:1,4,5,17, 24 242:3,20 243:16,20,21, 25 complex 43:10 219:17 220:3,4 compliance 80:20 component 10:4 35:18 36:1,3 93:17, 18,20 109:7 110:8 161:3,4 163:17,20 164:5,10,11 165:2 components 25:12,18 28:1,11,24 29:22 92:18, 20,21 104:6
---	--	---	---	--

110:5,10,11 113:4 158:8 171:9,12,13 172:16 175:9 comprehensiv e 220:18 computation 57:8 computations 187:12 computer 20:18,19 21:18,19,23, 24,25 22:4,8, 9,10,14,19 23:1,4,5,13, 15 24:8,13 41:8,9,13,15, 18,21,22,23, 24 42:4,7,10, 17,20,22,25 43:7,21 44:15 45:23 46:12 49:24,25 51:10 52:25 53:4,12,17 54:15 55:8, 13,15,16,21, 24 56:3,25 57:1,21,22 58:10 98:8 170:13 185:15,17 233:13 computer- implemented 222:13 computers 45:12,13 46:14 computing	24:13 45:17 249:18 concept 13:23 31:16 33:17,20 60:21 86:3,4 108:17 152:5 165:13,14,25 166:2 concepts 9:6, 8 13:7 27:7 64:9 162:11 166:4 concern 161:22 concerned 44:21 48:19 57:10 250:2 concluded 254:14 conclusion 96:14 condition 124:17,18 130:10 203:16,17 204:13 205:7 206:16,22 207:1 208:4 209:12 244:21 conditions 103:16 124:7, 21 172:24 204:11,13 207:9 209:14, 21 245:20 configure 59:1 85:14 114:14	configured 41:23 configuring 176:6 confirm 85:4, 5 87:10 201:13 confirming 253:21 confused 95:2 connect 151:21 connections 150:23 152:12,20 cons 67:24,25 69:4,9 consider 12:15 14:23 15:10 25:13 67:18 131:7 168:16 169:8 195:16 196:2, 3 232:10 233:22 241:8 242:17 consideration 37:11 38:19 62:21 63:2,3, 4 79:20 106:20,22 111:2 162:10 166:14,15 172:10 176:3 178:20,21 219:2 231:14 consideration s 253:8	considered 218:23 232:20 249:23 considers 168:25 169:1, 14 185:10 233:9 236:15 241:6 consisting 91:12 constantly 225:20 constants 205:7 construction 24:6 84:25 85:6,8,10 86:8,15 87:5, 7,12,16,18, 20,24 88:4 89:21 90:19 contact 228:6 contained 140:19 containing 143:11 content 25:16 28:8 32:2 33:3 34:2 36:25 37:10 38:17 60:7 63:4 65:10,17 66:4,7,13,22 67:12,16,24 69:7 71:3,4,6, 7,10,11,15,16 80:19 84:7 85:16 89:7,16 91:10 92:19	118:24 119:5, 7,20 122:1,9 124:8,21 128:7 146:5, 11 153:3 173:7,25 178:22 187:12 203:6, 13,25 204:10, 15 206:14 207:19 215:13 217:2, 9 221:13,18 222:3,15,18, 22 224:18,20 225:3 226:4, 20 227:18,21 230:17 241:22,23 245:10,19 content-based 65:9 68:11 contents 42:11 88:24 189:10 217:6 context 19:6, 14 33:22 34:6,15,20 35:2,3,6 117:15,21 168:7 contextual 141:12 continuously 135:10 contribute 92:23 93:22 94:4 110:5 172:16 236:17,18 conventional
---	--	--	--	--

16:11,13 83:5 conversation 7:15 21:15 24:16 115:20 133:9 converse 153:1 convert 84:1 copies 72:14 copy 7:8 72:19,25 73:1 Corp 78:8 83:7 158:2 Corporation 157:19 correct 11:7 17:11 35:14 40:2,7 42:17 43:13 45:19, 25 46:15 55:17 56:4 66:7,13,24 67:12 74:16 75:21 77:3,8, 11,12 80:14 81:6,13 83:11,17 84:5,8,9 86:9 87:17 89:23, 24 98:8 119:18 121:18 130:12,13 131:10,14,20, 21 141:23 143:2,25 144:1,3,4,7 146:5 148:17 149:15 153:24 154:7, 23,24 155:4,	11,17,18 158:3 159:13 160:13,20,21 165:21 170:3 173:13 202:9 210:2,7,9,10, 16,23 211:5 212:23 213:1 215:18 222:4 227:7 230:18 232:3 238:2, 7,8,25 240:18 243:22,23,25 245:12 247:12 253:12 correlated 196:5 correlation 117:4 193:25 194:14,23 195:8,13 196:4 197:6, 14 248:2,3 correspondin g 108:9 211:16 221:23 corresponds 211:11 costs 80:17 counsel 5:16 7:3 34:16 209:3 248:15 251:11 254:11 countries' 135:5 couple 12:24 28:5,6 35:16 39:5 57:17	58:14 coupled 85:13 114:14, 23 course 42:18 46:13 courses 22:9 court 5:23 cover 54:10 140:6 157:7, 14 162:17 236:18 covered 13:24 CPU 42:11,12 55:25 56:4,6, 10,21 57:2, 13,19 58:3,8 61:24 crazy 135:2 create 42:20, 25 43:7 140:19 167:4, 17 170:20 178:11 184:5 204:6 created 187:3 creating 141:11 creative 17:20,23,25 18:4,5,12 167:25 creativity 17:19 credit 218:11, 14,15,16,21, 22 219:4	220:7,8 cross 39:13 47:7 52:4 54:7 67:20 123:24 125:19,22 157:3 188:13, 17 236:5 252:23 cues 248:16 current 6:1 116:7 customer 17:16 customization 190:20,21 customize 167:23 168:6 181:4 227:22 cut 164:15 cyber 46:18 D D's 197:10 daily 138:1, 11,19 139:3,8 Dallas 36:21, 22,24 37:2 39:24 data 22:10 23:3,4,19,20 42:13 92:17 115:14,18 116:3 117:16, 22,25 118:3, 12,15,21,23 119:4,5,11, 13,14,17,20,	21,23 120:1, 10,16,20,24 121:1,17 122:3 136:16 141:11 158:9, 17,18,24 159:1,3,8,17 160:1,12 161:24 163:21 164:2, 6,7 180:2,6, 15 181:10,14, 15,20,25 182:4,6,13,25 183:5,9 201:20 215:24 216:15 219:17 220:3, 4,6,9 database 23:3 72:24 180:4 databases 164:7 date 10:20 11:2,7,20 12:9 68:22 121:14 dates 11:14 day 213:21 days 28:6 101:8 111:4 deal 215:10 dealing 33:11 215:24 deals 135:21 decade 149:2, 10 decertification 216:7
--	--	---	--	--

decided 107:22	20:4	195:5 224:1	61:5 62:8,15 91:4,9 95:15, 23 96:17 99:16 101:14 104:7 109:13, 20 111:14,20, 24 175:25 195:24,25 200:20 201:4, 14,25 212:21 216:4 217:16 234:2 241:1 243:5,10,12, 16,20 248:6	different 52:5 61:19 63:25 79:5 117:5 126:11 129:3 135:12,18 155:16 161:9 171:12 172:14 194:20,25 197:9 208:14 211:15 212:18,20 218:4 230:12 233:4 236:24 237:5,6,7,9 247:24
declaration 6:8,9,10,15, 16,24 7:8,9 10:13 12:12 14:9,16 19:17 31:19 41:19 49:14,15 50:8 54:4 72:1 84:22 96:23 102:25 105:3, 4 112:2,6 153:7,11,12 166:22 193:17 212:4 253:13	degree 15:22 20:19 21:19 22:13 23:4 24:6 222:3 delete 212:3 deleted 164:15 demonstrated 132:23 202:11 department 127:11 dependency 26:18 27:12 dependent 74:15 79:18 192:2 253:9 depends 93:16 96:20 109:11,19 199:22 200:10,18 201:18,19 247:2 deposed 5:8, 10 deposition 6:6,19,21 7:3 254:9 derive 107:16 187:17 derived 91:11 186:5 describe 26:14 107:18, 25 121:2 124:13 126:1 130:8 171:8	described 33:21 104:14, 24 117:6 128:18 143:21 158:23 228:5, 12 246:10 describes 130:5 137:24 187:17 213:7 230:8 describing 211:9 214:6 221:19,22 222:13 231:20,22 235:21 236:4, 6 239:24 description 249:18 design 20:21 180:3 designer 44:20 desirability 203:5,9 204:2,21,24 205:1,4,13, 16,19,22,25 desirable 103:4 detail 69:14 142:2 153:17 details 29:11 107:18,20 108:10 determine 26:11 34:9 59:1 60:11,19	determined 116:25 determining 114:25 145:11 197:16 222:14 243:21,24 develop 30:4 186:7 developed 27:1,4 133:14 219:9,15 developer 44:20 device 53:3 98:7 diagram 48:6 163:13 diagrams 101:8 died 219:11 difference 70:8 176:7 193:21 241:9	differentiate 187:23 differs 20:3 difficult 24:7 34:9 70:7 direct 19:22 82:6 84:21 141:17 directed 41:17,20 42:4,6 direction 40:12,14 109:17 directly 53:24 55:3 director 64:23 66:22 disagree 159:24 160:22 161:6, 14 162:8 disagreeing 162:6

disaster 147:14	110:13,20 114:13 115:14,18 123:11 131:3 154:15 179:25 189:5, 17,22 220:20 227:6,10,14 228:14 238:17	17 49:12,22 53:6,20,22 54:22 62:22 73:25 74:6,22 75:2,16 80:11,23 82:16,19 85:20 88:16 115:13,25 116:5 118:10 120:22 127:2, 6,14 128:2,5 129:7 130:18 131:6 133:7 138:6 141:22 143:6 144:12 145:6,17 146:19 155:21 156:15 157:12 163:22 165:6 167:2 180:8 181:22 183:12 184:1, 5,6 185:2,6, 17 186:13,23 189:15 191:24 202:3 204:3 206:10 209:5 211:19, 23 212:13 222:23 224:8, 15,16,17,20, 21 225:4,17 226:9,24 229:7 235:7 239:1 242:12 244:4,15 245:16 251:3	183:16,17,20 184:11,12,19, 21 185:15,21, 24 226:4,14, 22 227:11,12, 15 doing 9:4 64:8 88:17 147:6 162:7 198:3,4 217:1 dominate 110:8,10 dominating 110:11 done 61:13 107:19,21,23 108:10 109:2, 4 153:8 171:6 dot 118:4 double-check 212:9 double-checking 75:1 down 14:8 21:3 29:14 32:23 38:11 39:22 45:12 155:16 164:13 213:18 240:9 downstream 45:9 Dr 5:2,6 15:4 47:19 48:2 49:13 53:7,23 54:23 82:20 87:1,9 90:3 127:15 143:4 145:18 146:16	153:21 158:14 160:16 162:2 167:11 177:3 200:7 202:17 219:9 237:18 dramatically 213:9 drawback 142:3,11 due 99:19 duly 5:3 Dumais 10:19 11:1 13:15, 20,24 14:5 63:21 89:3 157:13,15,24, 25 158:7,16, 20 159:7,20, 25 160:12,23 161:6,10,15, 17,23 162:2, 16 163:13,24, 25 165:25 166:9 167:4, 17,20 168:9, 11 176:4 177:3,5 179:22 180:9 181:5 182:13, 17,25 183:5,8 184:10,18 186:5,15,25 187:17 188:24,25 189:17,22 190:9,11,18, 19,25 191:2,6 192:19,21 193:22,23 194:7,12,13 196:2,17
disc 55:25				
discard 125:6				
disclose 13:4, 8 89:4 91:20, 21 92:2,8,13 113:2,7 125:1 126:3,17 129:25 141:1 154:5,11,23 155:3,6,8,10 179:18 204:21,22 205:4,5,13, 16,21,25	discussion 47:2 203:15 dislikes 65:24,25 display 83:18 distance 233:15,17,18 238:18 239:2, 10,11,20 distinct 118:16 194:21 196:24 197:5 198:22 199:13 200:5 246:12,14 247:4,5,8 distinction 195:2 distinguishes 63:16 distribution 217:7 dive 85:4 doc 225:5 document 8:23 12:20 13:1 15:3 32:18 42:1,9 46:23 47:12,	documents 159:1,12 160:1,7,13 165:12		
disclosed 81:4,12 179:16 199:17				
discloses 13:3 77:9 78:12 79:21 92:3,9				
discourse 149:3,18 150:3				
discs 56:4				
discuss 85:18 148:6 154:16 251:10 252:5				
discussed 62:25 117:11 237:10				
discusses 82:7 154:4				
discussing 23:19 35:4 81:17,23 82:12,25				

197:1 204:1, 4,5 205:8,21, 24 duplicity 80:18 during 37:11 134:14 149:2 238:7 DUSJ 233:15	199:11 210:13,18,19 211:12,13,18, 25 212:1,2,3, 22,24 213:21 214:11 217:6 221:24 222:19,21 224:21,24 225:1,7,8 e-mails 83:22 84:9 185:12 189:7,8,10, 11,18,23,24 190:12,17 211:3 e.g. 180:2 each 26:11 29:19,22 50:6 72:19 80:5 98:24 99:10 108:10 116:3 117:4 118:3 119:1,24 142:24 143:10 181:10,13,14, 15 182:4,7, 14,18 183:1 194:19 195:24 197:5, 17,18 198:3, 21 199:13 204:16 213:21 217:4 227:22 230:20,23 231:5 232:2, 4,6 234:8,13 236:24 237:1, 5 241:6 245:24,25 246:11,14	247:4,5,8 249:23 250:12 252:6 earlier 13:8 37:15,22,25 39:8 43:9 68:9,12,18 69:2 96:24 110:13,20 117:12 123:4, 7 138:9,17 165:24 184:17 220:20 238:17 247:3 early 133:11, 24 137:24 254:9 earthquake 147:10 easily 153:10 easy 141:23 179:5 edit 140:15 edited 164:15, 16 165:4 effect 169:15 effectively 56:25 efficiency 44:4,10,11, 12,14,19 45:2,3,9 efficient 44:3, 4 173:22 efficiently 43:13,20 egg 27:10	either 115:21 182:21 186:16 187:1 216:8 254:6 electrical 20:19 21:19 22:16,17,23 23:5 24:3,14 electronic 31:22 32:2 52:18,24 53:10,16 54:14 55:6 63:24 85:15 89:6,16 91:10 103:15 116:4 118:4 119:1, 15,24 124:8, 20 125:15 129:22 131:12 173:2 176:12 203:18,20,25 204:10 206:14 207:18 208:5 213:8 214:6, 22 222:14,18, 22 224:18,20 225:3 226:22 227:11,15 245:10,19 249:22 element 205:4,13,14, 16 elements 16:11,14 else 7:2,5 111:4 222:20 251:15	email 56:25 embodied 16:25 emerged 149:2 Emergency- driven 132:13 emission 56:13 emphasis 184:18 emphasize 9:10 111:6 122:7 183:14 190:24 205:6 247:25 emphasizes 72:5 empirical 95:13 96:5,8, 12,16 109:11, 14,20,21 112:1,8,13,18 113:3,11,12, 15,16,20 168:20 170:14,20 200:20 252:18,19 employed 180:4 enable 150:20 158:9 end 7:24 8:4,7 11:16 83:18 109:24 130:16 161:1 162:9 178:25 182:20 195:6 196:14
E				
e-mail 8:25 10:6,10 17:8, 11,12 31:7,8, 9,12 32:9,10, 21 33:6,13 38:8,25 39:2, 9,17,23,24 40:6,15,22 46:3 51:20 62:7,14 64:1, 4 72:13 73:1 83:23 84:4,11 110:1 119:7 135:20 139:20 152:9 159:1,12 160:1,7,13, 16,19,23 161:7,10,18 162:3,13,20, 22 163:5,9 165:20 166:2, 9 169:5,7 182:6,8,13, 15,25 183:1, 6,15 184:18 185:4,18,19 189:6,18 190:2,4,5,21 191:3 193:9, 13 198:11				

206:24 229:21 247:2 254:9 endeavor 214:15,18,20 ending 127:11 enforce 80:19 engine 145:12 147:2,5,23 148:1 159:20, 21,22 160:4 161:2,22,24 162:25 167:22 168:4 169:9,10 180:23 181:2 226:20 227:3, 4,7,8,20 234:8,9,12,15 241:9 242:14, 16 engineer 44:20 engineering 22:1,5,17,23 23:5,6 24:4,6, 7,13,14 engineers 22:18 engines 147:17 234:18 English 140:6 enjoyed 66:20 67:9 enough 28:1 29:9 57:2,13, 19 58:3,7,8 86:10 92:17	ensure 139:23 enter 58:14 enterprises 80:18 entire 129:25 130:4,12,21, 24 131:10,14, 20 entirely 63:25 64:9 161:8 194:25 197:9 218:3 entities 143:1 entity 143:10 environment 213:20 equation 24:25 25:6 27:19 104:3, 24,25 105:23 106:1,5,6,8, 10,15,16,17, 18,19 107:1, 3,7,10 110:18,19 111:7 227:5 231:25 232:1, 11 233:19 234:2 236:15 242:10,11 equations 25:21,25 26:13,14,16 63:6 111:13, 19 171:8 232:18 equivalence 234:20,23 242:25 243:5,	10,13,15,17, 19,20 equivalency 236:17 equivalent 176:6 236:9, 12 especially 16:13 63:20 135:6 established 55:13 79:13 152:21 estimating 232:15 et 150:20 et al 137:24 Euclidean 238:18 239:2, 20 evaluate 168:10 171:2, 4 evaluated 168:11 evaluating 169:19,21,24 226:22 evaluation 170:9,10,13, 14 even 135:4 139:12 179:7 196:3 event 147:8, 13 eventually 29:10,20,21	64:19 93:2,12 94:3 102:1 104:9 162:8 ever 5:8,10,14 185:12 254:2 ever- increasing 34:3,8,22 35:8 every 178:25 181:16 185:17,19 206:12 everybody 18:9 179:18 196:5 everything 108:13 176:17 Ex 157:11 exact 30:20 68:22 exactly 49:5 143:23 171:6 198:22 EXAMINATIO N 5:4 example 29:25 53:2 65:9 66:19,22 67:5 83:9,15 93:16 122:20, 23 127:16,19, 25 128:9,11 129:6,10,13 130:3,12,20, 23 131:10,14, 20 146:4,10 150:18 159:4 165:4 180:1	186:21 189:6 190:1 218:10 228:2 240:1 244:3,10,14 246:5,13 Exchange 163:3,4 exchanged 76:14 77:1,10 execute 41:23 56:11 exhibit 7:9 40:25 41:1 75:15 80:2 81:19,22 82:24 84:15 104:2 131:22 132:1,2,5,6,8 136:22,23 137:1,3 141:3,4,5 144:20,23,25 145:2 148:4, 13,14,15,17 157:11 209:23,24,25 210:4 existing 145:12 exists 26:18 27:12 33:20 expansion 142:18 expectation 62:23 65:20 expectations 226:6,16 expected 211:11,17,25 212:1,2
--	---	---	---	--

experience 20:17,20 21:8,17 23:8, 10,16,17 224:2	F	223:12,14,15, 16,21,23,24 224:2 228:23 231:12,13 232:10,15	118:8 120:24 162:16 163:12 164:1 171:6 193:8, 15 194:17 197:24 210:11,12 211:10 220:22,24 221:3,19 229:23,24 237:15,22,23 238:1	122:4,8,14, 19,22 124:11, 18 125:7,13 126:4,12 130:5 146:25 168:2 176:9, 24 186:7 187:4,6 196:8 203:17 204:5, 19 206:5 207:23 208:1 215:15 236:10,20,22, 23 237:4
experiment 200:24,25 201:11 252:18,19	Facebook 135:3,8 136:20,25 149:1 150:20	feeds 108:22 feel 116:22 few 47:25 139:10,11 166:11 196:14 250:13	figures 29:5 file 165:5,11 180:3 225:5,6 filed 12:2 68:7 75:23 76:7	final 110:3,4 finally 109:24 financial 16:5, 8
explain 29:6, 12 51:8 112:24 171:9 246:13 247:5	factor 24:22 65:13 110:11 169:14 176:4	field 20:20 21:20 22:1,4, 5 23:15,18 24:8,13 214:15,18,21, 22 215:3	files 159:1,12 160:1,13 164:14 165:3 filing 225:7 filter 38:12 65:14 94:24 142:25 204:12	find 26:16 117:25 125:14 196:21 197:5 198:20 201:2, 13 208:11 232:20,24
explains 108:9	factors 166:15,19 176:3 221:7, 11 234:4 241:10,11	fields 23:23 24:10	filtering 35:23 37:9,17 38:2, 18,22 39:10 63:8 64:12 65:5,16 66:1, 6,7,12,13 67:25 68:14, 17,19,25 69:4,14,15,20 70:2,13,18 94:23 117:2, 9,11,15,21 118:1,11 119:17 120:2, 16 121:24	fine 29:1 47:1 51:11 143:8 216:18 244:24
explicit 237:11	fail 113:6	figure 29:4,6 48:17,19 49:7,11 50:7 51:12 52:17, 23 81:25 82:7,12 96:7, 25 97:1,6,8, 19,25 98:5, 13,16,18,22, 25 99:6,11, 17,19 100:3, 11,15,17 101:2,4,13,14 102:2,3,10, 18,21,22 107:17,20,22, 23 108:7,9, 11,15 110:13, 14,15,17,21, 23 111:9,12, 18 114:23 115:16 116:3	fingerpriting 117:2	finish 39:14 187:24 207:6
explicitly 48:12 50:9 85:22 165:14 192:17 194:11 202:15,22 208:22 237:13	fair 88:22 108:15 111:15 141:13	famous 140:2 151:12	finishing 128:18,24 188:6	finished 82:17
Explorer 83:6	fake 140:20	fashion 110:23	first 5:3 12:19 25:23 26:18	
exponential 132:24	family 150:21 151:3,22	feedback 31:11 36:7, 10,11 60:4,9, 11,18,22 61:11 62:21 64:4 108:18, 20 111:1 118:17 217:17,18 218:2,4		
express 113:19 139:8, 9 150:5 204:1	family 150:21 151:3,22	feed 108:22		
extend 234:12	family 150:21 151:3,22	feedback 31:11 36:7, 10,11 60:4,9, 11,18,22 61:11 62:21 64:4 108:18, 20 111:1 118:17 217:17,18 218:2,4		
extension 227:19	family 150:21 151:3,22	feedback 31:11 36:7, 10,11 60:4,9, 11,18,22 61:11 62:21 64:4 108:18, 20 111:1 118:17 217:17,18 218:2,4		
extensive 200:25 201:11	family 150:21 151:3,22	feedback 31:11 36:7, 10,11 60:4,9, 11,18,22 61:11 62:21 64:4 108:18, 20 111:1 118:17 217:17,18 218:2,4		
extent 168:14 203:22	family 150:21 151:3,22	feedback 31:11 36:7, 10,11 60:4,9, 11,18,22 61:11 62:21 64:4 108:18, 20 111:1 118:17 217:17,18 218:2,4		

31:14,19 32:3,4 36:9, 13 38:14 67:3,23 76:20,22 103:5,12,13, 15 107:13 118:2 127:22 133:4,5 137:7,9 142:24 147:12 158:8, 22 172:4,9 173:1,24 175:7 176:13 179:4,6 182:17 195:25 201:19 203:6, 13 204:9,15, 17 206:16 207:16,17 229:15 230:24,25 245:25 fit 18:15,19,25 19:12 five 60:5,6 253:2 five-minute 71:22 fixed 143:14 flight 180:14, 24,25 flow 111:12 flows 108:14 focus 63:22 79:5,7 118:20 123:3,9 126:4,11 128:12 136:9	160:10 166:5 191:22 233:2 250:4 focused 33:13,15 46:7 135:8 161:1 focuses 51:21 57:5 64:2 176:5 213:3 215:6 234:5 focusing 22:12 63:24 118:23 171:11 folder 214:14 follow 70:7 151:24 152:18 follower 152:6 followers 150:21 151:3, 22 152:7 following 117:1 follows 5:3 for 5:23 6:6, 20 7:3 11:7, 13 15:15 16:5,8 19:5, 23 25:1,4,12, 19 26:11 27:15,21 28:16,17 29:25 30:4, 12,22,24 34:15 36:20 39:24 40:23 45:3 50:6 61:16,17	66:5,21 67:7, 15 71:4,7,11, 16 72:4,18,23 73:22 74:4,5 75:10 76:18 77:4,14 79:15 83:10,16,18, 20 84:2,6,7,8 87:10 88:21 91:20 92:1,8, 17 93:4,11,16 94:5 96:2 97:6,24 98:3, 9,10,16,24 99:10,19 100:14,15 101:11,24 102:10,21,22, 23 103:6,9,22 104:6,18 106:19 107:14 108:11 109:7 110:8,9 113:16 114:4 126:6 135:3 140:8 141:2 142:24 145:13,23 146:1,18 149:3,18 150:2,18 153:9 154:10, 15,22 155:1, 2,5,7 157:1 159:3 160:6 161:23 164:13 165:4, 14 166:8 167:21 168:7, 9 169:5,25 170:1,25 171:1,12 172:24 176:4	177:6 180:1, 5,12,14 181:5 182:18 184:12,21 186:5,16,21, 25 189:7,25 190:9,11 191:23 192:21,23,24 193:1 194:19, 24 195:11,12, 14,24 197:5, 7,17,18 198:3,21 199:10,13 203:12 204:7 209:3 210:19 212:12 213:20 214:6, 14,15,18 215:9,24 216:15 217:4, 9 218:11 221:3 222:11, 13 226:19 227:22 228:2 230:19,20,22 231:5,21,22 232:2,4 235:16,22,25 236:7,21 237:5,8 238:10,13 239:25 242:17,18,22 244:3,10,14, 21 245:11,24, 25 246:5,11, 13,15,16,21, 22 247:8,20, 22 248:4,8,16 249:10,23 250:5,12 251:10 252:6,	12,16 253:15, 22 254:3,6,9 forgot 15:7 form 128:25 129:1 136:15 150:6 194:13, 16 196:4 199:5 240:20 250:8 format 84:2,4 226:23 formatted 83:25 formed 193:23,24 194:8 241:19 forming 54:3 113:21 170:2 formula 233:2,4,8 235:24 242:5 forwarded 164:16 found 102:1 130:6 foundation 134:18 four 25:17 60:5 92:20 93:6,8,25 94:6,9 95:8, 10,15,23 96:17 148:12 171:11 172:14,18 211:24 216:5 Foursquare 149:1 150:19
---	---	--	---	--

fourth 28:9 frame 169:6 framed 160:25 frames 110:9 framework 135:13 free 116:22 163:10 frequency 59:20 117:3 friends 150:21 151:3, 22 from 5:16 6:16,24 12:16 13:5,15,20 14:5,18 20:3, 21 23:24 24:18 31:4 32:10 33:23 35:13 56:12 59:21 71:23 83:6 91:11 93:10 96:21 97:8,19 104:4 106:11 107:16 110:1, 7 113:2 114:6 121:22 126:10 132:15,18,20 134:3 144:5, 15 147:12 149:14 151:17 157:9 158:4,11 160:5 164:19 166:21 167:22 170:22 178:7	180:14,15 183:4,14 187:20 188:5 194:25 195:6, 7,8 196:20 197:9 199:3 210:24 211:1, 4 212:5 213:14,25 214:24 216:4 217:6 218:4 219:14 220:7 222:10,17 223:4,6,19 226:17 229:19 231:18 232:10 234:8 239:21 242:14,15 245:3 247:21 front 80:3 249:3 fulfill 167:24 203:22 fulfills 178:5 full 19:25 126:3 142:4, 12 170:25 226:21 227:2, 6,8 full-fledged 179:7 fully 27:19 28:12 93:2,5, 11 function 27:22 28:17, 25 30:12,22, 25 192:22 231:15	functional 10:2 28:12 93:2,5,12 functions 233:9 further 20:14 130:15 174:2 228:4 Furthermore 228:9 future 59:19 116:8 118:5 119:25 120:5 121:12 fuzziness 219:1 fuzzy 215:23 216:6,14,19, 24 217:12,13, 20,23 218:7, 8,9,19,25 219:7,8,16, 19,24 220:1, 2,15,21 221:2,6,9,10, 12,15,22	58:10 77:4 113:7 124:11 159:15 161:16 166:5 176:16 177:8 197:1 226:19 252:21 generally 31:6 90:10 223:1 generate 186:15,25 generation 136:13 generic 182:2 206:4 get 17:11 31:10 35:19 36:16 40:14 56:23 57:13, 20 58:3,8 62:4 67:2 96:13 98:13 110:25 147:5 176:16,19 178:5 190:8 191:2 218:15, 21,22 219:4,6 220:8 234:12 gets 64:3 getting 59:20, 21 169:7 176:21 190:4 give 8:21 12:19,23 15:2 36:8,9,21 37:1 38:7 39:8 40:20 44:24 47:21, 25 53:2,21 61:10 82:18	144:11 146:13 147:3, 20,23 148:9, 10 152:1 161:4 163:10 168:4 171:2 176:18,23 191:2 197:22 211:22 217:8, 15,17 219:3 224:2 228:22, 23 231:9 234:9 241:12 251:5 given 176:25 gives 64:4 146:24 169:10 181:1 giving 171:10 218:3 248:16, 20,24 249:6 global 24:23 25:14,19,20, 22 26:10,12 27:7,10,19 28:7 29:15 30:6,9,12,17, 24 37:8 63:5 64:7 92:19 93:21 104:12 105:12,13,15, 24 106:5,7, 23,25 107:2, 4,6,9,12,15, 17,25 108:18 110:12,19 111:8 169:2 173:6,7,25 178:20 215:12 globally 25:7, 10
--	--	--	---	---

go 5:12 7:7 10:12,17 12:11 19:16, 25 20:14 21:7 22:5 23:11 34:19 37:15 40:24 41:2 52:16 57:18 60:16 64:15 67:4 69:25 81:25 82:7 84:14,19 88:24 90:6,24 91:2,25 101:3 102:9,24 105:2 116:14 119:16 124:4 126:21 128:13,25 133:11 142:1, 2,16 145:9 147:2 148:19 150:8 153:13, 16 154:1,8,25 155:15 157:14 158:20 162:17 163:24 164:13 170:19 171:15 177:18 179:22 180:12,14,23 182:2,12 186:4 187:23 188:18,19,23 193:3,16,19 197:21 201:22 203:3 206:2 209:23 211:6 213:2, 5,18 214:5	215:16,20 221:3 222:11 225:18 227:25 229:23 231:24 235:5, 14 236:24 237:15,22 238:15 239:22 243:2 245:4 249:8, 15 251:4,8 goes 19:23 20:21 27:15 53:2 119:25 121:1 138:8, 16 140:5 155:1 158:11, 25 164:18 197:15 207:23 228:9 250:11 going 5:13 7:7,17 12:23 35:15,16 40:24 41:2 44:6 47:25 49:5 54:6,13 57:11 58:5 71:9 75:14 82:6 84:21 91:25 93:9 114:20 115:2 116:21 131:22 144:20 148:9, 10 155:24 170:8 175:4 179:22 181:18 188:15 206:9 209:2,22,23 218:6,11	223:19 224:10 233:1 240:9 244:8 247:10 248:15 249:13 251:4, 13,14 252:20, 22 254:8 gone 14:13 good 5:6,7,24 22:18 44:7 55:25 56:4,6 60:3 114:3 134:24 137:2, 8 162:9 177:6,9 218:15 219:19,20,24 220:12,13,16, 17 Google 150:20 got 59:17 125:17 177:16 197:19 216:3 251:8,9 government 139:15 GPU 42:12 granularity 80:19 gray 192:3 great 61:17, 18 grew 134:14 GRM(K) 234:7 236:15 242:15,22	ground 209:1 group 70:6 89:25 90:3,4, 10,14,20,23 91:11 116:25 117:2 140:13 186:16 187:1, 18 193:23 194:7,11,17, 20,22,25 196:4,5,11, 16,19,20,22, 23,25 197:2, 8,10 198:6,7, 10,17,21,24 199:2,3,6,12, 15,16,20 200:13,15,21 201:4,6,14,25 202:21,24 203:21 208:11,12,13, 14 209:15,17 232:14 233:22 235:3, 10,11,12,16, 25 236:16,25 237:2,3 239:25 240:5, 10,12,13,15, 18,20,24 241:1,8,11, 13,14,15,16, 19,20,25 242:4,7,17, 20,22 244:1, 5,12 245:11, 21,25 246:1,4 247:12,15,17, 18 248:13 249:11,14,25 250:3,5,9,11, 12,16,20,22 251:1,17,22,	24 252:2,8,9 grouping 196:21 242:5, 6 groups 186:6, 8 187:8 193:23 194:14 200:4 237:1 242:22 243:4,9,12,24 244:3,10,14 grow 134:16, 19 grown 134:4 growth 132:24 133:23,25 134:12 136:2, 4 137:10,19 guarantee 203:23 241:12 guess 60:5 126:24 128:25 136:11,18 170:18 guy 219:11,14 guy's 140:2 guys 188:14
H				
HA 242:24				
HAK 234:20				
hand 7:7 40:24 75:14 209:22,24				

handcrafted 220:14	234:15	180:9,14	118:4,18	171:6 175:25
handle 135:13	help 168:1	183:4 186:18	121:11	185:1 196:15
Hang 101:21	helped 102:3	189:17,22,25	158:10 220:8	197:15
136:7	here 9:10	192:18	hold 10:21	199:15
happen	10:23 11:14	194:18 195:3,	13:25 123:25	200:12,20
156:17	15:8 17:6	17 197:15	207:6	201:4,6,8,14
182:23	19:8 20:8	199:18 205:1	home 6:3	202:11
happens	22:20 26:22	206:19,25	251:8	203:16
147:10,15	31:4 32:1	209:10,16,18	Homestead	209:17 213:8
162:2 178:24	33:13 36:16	211:9 213:7	6:3	215:7,8,10
happy 17:13	42:10 47:21	215:15	hook 153:9	220:20 221:1
31:13 45:10	48:6,9 56:14	220:25	hopefully	231:10
169:7 217:19	57:12,17	221:15	181:1	235:21 236:6
218:1	59:5,14	224:15 227:3,	horizon	239:25
hard 94:18	63:13,16 72:7	6 230:19	164:18	246:13
141:20	73:4 75:9	232:12 234:4,	Houh 90:3	however 27:6
having 5:3	79:2 80:2	6,14 235:4	hour 56:16	125:2 209:11
7:25 8:10,12,	81:5 85:8	239:6,24	155:24	HP 137:8
14 9:22	86:2,5,7,14,	250:10 253:2	how 8:25 9:2,	HTML 83:22
214:11	23 87:10,16	254:1	5,16,23 10:10	84:1,5,6
215:25	90:13 101:7	herein 158:23	29:3,6 35:20	140:20 159:9
216:16	104:2,25	high 45:7,8	36:17,23 37:5	160:6 165:9,
241:22 244:4,	105:22	61:5,6 62:8,	42:20,25 43:7	11 166:8
15	107:24	16 162:12	59:25 60:23	180:11,18
head 5:23	108:14,19	166:10	61:5,21 62:7,	183:16
7:11 40:1	109:2,7	176:14 178:3	15 63:7 64:3	184:10,19
74:25 97:11	110:14,20	high-quality	73:8,9 74:7,8	230:17
102:13	111:6 112:24,	167:4,18	79:2 82:3	huge 182:20
132:21	25 113:10,11	171:18,22	89:2 96:6	hundreds
137:20	122:2,11	172:8,16,19	104:15	143:12
193:12 194:4	126:13	173:12,18	107:18,20,22,	213:21
220:5 234:22	127:17	174:5,10,15,	23,25 108:2,	Hungary
243:8	128:12 129:5	21,24 175:3,	10 109:1,3	180:13,14,24,
header 20:15	135:18,25	11,14,17,21	110:24 111:8	25
heading	137:9,23	177:4,11,24	115:14,18	hurt 176:18
153:2	141:17 142:7	178:11	116:24	hyphen 203:4
heard 157:25	146:20 147:6,	higher 63:17	122:24 123:4	
heavily 180:9	16 153:18,23	highest 235:8	124:11 125:7	
	155:16 161:2	historical	126:12	
	165:15 166:4,	180:15	127:17 130:5	
	7 175:7	history 116:8		
	176:22			
	179:14,25			

idea 56:14 147:6 171:7 181:5 213:14 218:5,7 239:6	10,11,14,15, 20 154:16,23 155:3,9 172:24 195:20,22 196:10 203:5, 11,23 204:14 205:23,25 245:7,8 248:4,9	160:24,25 163:24 164:13 166:7, 8 167:12 168:17 169:8 174:1 178:24 179:4,7 182:17 184:5, 11 185:1,9 186:19 187:25 188:7 190:24 195:4, 10 196:20,21 198:25 199:8, 9 201:22 206:2,11 211:6 213:18 214:5 217:17 218:2,14,15, 20,21 219:2, 18,19,20,23 220:6,13,17, 22 221:3 222:21 223:15 224:20,24 225:6 226:18 228:15 229:18 232:12,18 234:12 235:5, 14,24 238:23 239:9 243:2 249:15 251:5	images 158:19 159:10 immediately 36:10 111:5 impact 104:12 implement 45:19,25 57:21 58:5,9 124:11,12 179:5,6,7 implementatio n 20:21 46:8 125:9 126:5 implementing 42:19,24 43:6,19 implements 178:25 implicitly 175:17 importance 27:19 29:16 30:4,5,6,8,9, 11,12,16,17, 22,24 39:19 105:12,14,15, 24 107:6,9 108:12,23 110:12,19 111:8 117:4 214:7,13 221:7,17,24 222:2 249:19 importancies 38:21 importancy 26:10,12 27:7 31:17 35:23 37:7,17 38:1,	17 63:3,4,5 64:6 93:17, 19,20,23 104:5 106:6, 11 107:14,15 108:6,17,18, 22 162:12 166:14,19 169:1,2,3,16 173:7 178:20, 21 215:11,12 217:3,4,10 important 10:3 25:12 31:16 32:1 42:16 58:15, 16,18 59:12 61:4 62:5,12 86:3,4 108:13 109:6,7,9,13, 21 111:25 166:4,7 171:9 172:15 174:2, 4 175:7 176:7,25 178:23 182:22 190:9 194:18 205:7 206:25 207:1 234:5 237:16 impossible 171:3,4 imprecise 215:24 216:15,25 impreciseness s 218:9 impression 135:10 impressive 168:25 175:15
ideal 239:9 ideas 125:1 identification 116:25 245:21 identified 124:6 245:12 identifies 31:21 245:17 identify 34:21 35:7,12 36:4 85:14 103:4, 7,10,19,23 104:18 125:12 129:14 173:12,19 176:10 177:7, 10 196:11,14 204:2,8 206:13 239:25 240:10 identifying 87:22 88:1,6, 7,9,19 89:5, 13,15,23 114:24 123:8, 9,11,16,19,21 124:3,5 126:3,18 127:16,19,20, 23,25 128:9, 11 129:6,9, 11,17,19,25 130:4,12,21, 24,25 131:2,	if 5:14 6:13 9:4 10:17 13:2,4,7 16:15,20 18:17,22 19:25 20:14 21:12 22:13, 16 23:1,2,21 24:5,7,21 25:6,20 28:22 29:4,12 33:16,18,20, 23 44:7,24 52:16 56:13, 16,23 59:19, 20 64:8 65:23 66:19 70:23 79:14,17 82:6 88:14 90:11 93:8 96:12 104:1,2 105:2,12 107:17 120:23 128:3 132:22 135:18 141:9 142:1,16 144:10 145:8 147:9 151:8, 15,16 153:1,4 154:8,14,25 155:11,24 156:2 158:20 159:18	IIC 104:24,25 105:19,21 106:14,23 IIC's 105:14, 22 IICS 105:25 illustrates 164:2	illustrates 164:2	

improve 45:8 61:14 62:22 63:9 140:8	56:2,15,23,24 57:13,20 58:3,8,16,20 59:19,22 63:11,16,25 64:9 65:18,23 66:15 68:4 69:14 70:22 72:7,12,15, 19,24 73:18, 19,20 74:7,8, 9 75:23 76:7, 12 77:4,19 78:19,20 79:2 80:9 81:4,5, 12,25 84:2 85:4,6,8,9,12, 18,21,23 86:7,15,21 87:5,16,18, 20,24 88:4,9 89:21 90:20, 23 91:10 92:16,23 93:1,4,10,11 94:4 95:14,21 96:6,16 97:11,23,24 98:22 99:8, 16,25 102:17 103:6,9,11, 21,22 104:2, 9,10,16,18, 23,25 105:4, 23 106:1,4,6, 15 107:18 108:6,10,13 110:4,13,14, 19,20,23 111:5,13,24 112:2,5 113:1,4,6,7, 21 114:23 115:17	116:24 117:6, 15,21 118:2 120:5 122:19, 22 124:11,24 125:13,25 129:13 131:1, 15,16 132:14, 16,22 133:1, 2,3,4,12 134:4,5 135:7,9 136:10,14 137:8,9,10, 14,19 139:10, 22 140:23 141:9 142:2 143:21 144:6, 15 147:8,10, 11,18 150:5 151:14 152:6, 9 153:16 155:16,23 157:23 158:1, 5,22 159:15, 18,19,25 160:9,17,20, 22 161:16,17, 23 162:3,19, 21 165:25 166:4,10,11, 18 167:24 168:7,17,22 169:6,16 170:13 171:14,17 173:12,18 174:20,24 175:2 176:16, 24 177:8,11 178:14,17,20 179:16,25 180:4,6,16 181:16,17 182:17 183:5	189:5,6 190:1,6,11, 18,21 191:19 193:14,22,23 194:7,10,13, 19 195:5,8, 12,18,19 196:5,10,13, 16,23 197:1, 4,8,15 198:16 199:12 200:12,13,15 201:13,24 202:7,9,21,24 203:10,21 204:6,7,22 205:8,9 206:4 208:13,23 209:6,7,11, 12,21 210:12 211:10,11,12 213:7,9,20 215:2 216:11, 13 217:1,7 218:19,25 219:2,21 220:9,20 222:22 223:2, 11,20,23 224:6 225:7 226:2,4,19, 23,24 227:4, 6,23 228:2, 10,19 229:4, 16 230:3,15 232:1,3,11, 18,20,22,24 233:16,18,20 234:14 235:16 237:4 239:6,18 240:4 241:2, 10 242:10 245:7 246:10,	15,17,23 247:25 248:1, 3,11 249:3,13 250:5,6,25 251:16,20 252:8,9,21 253:2,12,14, 18,19 inbox 189:6 210:18,19 213:3 214:14 215:7 incentive 16:23 17:2,5, 6 incentives 17:3,7 incident 147:14,15 include 55:16 119:12 164:14 190:13 225:6 includes 10:6 19:24 35:25 82:25 121:17 158:25 190:16 233:4 238:4 including 51:13 118:4 119:15,24 187:10 221:12 222:2 incorporate 63:7 72:4 increase 133:12 increased 213:8
--	---	---	---	--

increases 136:11	2,13 144:2 181:25 217:11 225:19 228:4 229:1,20,22	inter 23:2	106:20,22 108:14,22 111:1 116:21 142:2 145:5 147:21 162:10 166:13,15,18 172:10 176:2 178:19,21 219:1 231:13 235:9,15	157:23
increasing 32:25 33:3 225:20	informational 176:16	interacted 164:17	intrinsic 230:22,25 231:1,2,3,5,8, 11,15,21 233:21 235:25 236:2, 16 242:7,17	inventors 77:23
index 161:25	infrastructure 79:10 80:17	interaction 163:21 180:1, 3,17 181:19, 21 232:5,13, 14,19	introduce 31:16	involved 22:21 25:6 33:17 43:10 108:19 161:23 179:14
indexing 180:5	initial 27:24	interest 65:17,18 66:3 181:3 214:1 228:18 229:13,19	introduced 27:8 68:17, 20,25 142:18 152:6	involves 234:17
indicate 191:11,18	inoperable 156:19	interesting 141:7,8 144:24	introduction 132:22 133:1, 2 137:4,10, 15,16 141:10 146:14,16,17	ipad 55:22
indicates 201:23 211:13 251:17	input 27:14, 15 178:10	interests 69:16,22 70:4,15,21 150:24 152:13	invalid 13:10	IPR 77:19
indicating 10:23 120:21 157:21 228:11 230:3	inputs 178:11	internet 32:24 33:6,7,8,10 52:1 83:6 225:20	invention 12:16 13:5,21 62:5,13 204:22	IRC 105:20
indicia 253:11	inside 206:23	interperson 185:22,25	inventions 13:16 14:6	IRCS 105:15
individual 93:17,19 104:5 195:24 197:17,18 241:6	instance 99:25 164:13 195:24	interpret 170:15	inventor 75:21 78:1, 15,18,25	irrelevant 60:5,7 192:20
individuals 186:6,8,9 187:7,8 213:20	instead 180:24	interpretation 112:8,14,19 199:14	inventor's	issue 25:1,3 33:2 37:5 50:10 51:8,9, 18 52:8,12,15 72:17,18 131:8 141:11 155:12
industry 26:1	instructed 5:17	interviews 13:23		issued 149:16
influence 110:6	instruction 56:11,12	into 17:10 37:10 38:19 40:15 62:21 63:2,3,4 79:20 84:1 100:15 101:1		issues 34:7, 20 35:4,6
inform 102:3 112:8,14,19	instructs 34:16			it 5:15 6:13,14 9:5,10 10:1 11:8,9 12:23 13:3,4,8,9 14:8 16:17,20 18:23 19:24 20:1,21 21:12,25 22:1,4,5,7,22 23:20 24:7 26:25 28:23 29:11,20,21
information 15:24 22:11 23:2 32:24 132:13 138:1, 11,20 139:3 140:21 141:1,	integrated 84:12			
	intensity 230:11,20 231:19,21 235:8,16 241:7,8			
	intensity/ intrinsic 230:9			

30:19 31:19, 25 32:13 33:1,8,9 34:5, 9 37:7 38:13 39:22 40:3,5, 22 42:13,18, 23 43:16 44:8 46:11,25 47:13 48:5, 12,13 50:4,7, 23 51:13,25 52:23 53:2 54:17,25 55:5,25 56:6, 10,11,13,16 58:4,21,24 59:18,23 60:6,23,24 61:16,17 62:8,15 63:7, 9,13,14 64:19,24,25 65:20,24,25 66:10 69:19 70:11 72:9, 12,18 73:8 74:18 75:4,10 76:12 78:23 80:5,8 82:5, 12,14,15 83:4 84:1,2,18,19 87:7,8,23 88:8,15 90:11,15 91:4,15,21 92:2,3,8,9,11, 18 93:20,21 95:12 96:4, 12,20 97:21 99:3,4,9 101:9,17,18, 24 103:3,16 104:1,10,11 106:4,6	107:18 108:5, 12,14 109:11, 17,19 110:7, 10,24 111:7, 23 112:12 113:2,3,4,5,6 114:24 115:14 116:7 117:8 118:3, 14,16,25 119:7,11,13, 23,24 120:16 121:1,2,6,10, 11,13 122:9 124:10 125:7, 17 126:12 127:17 128:3 129:12,20,21 130:5,8,9,15 131:1,7,23 132:16,24 134:3 135:8, 13 136:11,12, 15 137:9 139:18,22 140:5,6,15, 21,25 141:6, 10,15,18 142:23 144:10 145:4, 9,21 146:24 147:10,11,21, 22 148:25 149:16 150:2 151:2,10,13, 21 152:12,17, 18,19 153:3, 16 155:1,10, 13 157:18 158:11,22,25 159:9,10,11, 16,20,25 160:5,6,7,8, 16,19,23,25	161:3,5,12, 13,18 162:3, 7,9,10 164:1, 5,13,18,24 165:9,11,16, 18,20 166:10, 11,12,21,25 167:3,13,20, 21,23 168:6, 8,11,19,25 169:1,13 171:2,9 173:9 175:18,21 176:2,13,14 177:6,17,20 178:3 179:7, 9,10,18 180:25 181:3, 4,15,17,18, 23,24 182:6, 10,13,22,25 184:8 186:5 187:16 188:19 189:5 190:3 192:11 193:8,21 194:6 195:5, 12,13 196:24 197:19 198:8, 11,12 199:21 200:3,10 201:2,8,18,19 202:5,10,22 203:22 204:20 205:3, 5,12,15,17, 18,24 206:3, 20,23 207:21, 24 208:22,23, 24 209:6,11 211:2,10,24 212:3 213:3, 7,19 214:9,22 215:8,22	216:13,23 219:6,8,10, 20,25 220:9, 10,18,21 221:6,11 222:1,19,20, 21,23,25 223:5,7,9,10 225:9,19 226:1,8,19 228:2,3,9 229:10 230:8 231:22 232:21,24 233:9 234:4, 25 235:4,9, 11,14,15 236:14 237:12,13 238:23 240:7, 9 241:3,12 243:4 244:20 245:17,24 246:13 247:1, 2,17,20,21,22 248:8,17 249:22 250:11 251:9 it's 5:22,24 9:9 10:2 16:15 27:3 28:16 29:18 31:7 33:15 44:9 60:4 62:5 63:24 65:17 66:2,3 79:12,15 80:2 84:8 86:4 91:16,19 93:4 94:25 115:18 120:17,21 123:2 124:4 127:19 132:3 135:2 139:17,	21 140:1,5,7, 16,17,18,19, 25 141:23,24 144:24 150:5, 6 151:10 153:4 157:13, 18 162:7 167:25 170:25 171:1, 3,4,6 176:15 179:5,25 182:1 184:6 185:7 189:5 200:6,10 201:2,3,13, 14,20 202:12, 14 206:20 208:19 210:2, 6,14,21 211:9 216:7,25 220:10 221:10 222:12 224:24 225:7 227:6,10,14, 19 231:11 237:11 241:7 246:10 253:18,19 item 159:3 180:2 181:10, 14,15,20,24, 25 182:4 items 13:6 159:1,3 160:1,12 163:21 164:7 180:6 182:6 187:13,18 234:25 iterations 28:6 232:6,9
--	---	---	---	--

its 50:7 154:16,22 155:2 234:13 itself 42:14 105:25 175:13 J January 11:3, 21 Java 137:23 job 121:14 John 190:12, 13,16 join 152:18 joined 250:7 jump 101:1 155:23 jumping 98:18 June 10:20 11:2,8,20,25 junk 32:9 44:24 176:18, 21 189:18,23, 25 190:2 just 5:15,21 12:23 26:22 29:13 31:5 34:15,19 35:4,15 36:14 37:15 40:15, 17 42:5 47:22 50:11 53:21, 25 54:11 57:11 69:13 75:1 82:18 84:17 85:3,4	87:10 88:20 90:9,13 95:2 97:23 99:24 113:19 114:21 122:1, 7 123:9,10, 13,14 125:5 126:15 146:15 147:17 152:1 153:15 155:16,23 156:7 162:17 166:23 168:15 169:9, 11 170:10 173:10,11 175:4,8 181:18 190:1 191:21,22 205:5 211:21 215:16 224:12 239:20 245:6 251:4 Justin 6:5,17 75:20 K keep 72:12, 14,19 91:25 95:5 181:24 182:18,19,22 249:1 kept 72:25 248:25 keyword 189:8 192:12 keywords 145:11,23 146:1 180:18	Khan 5:2,6 15:4 47:19 48:2 49:13 53:7,23 54:23 82:20 87:1,9 127:15 143:4 145:18 146:16 153:21 158:14 160:16 162:2 167:11 177:3 200:7 202:17 237:18 kicked 253:1 kind 108:14, 21 138:8,16 141:12 200:1 Kircher 11:19, 24 12:2 13:15,20,24 14:5 63:21,23 64:1,2,10 154:4,15,22 155:8,9 156:11,18 157:4 210:2, 11 211:6,15 212:21,24 213:5,6,19 214:5,10,25 215:2,6,14,21 217:2 220:21, 22 221:22 225:14 know 5:15,22 18:22 22:14 25:7,22 29:11 31:24 47:19 55:22 64:14 69:25 80:10 89:25 90:14	97:11 104:1, 24 109:11 111:23 123:4 136:19 139:11 147:12 148:11 156:13 158:6 161:12 162:22,23,24 174:13,14 185:1 198:13 216:20 218:10 252:14 knowledge 36:8 140:1,19 known 16:11, 13 193:14 knows 88:19 180:15 Krug 11:19,24 12:8 13:15, 20,24 14:5 63:21 72:2,3 73:5,7 75:4, 11 154:10 155:2,8,10 156:11,18 157:5 176:5 194:10 196:3 205:9 210:5,6 225:11,12,14, 15 226:13 227:2,9,17 228:14,16 229:4 230:19 231:4,7,8,24 235:21 236:4, 6,21 238:15 239:22,24 240:9,10	241:24 242:3, 19 L labeled 82:4 lack 45:17,23 134:17 141:12 Lane 6:3 language 28:23 159:15 192:12 223:3 237:13 languages 140:6 large 162:25 200:20 201:4, 6,8,14 219:22 220:2,4 226:3,14 larger 200:4, 16 219:17 239:11 last 8:9 16:18 25:4 78:23 89:10,11 102:25 121:7 149:2,10 150:14 164:16,17 213:18 230:5 233:16 latent 65:13 later 22:20 84:19 97:21 125:11,17,25 155:18,19 159:19 180:4 254:11
---	---	--	--	---

latest 65:12	226:8 252:25	8 59:19 60:6, 8,22,25 64:24 65:21 104:24 108:12 135:12 139:20 140:19 150:19 176:4 198:5,7 219:6 248:18	limited 47:4, 16,20 48:13, 20,22 49:1,19 98:21 99:5,17 100:2,12 102:17	listed 93:6
LATIFUR 5:2	let's 13:7 14:20 23:1 24:6,17 28:5 29:14 36:20 39:22 40:14 64:22 65:15 67:4 72:9 90:24 91:2 92:18,20 108:11 123:3, 9 126:21 147:7 155:15 157:8,14 158:7 162:17 176:4 180:10, 12,13 186:4 187:23 188:18,23 190:1,4 191:22 194:21 197:21 206:2 208:10 217:6 218:10,13 223:10,18,19 228:25 229:14 233:2 237:1,2 240:12 247:18,21 250:4,7,8	likes 65:18,20 152:19 228:15	limits 199:20	listing 17:11, 12 230:13
launches 228:25		liking 229:1	line 41:7,11 52:16,20 54:19 55:5 91:2 114:12, 15 126:1,23 128:15 148:20 150:10 193:3, 5,6,7,16 249:16	lists 75:20 210:13
lawsuit 7:4		limit 198:16	lines 104:21 115:9 116:15, 16,18 120:25 123:13 126:2, 6,22,24 128:14 129:10,24 130:3,11,16, 20,23 131:9, 13,19 148:19 150:8	little 9:6 14:7 16:3 29:14 44:12 47:2 48:18 49:4 68:9,12,18 69:2,14 70:7 122:12 142:2 146:18 153:16 155:25 159:15 177:2 214:1
learn 27:25 28:3 29:20		limitation 88:9 89:4,14, 23 114:21 115:3,4 123:8,10,11, 16,22 124:5 126:3,18 129:17,19,25 130:4,12,21, 24 131:2,10, 14,20 154:6, 16,23 155:3,9 171:17,21 172:5 174:20, 24 175:2 178:25 201:23 245:8 246:15,17,23 248:4,8,9 251:16	link 152:20	local 24:24 25:7,13,19,23 26:9,12 27:7, 9,18 28:6 29:16 30:4,6, 8,11,16,21 37:8 64:7 92:19 93:16, 18,19,22,23 104:10,11 106:20 107:14,16 108:12,17,22, 25 109:1,25 111:8 169:1,2 173:4,6,25 215:11
learned 220:15		limitations 154:12 172:7 174:4,14 177:11 191:10,16,18 203:11	linked 107:1,2 189:10	log 17:10 56:15 181:17
least 20:18,20 21:18 31:21 77:25 85:14 89:5,15 91:10 124:6 146:14 245:8,15			Linkedin 150:19	logging 40:15
left 82:1 251:7			links 189:8	logic 215:23 216:6,14,19, 20,24 217:12, 13,20,23
legitimate 167:12	level 9:9,12 20:15 166:11 183:15,17 184:18 197:4		list 31:12 36:8,12 38:7 39:8 44:22,23 56:15,16 59:22 143:11, 12 217:7	
length 155:1	lies 37:5			
less 45:13 226:5 228:15	life 16:12 17:21 140:3 219:21			
let 5:15 14:8 15:2 16:3 21:10 39:14 47:6 53:21 59:8 64:11 68:24 80:10 90:24 112:24 115:16 123:25 125:20,23 141:15 144:10 145:16 153:9 156:7 165:16 166:21 177:2 186:11 187:24 189:13 205:17 207:6	like 18:16,20 19:1,13 44:5,			

218:7,8,9,17, 19,25 219:7, 8,16,19,24 220:1,2,15,21 221:9,10,12, 15,22 logistics 254:11 long 23:4 28:25 33:16 55:25 57:25 100:10 139:10 141:15 151:16 183:24 184:6, 24 long-term 17:14 look 14:20 46:21 47:6 48:15,16 49:4 62:7,15 66:20,21 67:8,12,15 85:19 99:17, 19 100:11 102:9,18,25 105:13 108:11 111:12,13,18, 19 120:23 130:14 132:22 137:4 141:9 145:8 150:14 154:14 157:14 158:7 162:16 186:19 191:7 201:24 206:2 209:7 220:22	226:18 238:23 253:1 looked 49:6,9 100:14,15 looking 49:10 79:23 96:25 97:1,6,25 98:3,5,9,10, 16 100:15 101:10,13 119:22 145:13 163:12 166:8 168:9 171:5 178:7 180:12, 13 189:25 247:20 looks 221:11 loop 108:19, 21 lot 22:9,21 44:4 110:9 134:14 141:25 148:7 176:18,21 178:18 179:8, 13 180:16,17 197:24 224:1 Lotfi 219:9 loudly 145:3 low 61:6 176:20 214:1 lower 198:16 lunch 114:4 M machines 57:7	made 95:7 254:5 mail 52:18,24 53:10,16 54:14 55:6,13 57:22 58:10 74:7 115:14, 18 116:3,4 117:15,16,21, 22,25 118:3, 4,12,15,21,23 119:4,5,11, 13,14,17,20, 21,23 120:1, 10,16,20,24 121:1,17 122:3,8 249:22 main 56:10 153:1 160:10 181:5 218:5,7 mainstream 147:11 maintain 72:24 maintained 73:3 major 142:3, 11 162:19,21 make 5:19 10:1 16:3 40:17 44:23 56:24 57:2 70:8 90:24 92:22 103:14 150:22 152:12 195:3 209:20 245:6 make-- 124:15 makes 141:20	176:14 199:9 making 44:15 47:22 109:6,8 132:24 171:7 manage 215:7 management 227:18 manages 227:21 many 9:25 10:1 16:16 17:15 54:8 60:23 85:21 125:10 134:5, 13 135:4,5 140:7 200:13 213:24 215:10 219:23 231:19 mark 131:22 marked 7:9 40:25 75:15 132:1 136:22 141:4 144:23 148:13 157:11 209:23,24 Markush 89:25 90:3,4, 10,14,19,23 Marston 6:5, 10,17,20,22, 25 75:21 81:5,12,17 Marston's 6:8 match 226:6, 15 math 22:18,21	103:6,9,19, 22,25 104:14, 18 105:4 mathematical 63:6 215:24 216:15 matter 8:1,5, 11,15,19,24 9:12 10:6 75:4,10 184:11 matters 209:10 maximum 198:9 maybe 68:9 97:16 168:5 194:25 247:17 me 5:15 6:12 8:21 12:19,23 14:8 15:2 16:3 19:4,6 21:10 26:5 32:15 36:21 42:2 47:6,21, 25 49:23 51:7 53:21 58:20 64:11 68:24 77:4 80:10 82:18 84:16 90:12,24 97:2,6,21 99:13 100:21 103:18 112:24 115:16 125:20,23 135:19 141:15 144:10,11 145:16
---	---	--	---	---

146:13 150:25 152:1 156:7 165:16 166:21 168:17 171:2, 17 174:1 177:2 186:11 189:13 191:10,15,17 201:23 205:17 207:6 211:22 213:10 226:8 244:18 252:25 mean 6:9 9:13 14:14 15:22 21:23,25 29:13 48:2 54:8 56:22 59:24 61:3 62:1 64:13 69:6 86:20 87:8 88:8 90:2 93:9,14 99:24 101:19 106:16 109:19 114:2 118:14 119:20 120:23 158:18 170:12 178:15 194:7 198:1 203:9 206:8 208:6 219:25 224:15 232:8, 19 247:6 253:1,9 meaning 85:11 86:1,6, 14,18,23	87:5,15,22,25 88:6 89:22 90:4 170:17 202:18 means 23:1 33:8 42:11 44:3,4,11 51:17 52:7 55:21,24 60:23 70:23 72:24 78:7 87:13 92:15 97:15 113:3 119:2 120:6 131:15 158:18 168:15 170:14 172:4, 9 173:5 203:18 213:14 232:13 meant 12:25 19:21 22:7,25 224:4 measure 91:5,9 94:23 172:13,17,18 175:6,7,10, 13,16 177:19, 24 179:1 221:7 226:2 measurement 114:13,22 115:4 122:24 123:5 measurement s 238:24 239:16 measures 91:11,16,17, 22 92:3,9	93:6 95:8,16, 23 96:7,17 193:24 194:9 196:16 220:22 239:19 mechanism 58:25 63:1 173:22,23 175:22,23 177:20 178:4, 14 229:21 media 132:23 135:1,6,9 136:18,19,21 139:22 147:7, 11,16 medium 41:8, 14,22 219:22 220:10 memory 56:12 mention 9:16 26:21,22 29:5 47:21 48:10 74:8 85:23 113:11 130:1 159:16 166:10,11 183:7 192:17 227:5 246:11 247:3 mentioned 9:22 10:5 17:4 23:16 26:9 27:9 29:15 43:9 50:3,19 51:1 58:25 63:13 85:8,21,23 99:8 120:8 122:2 140:13	165:15 179:17 208:23 223:23 242:16 mentioning 122:12 message 26:11 31:9, 17,22 32:3 33:23 72:8,9, 10,15,19 73:1 103:15 116:7 118:16,18,21 119:8,10,15 121:23,25 124:20 125:16 127:23 129:22 131:12 146:5, 10,23,24 151:7,15,16 152:19 162:13 173:2 176:12 203:20,25 204:10 207:18 208:5 209:13 211:12 213:8 214:23 217:6 221:24 222:19,21 224:3 228:10, 14,17,20 229:5,9,11 messages 31:10 33:6 34:3,9,22,23 35:8,9,12,13, 20,21 36:4,5, 17,18,21,24	37:2,3 38:8 39:1,2,9,17 40:22 51:22 60:24 64:4 72:8 73:6 76:14 77:1,10 79:10 118:18 119:24 120:6, 8 121:24 126:15 134:3, 5 136:9,11,16 139:21 145:10,23,25 146:1,22 147:4 148:1 153:2,5 159:2,12 160:2,8,13, 17,20,23 161:7,11,19 162:3 169:8 178:14 185:4, 10 190:2,4,5, 8 191:3 203:18 210:13 213:21,24,25 214:6,7,11,12 messaging 8:25 10:6,10 17:8 31:8 40:16 46:3 51:21 63:24 64:1 72:14 76:13,18,25 80:5,16 81:17,23 83:10,16,20 118:19 135:20 139:20 152:9 169:5 198:11 214:23
--	--	--	---	--

met 209:21	145:10,22,25	186:18,20,22, 25 187:17 192:2	87:23 88:3 91:11,16 92:5,11,19,24 96:23 99:3 104:9 116:2 117:1 130:22 134:5 136:12 139:12 140:12 142:2 147:3,7,8,23 148:6 152:6 153:17 156:21 164:6, 7 167:25 174:3 176:23 177:7 181:1 183:16 189:18,23 200:24 201:10 202:22 206:4, 8,18,20 207:20 226:5 227:19 240:7 246:21 251:5, 14	motivation 14:24 15:11 16:22 17:4 motivations 15:25 17:10 move 251:15 moved 62:1 movie 64:23, 25 65:2,19, 21,22,25 66:2,21,22 67:9,12 movies 64:19, 21,22 65:18 mr 5:5 6:8,10, 20,22,24 7:12,17,21,24 9:11,18,21 10:23,25 12:5,8 16:21 18:21,24 19:18,19,21 20:23,24,25 21:2,3,6,11, 12,16 23:7,12 24:17,19 26:2 27:3,9 28:18, 21 29:13 30:13,15,18, 21 32:11,14, 16 33:4,12 34:4,6,11,14, 15,24 35:2, 10,14 37:20, 22 38:6,10,24 39:2,4,7,20, 22 40:11 42:3 43:14,18,22 44:1,14,16 45:5,14,17, 20,23 46:1,7, 9,11,16,19
Meta 254:6	minute 12:19 15:2 52:20 211:22	models 117:3 186:5,15 187:3		
metadata 118:24 119:1, 2,3,12 121:17,25 122:11,13,17 180:10 182:20	minutes 8:21 12:24 48:1 55:3 82:18 102:10,12 144:11 146:13,16 251:5 253:2	moderate 198:12		
method 194:15 214:6 226:21	mis- 178:1	module 83:1, 5 85:3 114:14,23 115:4 122:24 123:5		
methods 69:5,6 92:15 117:3 158:23 194:2 201:1	missing 64:9 194:18	modules 41:9,15,23,25 52:19,25 53:11,17 54:15 55:7,14		
metrics 39:19 195:7,13 197:7	mission 56:18,20	monitor 163:17,20 164:5		
misstate 120:3	misstates 83:12 94:7 99:2 172:21 183:21 184:3	monitored 180:2 181:19, 21		
microbloggin g 137:24	modalities 179:12	monitoring 85:13 114:14, 23 164:10,11 165:2	morning 5:6,7	
Microsoft 83:6 157:16, 17,19 158:2, 4,5 162:18, 19,21 163:3, 4,9 165:6 171:1	model 65:13 72:4,5,6,18, 24 73:11,15, 19,21 74:4,5, 8,11,14,18, 19,20,24 75:5,11 76:13,19,25 77:10 78:12, 18,20 79:1,2, 8,11,13,20,21 80:14 81:1,4, 11,18,23 83:21 85:13 97:17,18 152:9 155:12	more 9:20 13:17 14:2 16:6 18:17,23 28:3 31:13 33:1 35:1 42:23 43:16 44:21 45:22 50:23 57:25 62:11,22 65:10 69:14, 19 70:11 74:1 77:17 78:23 79:6 81:9	most 111:25 132:24 143:13 174:1 176:25 182:22 195:13 198:4, 5 249:24	
middle 10:17, 21,22 141:9 233:15	million 248:22		mostly 161:1 166:5 195:15	
millions 46:6 199:8	mind 18:17 128:3 144:10 155:24		motivate 15:16,20 16:1	
mining 22:10 23:3 141:11			motivated 16:4,7,10 81:4,11 156:10 157:4	

47:18,19,23 48:2,8,11,14, 16,21,24 49:2,6,20 50:11,14,17, 21,24 51:4, 16,19 52:3,9, 14 53:13,15, 19 55:18 56:2,7,24 57:4,11,23 58:2,11,23 59:4,6,9,12, 15,25 60:2, 10,13,15,18, 20,25 61:7, 15,20,21 62:9,12,17 63:15,18 64:11 65:18, 19 66:8,11, 14,17,23,24, 25 67:4,13, 17,19,21 68:3 69:10,13,17, 20,23 70:2,5, 8,9,13,16,20 71:21,25 73:23 74:3, 21,25 75:6, 10,12,14 76:3,6,20,22 77:16,18,21, 24 78:21,24 79:4,7 81:7, 10,14,16 83:2,4,12,15 86:7,9,12 88:2,4,11,13, 14,17,22 91:24 92:1,4, 7,10,12 93:7, 9,15,24 94:1, 5,7,14,15,17,	22 95:17,21, 24 96:3,9,15, 18,22 97:10, 13 98:1,6,14, 19 99:1,4,12, 15,18,21 100:4,7,13, 17,19,23,25 101:3,5,12, 15,18,21 102:3,5,7,11, 13,19,24 105:6,7,9 106:2,7 108:16,20,24 109:3,15,19, 22 110:12,15, 18,22 111:11, 16,19 112:3, 7,10,13,15, 18,20,23 114:3,8 116:12,14,16, 17,19 117:17, 20,23 118:2, 6,9,13,23 119:19,22 120:3,9,11, 15,18,21 121:4,8 122:5,13,15, 18,25 123:3, 23 124:1,4 126:8,14,19, 21 127:7,9, 10,12,13,15 128:1,4,8,17, 20,22,24 129:1,3 131:24 132:2, 6 134:17,20, 21,23,25 135:14,16,22 136:6,17	137:14,18 138:12,16,21, 24 139:5,7 141:14,17 142:6,8,14,16 144:8,14,17, 20,22,25 146:6,10,12, 15 148:2,7, 21,23,24,25 149:7,9,11, 14,20,23 150:1,4,8,12, 14,16,18 151:5,13,25 152:11,15,22, 24 153:6 154:17,18,21 155:23 156:1, 2 157:8,10 159:24 160:14,16 161:20 162:1 164:22,25 165:23,24 166:20,23 167:5,7,9,11, 19 168:10,13, 16 169:22,24 170:4,6 171:19,22,24 172:2,3,21 173:10,14,16, 20 174:3,6,9, 12 175:4,10, 12,16,19,25 177:13,16,23 178:1,6,12,16 179:2,15 181:9,11,13 182:3,9,11, 16,24 183:2, 5,10,19,21,23 184:1,3,9,13,	17,23 185:1, 3,6,8,12 186:1,4,17,19 187:19,22,24 188:1,5,8,9, 10,11,12,15, 16,18,21,23 189:20,22 191:13,17,20, 22,25 192:4 196:12,15,18 197:11 198:18,25 200:14,17,22 201:3,5,7,10, 16,22 202:1, 6,25 203:3 204:20,23,25 207:13,15 208:9,15,17, 19,21,24,25 209:2,9 210:25 211:1, 7,8,9 218:6 219:16 222:8, 11 224:9,10, 12,14,17,19, 24 233:1 242:19,21,24 244:25 245:4, 23 246:2,19, 22,25 247:7, 10,13,15 248:5,8,10, 12,14,15,17, 19,20,23,25 249:2,5,6,10, 12,15 250:17, 19,21,23 251:2,4,6,7,8, 9,13,19,23 252:4,8,13, 15,17,20 253:15,17,18,	20,21 254:8, 13 much 49:25 110:5,6,11 155:19 214:11 217:20 231:10 multi- dimensional 239:7 multi- processor 53:4 multi-variant 233:7 multiple 18:15,19,25 19:12,24 25:11 28:23 50:2,19 51:1 65:7 72:14 75:9 92:15 99:8 125:9 158:9,17,18 159:8,17 179:10 198:23 206:12 215:25 216:16 221:16,17 227:4,8 233:9,10,20 234:4,8 multiple- variable 234:2 my 5:14 7:20 10:18,24,25 11:9,12,18 13:2 14:15
---	--	--	--	--

18:2 20:3,16 21:10,17,22 22:19 38:9 39:9 41:19 43:5 44:12 47:10 48:11, 25 49:15 50:8 51:25 52:14 54:23 55:5 61:3 63:12 78:4,5 97:11 98:7 99:15,24 102:17 109:17 113:16,19 119:16 125:20,23 126:10 127:15 130:2 135:25 137:7 141:8 144:11, 24 153:8,11 156:20 161:22 166:21 169:16 170:18 171:10 182:24 199:14 205:10 207:6 215:16 218:6 231:4 244:19, 20 247:11 myself 115:24 145:3 N name 143:10 named 75:21 narrow 38:11	necessarily 10:2 16:16 18:8,12 55:22 94:2 95:1 185:23,25 197:13 247:1 necessary 27:21 28:16 29:19 57:21 58:4,9 59:5, 13 need 5:21 8:24 9:16,23 25:6,7,9,10, 13,22 26:11, 16 27:18 30:11,21,24 37:3 38:13 39:5 42:20,25 43:6 44:23 56:3,6 57:1, 12,19 58:2,8 69:25 79:20 80:19 84:18 88:12 93:2,5, 12,25 94:6 96:1,16 97:8 103:14 104:23 111:25 113:10,16 124:20 142:10 176:11 178:11 179:9 182:21 188:7 199:15 200:19,24 201:10,24 202:21 203:17,19 204:10,11,18 206:22 207:2,	9,14,16,17,18 218:4 229:15 253:4 needed 99:17 needs 17:9 28:24 32:2,4 37:2 44:7 50:1,18,25 56:10 92:12 99:7 103:11, 12 125:15 172:25 173:1 174:2 187:25 190:3 203:19 204:1,8,21 205:4,7,13, 16,25 206:16 209:11 neighboring 54:12 neither 209:14 Nepal 147:10 Netflix 64:15, 17,20 66:19 67:4,8 networking 150:19 networks 132:14 149:1 neutralized 28:2 never 215:14 new 36:11 64:25 65:19, 24 147:13 150:22 152:12,20 news 136:14	145:14 next 10:15,17 19:24 64:25 80:16,22 130:14 131:22 142:1, 17 154:8 163:14 182:10 235:6 nice 195:5 nicely 124:14 197:7 no 5:11 6:7, 10,18,21,23 7:1,5,6,13 12:6 14:19 15:24 19:4,14 23:20 28:19, 20 42:12 46:10 47:11 48:6,9,12,22 50:16 54:11, 24 68:5 75:3 76:4,17,18 77:24,25 78:4 79:9 83:21,23 86:3,16,24,25 87:3 90:3,5, 11,21 93:8 94:2,24 95:4, 10 96:1 97:6 98:2,9,16 99:19 100:20 101:2,17,20 102:6,7,8 107:1 109:10 110:23 112:6, 24 113:13 114:2 115:23 118:25 119:5 126:13 129:20 131:7	132:5 138:24 142:21 146:17 150:25 155:20 160:3 162:24 164:23 165:12,13,25 166:2,16 167:20 170:21,23,24 171:3 172:13 173:15,16,21 174:20,23 175:1,13,18 177:5 179:20 182:2 183:22 185:19 187:21 188:1, 9,12,16 189:25 190:24 192:8, 12 199:21 200:24 202:4, 6,15 203:2, 15,22 208:4, 18 209:6,7,16 212:12 213:10 220:24 223:6, 15 225:14 236:12 237:10,18,20 242:10 244:6, 8,17,19 246:6,7,8 247:17 248:13,17 249:13 252:1, 5 253:1,10 254:4,7 nobody 140:21
--	---	---	---	--

nod 5:23	78:4 79:8,12, 15 83:20	166:7,12	note 209:3	13,16 199:12
Nods 7:11	85:5,7,22,25	167:11,12,17	248:15 254:8	200:2,3,4,15
40:1 74:25	86:5,10,12,	168:22	noted 130:15	202:21,23
102:13	17,20 87:1,4,	169:16	nothing 59:2	206:24
132:21	14,21,24 88:5	170:17,25	65:16 66:3	220:21
137:20	89:3,21	171:1,2 174:3	noticed 18:3	221:20 222:1
193:12 194:4	90:11,21	176:3 177:4,5	noting 137:25	226:3,14,23
220:5 234:22	91:16 92:17,	178:3 179:5,	now 23:20,24	230:13 232:6,
243:8	21,22 93:8	15 181:15	25:19 37:2	8 233:4
noisy 141:19	94:2,9,24,25	182:1,21	38:12 43:24	240:19
220:10	95:4,15,22	183:4,15	60:16 65:12,	245:17 247:9,
nonobviousne	97:18 98:2	184:18	24 84:18	10 249:14
ss 253:11	100:22 101:1	185:21,23,24	90:15 107:4	252:10,11,19
nonresponsiv	102:4,20	190:6,25	114:3 116:2	numbering
e 205:10	109:1,5,6,8	191:2,16	117:6 131:4	211:12
nonverbal	110:5,10	192:17	135:2 136:11	numbers
248:16	112:17,18	193:23 194:8	137:7 141:6	113:2,8
not 5:17 9:9	113:1,20	195:18 196:7,	153:9 154:17	168:15,20
10:2 11:6,15	118:21,24	23 197:12	158:5 187:20	200:25
13:23 16:16	119:4,11	198:7,12,14,	191:23 222:9	201:11
18:4,8,12	120:10,13,16	15,22 199:17,	248:23 249:2,	numeric
20:8,11 26:25	125:4 126:3,	21 200:11	6,17	221:23
27:3,24 28:1,	17 127:19,25	201:2,3,9,13,	nowadays	numerical
24 29:9,19	128:8,11,12	14 202:12,14	23:22 84:10,	211:10,16
30:1,14,15	129:23,25	204:13,19	12,13 97:14	
33:15 34:10,	130:2,8,11	205:5 206:25	139:12	O
16 42:18	131:9,13,19	208:2,4,19	nowhere	oath 68:21
44:25 45:1	133:20	209:9,18	49:13	102:15
46:5,10,14	136:20	213:19	NS 215:10	object 5:17
47:19,22	139:10,20,23	216:24	number 34:3,	33:18 35:10
48:9,13,22	140:5,19,25	217:20,22,23,	8,22 35:8	80:6 110:1
49:25 50:9,16	141:23	25 218:7,21,	51:21 85:2	136:6 151:25
51:9,17 52:3,	147:10,16,18	22 219:5,24,	89:10 132:1	159:9 166:5
7,11,15 54:9,	148:9 151:17	25 220:9,18	133:13 135:5	175:4 177:8
11 55:21	152:10 153:5	223:2 225:2	136:22 141:4	228:4,10,12,
56:16 58:24	154:5,11,16,	226:5 236:12	143:14	17,20,24
59:21,23	23 155:3,6,8,	237:11	144:23	229:4 230:23
61:17 63:13,	9,10 156:10	239:10 242:2	148:13	231:5,21
14,24 64:5,7	157:4,6	244:6,7 246:9	173:23	232:2,4
65:4 66:2	160:3,10	247:1 248:20	196:13 198:9,	233:14,16
72:3 73:5,7	161:13 162:1,	249:13 250:9		234:5,7,9,21,
74:13,24 75:8	9,12 165:6,	251:10,21		
	12,13,14	253:10,18,19,		
		22 254:5		

23 236:1 238:20 239:5, 7,8 240:1,5,6, 11,14,15,21 241:15 242:18 244:11,16 objected 138:23 objection 9:18 18:21 28:18 30:13, 18 32:11 33:4 34:4,11,24 37:20 38:6,24 39:4,20 40:11 43:14,22 44:16 45:14, 20 46:1,9,16 47:18,23 48:14,21 49:2,20 50:14,21 51:4,19 52:9 53:13,19 55:18 56:7 57:4,23 58:11,23 59:6,9,15 60:2,13,15,20 61:7,20 62:9, 17 63:18 66:8,14,23,25 67:13,19 69:10,17,23 70:9,16 73:23,24 74:21 75:6,12 77:16,21 78:21 79:4 81:7,14 83:2, 12,13 88:2,11 91:24 92:4,10	93:7,15 94:1, 7,17 95:17,24 96:9,18 97:10 98:1,14 99:1, 12,18 100:4, 13,19,25 101:5,15,22 102:5,11,19 108:16,24 109:15,22 110:15,22 111:16 112:3, 10,15,20 117:17,23 118:6,13 119:19 120:3, 11,18 121:4 122:5,15,25 123:23 124:1 126:8,19 128:1 134:17, 21 135:16 136:8 138:21 139:5 141:14 142:6,14 144:8,17 146:6 148:2 149:7,11,21 151:5 152:2, 15,24 160:14, 15 161:20 165:23 166:20 167:5, 9,19 168:13 169:22 170:4 171:19,24 172:21 173:14,20 174:6 175:12, 19,20 177:13 178:1,12 179:2 181:11 182:9,16 183:2,10,21,	23 184:3,13, 23 185:3,8 186:1,17 187:19 188:3 189:20 191:13,20,25 196:12,18 198:18 200:14,22 201:5,16 202:1,25 204:23 207:13 208:9, 17 209:2 224:11,19 242:21 245:23 246:19,25 247:7,13 248:5,10,14, 19,21,24 249:7,12 250:17,21 251:2,19 252:4,13,17 objections 35:11 70:5 146:12 150:4 objective 135:18 183:15,16 184:10,19 253:11 objects 72:4 73:10 74:7 167:23 168:9 177:8 227:12 228:16 230:14,20 235:16 observation 18:2 22:19	221:18 observes 164:6 165:2 observing 164:14 obstacle 45:18,24 obvious 8:6 10:24 89:4 154:5,11 200:3 obviousness 10:18 11:1,18 12:15 14:22 15:9 20:12 of 5:12,14 6:6, 15 7:8,24 8:4, 7 9:5,7,12 10:9,12,17 11:13,16 12:9,11,14, 22,24 13:11, 14,19 14:4, 17,21,22,24 15:10,16,19, 20,22,23,25 16:1,4,7,10, 22,23 17:7, 10,18,22,24 18:7,11,14, 15,16,18,19, 20,25 19:1,8, 12,13,16 20:2,6,7,10, 12,15,17,20 21:17,18,22, 23,24 22:5,8, 9,21,25 23:12,13,17 25:17 26:12 27:8,25 28:6, 16,24,25	29:5,19,22,25 30:1,9 31:10, 21,22 32:2,3, 8,20,21,24 33:3 34:3,6,8, 20,22 35:2,6, 8,18 37:10 38:12,25 39:2,5,17 40:6 42:14, 16,18,19,24 43:5,12,18,19 44:4,5,19,21 45:2,3,17,18, 23,24 46:6,13 47:11 51:17, 21 52:7,18, 24,25 53:2, 11,12,16,17, 24 54:14,15 55:7,14,15 56:15 57:6,8, 17,20 58:4,14 59:22,24 60:1,11,19, 21,22,24,25 61:4,6,10,13 62:4,5,6,8,13, 15 63:5,7,8,9, 10,11,17,22 64:1,2,4,10 66:3,19,21,22 67:7,11,12 68:6 69:8,16, 21,22 70:3,4, 6,14,15,21 71:2,3,6,7,9, 10,11,13,15, 16 72:1,14 73:12,15,16, 19 74:7,10,13 76:14,23,24 77:1,14,20,25 79:6,7,10,25
--	---	--	--	--

80:2,13,25	15,25 127:16,	17,19,25	18,21,24	15,17,23
81:3,5,10,13	19,23,25	173:2,23	214:1,11,15,	250:3,7,16,
82:7,24 83:9,	128:9,11	174:16 175:6,	18,21,24	20,22 251:1,
15,23 84:9,	129:4,6,11,	7,9,10,13,16	215:5,12,17,	18,22,24
22,24 85:2,3,	15,17,19	176:11,18,21	22 216:13	252:2,6,10,11
10,11,14,15	130:3,6,12,	177:10,19,24	217:5,24	253:2,11
86:1,6,14,18,	14,21,24	178:18,24,25	218:5,7,17	254:5,6
23 87:5,15,22	131:10,14,20	179:1,4,6,8	219:1 220:8,	off 21:11,13
88:1,6,24,25	132:10,12	180:3,6,16,	22 221:2,10,	146:22 153:9
89:2,4,5,6,9,	133:13,19,23,	17,19,24	19,24 222:1,	188:18,19,22
15,16,22	25 134:17	181:9,13	2,3,12,14,18	235:2 249:8,9
90:4,6,19	135:2,9,11,14	182:3,6,13,	223:2 224:1,	254:5,12
91:5,9,10,12,	136:4,18	17,18,19,20,	4,17,21,22	officials
17,21 92:3,9,	137:9 138:8,	22,25 183:5,	225:3,4,6,7,	139:15
21 93:3,6,12,	9,16,17	20 184:10,11,	12,14,19	often 66:6,12
13,25 94:6,	139:1,4,14,	18,19 186:4,	226:1,3,4,5,	141:19 226:2
10,11,25	15,24 140:1,	6,8,9,16	13,14,18,21,	old 132:10
95:2,4,5,8,11,	8,16,18	187:1,7,8,13,	23,24 227:19	on 10:17,21
14,15,19,21,	141:12,25	18 188:23	228:5,15,17	11:8 12:2
23 96:2,3,6,7,	142:3,5,11,13	189:10,18,23	229:4,16	14:22 15:9
11,15,17	143:12,14	191:7 192:7,	230:13,14,20,	19:22,23,25
97:24 100:22	144:2 145:2	22 193:3	23 231:5,16	20:16,21
102:24,25	146:4,10,18,	195:2 196:3,	232:5,6,8	21:7,17
104:22 105:3,	22 147:14,25	5,11,13,22	233:4,18,22	22:12,23
13 106:5	148:7,10,12,	197:4,24	234:7,9,17,	31:12 32:24
107:20	17 149:17	198:6,9,10,16	20,23,25	33:13,15
108:14,21	150:1 151:1,	199:8,12,20,	235:2,3,9,10,	36:8,11 37:7,
109:17,20,25	16 152:5,8,9,	23 200:2,3,4,	16,17,25	8,9 40:22
110:1,9	22 153:15	12,15,19	236:3,6,14,18	41:3,24 42:13
111:2,11,12	155:8 156:10	201:1,19,25	237:3,4	43:20 44:15,
112:2,8,14,19	157:1,14,22,	202:4,7,11,	238:12,15,20,	24 46:4,7,11
113:4,21	23,25 158:1,	18,21,23	23,24 239:18,	47:8,11 48:19
115:17 116:3,	7,10,19,20,	203:3,5,6,11,	22,24,25	51:14,21,23
25 117:1,4	22,24 160:10	13,24 204:21	240:4,19	52:25 53:2,
118:3,15,17,	161:14,17	205:4,6,13,	241:11,17,22,	12,17 54:15
18,21 119:1,	162:7,16	15,16,23,25	23 242:19	55:7,15 57:1,
4,7,9,10,15,	163:24,25	206:3,14,24	243:17,18,21,	5,22 58:10
20,23,24	164:17	207:21,24	24 244:1	59:18 61:11
120:20	165:25 166:2	208:13	245:6,8,9,11,	63:8,22,24
121:20	167:13 168:1,	209:14	15,17,18,21	64:2 65:17
122:10,11,17,	7,11,17	210:11,14	246:4 247:9,	66:2 71:2,6,
20,23 123:10,	169:14,20	211:6,9,13,	12,15,17,19	10,15 72:16
15,17 124:6,	170:2 171:13	15,18 212:4,	248:4,9,13	
20 125:1,12,	172:9,13,14,	6,21 213:5,	249:3,11,14,	

73:2 78:25 79:8 80:3 82:1 87:1,5 89:2,22 90:19 91:11 93:16, 19,20,21,22 96:20 97:2,3 98:8 100:16 101:21 102:9 104:12,13 105:23 106:18 108:5, 14 109:11,19 114:22 116:22 117:15 118:17,20,24 119:25 121:2, 10 122:8,9 123:9,25 126:4 132:25 133:11 135:8 136:7,9 137:6 139:15 140:5, 21 141:1 142:16 143:10 146:23 148:22 150:23 152:13 153:19,23 154:16,22 155:1,2 158:9,11,25 160:7 161:1, 3,24,25 164:18 166:5 168:21 169:2, 3,9,11 171:10,11 172:11 173:5, 23 176:5 177:8 179:12	180:10,24 181:3 182:7, 14 183:1,9,20 184:18 185:15,17 187:7,12,18 189:7 190:8, 19,20 191:22 193:24 194:8, 14,16,23 196:21 197:21 198:16 199:20,22 200:10 201:18,19 202:18 204:6 207:6 213:3 214:7 215:6 217:6,9,10,14 224:2 225:20 227:10,14 228:9,23,24 230:6 231:10, 14 233:2,23 234:5,15,24 240:10,18 241:19,21,25 242:4,6 244:4,15 245:7 247:2 249:2 250:4,7 251:14 252:24 once 80:6 179:9 one 5:14,21 7:4,5 8:21 9:1,20,25 10:3 12:15,19 13:17 14:17, 23 15:2,10 16:6,16,23	17:8,10 18:17,23 24:23 25:7,15 26:17 27:14 28:9,25 29:5 31:14,21 32:1,8,20 33:1 34:6,20 35:1,2,6,18 36:7 38:14 40:3,5,12 42:2,23 43:12,16,18 45:2,22 50:23 52:20 56:16 57:25 60:6, 14,21 61:10, 16 62:11 63:25 64:2 65:8,11,12 67:7 69:8,19 70:11 71:1,2, 6 72:19,25 73:19 74:1 76:5 77:17,25 78:23 80:13 81:9,19 82:18 85:14,23 87:23 88:3 89:5,8,10,11, 15 91:11,15, 21 92:3,5,9, 11,13,19 96:1,23 99:3 105:8 107:4 109:5,13,20 114:24 116:25 120:13 122:21 124:6 128:20,22 129:12 130:22,25 132:10	133:19 135:6, 14 136:20 137:7 138:9, 17 139:1 141:11 142:3, 11 145:4,9 148:10,12,17 151:1,17 152:1,5,22 153:3 155:15 157:22,23 164:6,7,10 169:14 171:14 172:14,15 173:3 174:1 176:3,7 178:23 179:10,20 182:6,13,23, 24 183:5 184:6 185:9 188:14 189:6 192:22 195:2, 14 203:11 205:6 207:11 211:16,22 213:3 215:6 221:3 226:13 230:3,5,24,25 231:3 233:11, 18,25 234:5, 14,17 235:6 236:25 239:13 240:7, 12 241:11 242:13 243:17,21,24 244:1 245:5, 7,8,15 246:21 247:1 248:6 251:14 one-minute 24:17	ones 34:9,10 94:15 109:9 111:24 169:17 174:10 ongoing 128:18 online 132:14 148:22,23,25 229:14 only 10:3 16:16 64:2 72:19 75:7,8 80:6 85:17 88:17 91:19, 21 92:2,9,12 109:11 129:20 139:11 140:5 148:11 149:2 169:14 176:3 180:24 185:6 195:16 199:11 204:12 207:23 212:2 224:24 246:16,17,23 247:20,21 onto 19:24 open 62:6,14 opened 164:14 165:3 operate 158:16 opinion 11:6, 9,13 44:13 49:18 69:16, 21 70:3,22,23 93:4 98:20 99:5 113:19
--	--	--	--	--

139:10 150:5 171:10 205:24 opinions 20:3,7 54:4 70:14,20,22 85:2,9 113:21 253:10,12 254:5 opportunity 54:9 opposing 251:11 254:11 options 125:10 221:17 order 25:22, 24 26:13,15 37:4 38:14, 23,25 56:2,24 58:16 81:5,12 92:16 93:1,4, 10,11 97:23, 24 99:16 102:17 103:6, 9,22 104:18, 23 111:14,24 125:13 144:6, 15 169:12 173:12,19 181:16 190:22 201:24 204:7, 22 215:8 ordinary 7:25 8:10,12,14 9:22 10:9 17:18,22 18:11,14,18, 25 19:3,9,12 20:2,7,11,16,	17 21:17,22 22:8 23:13 81:10 95:19, 21 96:6,11,15 111:17 179:6 215:22 216:13 organization 46:5 50:6 63:5 98:24 99:11 199:10, 22 215:10 219:22 organizational 51:12 origin 180:19 original 147:1,21 162:10 176:12 180:21 247:11 originally 120:25 other 5:21 7:2 23:23 24:23 27:15 31:21 37:14 60:22 63:23 80:20 85:14,23 89:5,15 90:2 102:22 110:11 114:25 124:13 140:6 141:2 147:19 163:8 169:9, 15,17 175:24 177:22 204:16 207:12 209:7 231:3 232:6	238:24 239:19,20 245:8,15 249:11,14,23 250:3 others 70:15, 21 171:14 Otherwise 42:18 58:24 our 31:18 135:4 143:13 147:21 out 26:16 32:9 53:24 96:7 97:19 100:18 101:13 110:24 111:12 141:12 142:25 143:13 145:3 155:11 167:23 171:6 189:18,23 197:24 204:5 226:20 253:1 254:10 Outlook 163:1,2 outperform 169:17 output 27:15 40:21 167:4, 18 175:17 outrageous 249:5 outside 125:25 251:11 over 5:12	14:13 18:2 28:2 34:19 58:6 61:14 62:21 63:16 92:23 108:14 123:11,13,15 133:13 149:10 155:24 164:6, 18 overall 20:11 238:10,13 overcome 68:1 69:9 overlap 24:12 197:12 overlapping 78:1 own 50:7 88:21 116:22 140:9 154:16, 22 155:2 owner 17:16 27:8 109:12 113:7,9 228:17,18 229:2,12,16, 20,22	28:18,21 30:13,18 32:11,14 33:4 34:4,11,14,24 35:10 37:20 38:6,24 39:4, 20 40:11 43:14,22 44:1,16 45:14,20 46:1,9,16 47:18,23 48:8,14,21 49:2,20 50:14,21 51:4,19 52:9 53:13,19 55:18 56:7 57:4,23 58:11,23 59:6,9,15 60:2,13,15,20 61:7,20 62:9, 17 63:18 66:8,14,23,25 67:13,19,21 69:10,17,23 70:5,9,16 73:23 74:21 75:6,12 76:3, 20 77:16,21 78:21 79:4 81:7,14 83:2, 12 86:7 88:2, 11,14,17 91:24 92:4,10 93:7,15 94:1, 7,14,17 95:17,24 96:9,18 97:10 98:1,14 99:1, 12,18 100:4, 13,19,25 101:5,15,21
P				
p.m. 114:6,7 157:9 188:22 222:10 245:3 249:9 254:14 Padmanabhan 7:12,21 9:18 10:23 12:5 18:21 19:18 20:23,25 21:3,11 27:3				

102:5,11,19 105:6 106:2 108:16,24 109:15,22 110:15,22 111:16 112:3, 10,15,20 116:12,16 117:17,23 118:6,13 119:19 120:3, 11,18 121:4 122:5,15,25 123:23 124:1 126:8,19 127:7,10,13 128:1,4,17,22 129:1 134:17, 21,23,25 135:16 136:6 137:14 138:12,21 139:5 141:14 142:6,14 144:8,17 146:6,12 148:2,21,24 149:7,11,20, 23 150:4,12, 16 151:5,25 152:15,24 154:17 155:23 160:14 161:20 164:22 165:23 166:20 167:5, 9,19 168:13 169:22 170:4 171:19,24 172:2,21 173:14,20 174:6,9	175:4,12,19 177:13,16 178:1,12 179:2 181:11 182:9,16 183:2,10,21, 23 184:3,13, 23 185:3,8 186:1,17 187:19,24 188:5,9,11, 15,21 189:20 191:13,20,25 196:12,18 198:18 200:14,22 201:5,7,16 202:1,25 204:23 207:13 208:9, 17,21,25 210:25 211:7 224:9,12,19 242:21 245:23 246:19,25 247:7,13 248:5,10,14, 17,20,25 249:5,12 250:17,21 251:2,4,7,8, 19 252:4,13, 17 253:15,18 page 7:23 10:17 19:22, 24,25 21:2 29:4 41:3,4 47:9,10,11,13 80:3 89:2,8,9 105:13,23 106:18 114:11,22 140:20,23	142:1 153:13, 19,24 154:9 156:12,21 163:14 183:16 184:19 222:25 223:5, 6 pages 33:11 54:8 139:10 140:18 159:2, 9 160:6 165:9,12 166:8 180:11, 17,18 181:1 184:10 230:15,17 paper 132:12, 14,15 135:25 137:2,6 139:4 143:21 144:11,24 147:18,19 148:4,8 157:23 158:1 168:18 papers 132:10 141:8 148:6,7 153:8 paragraph 7:18,21,22, 23,24 8:6,13 10:12,14,15, 18 11:16 12:11,13 14:8,20,21 15:6,8 16:22 19:16,18,22, 23 20:1,14, 15,24 21:2,5 26:6 32:16,17 35:3 54:12	71:25 82:7,8, 24 84:22 102:24 103:1, 21 105:3,9 128:6 129:4 130:15 133:4, 5 141:9 142:17 150:13 154:20 158:20,22 159:11 160:17,20 161:14,18 162:4 163:24 179:23 181:18 186:4 187:23 188:23 189:2, 3,5 203:3 211:7,8 212:4 213:2,5,6,7, 19 214:5 215:20 225:12,13 226:1,19 227:25 235:5 238:15,16,23 239:22 243:2 249:17 paragraphs 19:25 154:14, 18,21 155:1 parameters 179:11,14 201:21,24 parse 141:24 part 9:15 12:14 22:5 30:9,14 42:14,16 56:10 57:20	58:4,15 59:12 61:4 62:5,13 66:19,21 67:7,11 70:6 78:23 82:7 91:11 100:22 119:4,9 121:6 122:1,17 129:21 130:8 149:17 150:1 160:10 190:9 194:18 196:5, 22 198:13 207:1,24 211:9 221:2, 10 224:21 225:7 236:14 238:12 241:17 243:17,21,24 244:1 particle 64:2 particular 40:23 51:23 114:21 181:24 182:1 190:20 198:24 210:19 213:3 214:14 215:7 229:19 parts 30:14, 16 44:5 129:17,19 passage 115:17 118:2 passes 28:3 past 62:1 65:19,23 132:18,20 136:10 157:23 158:1
---	--	--	---	--

180:16 213:9, 14 pasted 164:16 patent 6:9 9:13 11:7 13:23,25 16:25 22:20 24:21 27:1,6, 8,23 29:2,5 31:2,8,15,20 32:5,9,21 33:12 34:7,20 35:7,17,25 36:7 37:6 38:21 40:9, 21,25 43:2 45:1,6 46:4,7 47:11 50:3,9, 19 51:2,13 52:17 53:8,24 54:1,3,21 55:2 57:5 61:4 62:20,24 68:6 72:5,7 73:4,17,18 74:9 75:18, 20,23,25 76:1,6,9,10, 24 77:5,6,9, 13,19,22 78:9,11,19, 20,25 79:1,3, 5 81:5,12,17 90:2,7 97:2,3 98:22 99:8 103:3,5,22 107:18 109:12 113:1, 6,7,9 115:10, 11,18 119:23 122:20,23 123:10,12,17 124:10,24	125:25 131:1 135:19 148:11 157:7, 23 158:2 159:14,19 160:11,25 166:18 168:9, 12,22,24 169:6,17,20 170:1,11 171:1,8,11 179:16 183:20 184:12,21 187:20 191:8, 19 193:4,13, 22 194:19 195:4,18,20 196:3,10 197:2,4,15 198:19 200:12 203:10 205:9 206:4,11,18 207:3,8,20 214:16,19,21 215:1,2,9 217:2 218:5,8 220:21,23 224:22 237:5 242:9 244:21 245:6 246:1 249:13,16 251:20 patent's 149:14 patents 9:12 148:10,12,17 171:14 177:22 203:10 Paul 6:22,24	pay 163:10 PDF 225:2,5 peer 70:14,20, 22 peers 69:16, 21 70:3,6 pending 114:2 156:3 188:2,12,16 237:18,20 people 16:16 17:15,20 18:3,4,5 44:11,25 67:23 68:10, 13 69:3 136:10 139:14 140:5, 7 147:12 150:23 151:2, 21 152:13,20 163:8 170:14 185:13 186:16 187:1, 18 196:11 198:8,9,16,25 199:3,5 200:13 202:21,24 229:17 239:25 245:22 per 134:3,5 percent 106:5 133:12,24 134:1 176:19 219:5 perfect 45:19 perform 28:4 performance	176:19 performed 182:7,14 183:1,8 228:10,19 229:3 period 23:25 24:1,3 68:4,6 periodically 111:3 permits 96:12 person 7:25 8:9,12,14 9:22 10:9 15:16,20,25 16:4,7,10 17:18,22,24 18:7,11,14, 18,25 19:3,8, 11 20:2,7,10, 17 21:17,22 23:12 33:19, 24 42:19,24 43:5,19 45:18,24 61:16,17 65:15 78:25 81:3,10 95:14,19,21 96:6,11,15,21 110:7 111:11, 17 113:5,6 129:22 135:6 151:17 152:18 156:10 157:1 178:24 186:16 187:1 200:19 239:18 personal 31:7 46:12,14	49:24 51:10 55:16 57:1 98:8 184:7 199:10 214:23 217:4, 10 personalization 61:12 177:7 221:13 222:3 personalize 168:6 perspective 178:8,10 pertains 8:1, 11,15 phenomenal 137:10,19 phenomenon 137:24 phone 21:9, 10 phonetic 23:2 37:9 192:3 232:13 phrase 205:17 piece 71:3,6, 10,15 89:6,16 91:10 203:6, 13 206:14 222:14,18 224:17 225:3 241:22,23 245:7,9,18 pieces 18:16, 20 19:1,13 place 85:17, 23 107:24 110:25 111:5
---	--	---	---	--

125:2 166:11 180:6 230:12 places 29:3 85:21,23 232:20 PLAIL 5:5 7:17,24 9:11, 21 10:25 12:8 16:21 18:24 19:19,21 20:24 21:2,6, 12,16 23:7,12 24:17,19 26:2 27:9 29:13 30:15,21 32:16 33:12 34:6,15 35:2, 14 37:22 38:10 39:2,7, 22 42:3 43:18 44:14 45:5, 17,23 46:7, 11,19 47:19 48:2,11,16,24 49:6 50:11, 17,24 51:16 52:3,14 53:15 56:2,24 57:11 58:2 59:4,12, 25 60:10,18, 25 61:15,21 62:12 63:15 64:11 66:11, 17,24 67:4,17 68:3 69:13,20 70:2,8,13,20 71:21,25 74:3,25 75:10,14 76:6,22 77:18,24 78:24 79:7 81:10,16	83:4,15 86:9, 12 88:4,13,22 92:1,7,12 93:9,24 94:5, 15,22 95:21 96:3,15,22 97:13 98:6,19 99:4,15,21 100:7,17,23 101:3,12,18 102:3,7,13,24 105:7,9 106:7 108:20 109:3, 19 110:12,18 111:11,19 112:7,13,18, 23 114:3,8 116:14,17,19 117:20 118:2, 9,23 119:22 120:9,15,21 121:8 122:13, 18 123:3 124:4 126:14, 21 127:9,12, 15 128:8,20, 24 129:3 131:24 132:2, 6 134:20 135:14,22 136:17 137:18 138:16,24 139:7 141:17 142:8,16 144:14,20,22, 25 146:10,15 148:7,23,25 149:9,14 150:1,8,14,18 151:13 152:11,22 153:6 154:18, 21 156:1,2	157:8,10 159:24 160:16 162:1 164:25 165:24 166:23 167:7, 11 168:10,16 169:24 170:6 171:22 172:3 173:10,16 174:3,12 175:10,16,25 177:23 178:6, 16 179:15 181:9,13 182:3,11,24 183:5,19 184:1,9,17 185:1,6,12 186:4,19 187:22 188:1, 8,10,12,16, 18,23 189:22 191:17,22 192:4 196:15 197:11 198:25 200:17 201:3, 10,22 202:6 203:3 204:20, 25 207:15 208:15,19,24 209:2,9 211:1,8,9 218:6 219:16 222:8,11 224:10,14,17, 24 233:1 242:19,24 244:25 245:4 246:2,22 247:10,15 248:8,12,15, 19,23 249:2,	6,10,15 250:19,23 251:6,9,13,23 252:8,15,20 253:17,20,21 254:8,13 plain 13:2 Plano 6:3 platform 139:9 151:17 153:5 play 35:24 37:18 38:2 94:20 160:9 179:11 200:25 201:11,21 241:10 player 162:19, 21 please 7:18 34:5 39:15 43:16 45:22 54:25 55:12 58:20 62:11 70:1,11 71:5 74:2 87:23 128:13 188:3 191:10 237:22 246:21 plug 233:20 234:14 plurality 85:15 89:5,15 158:24 245:9 plus 23:8,10, 16 42:12 106:23 143:10	150:20 180:20,21,25 230:10 234:10,13 point 27:25 29:24 32:1 36:9 37:14 51:8,9 52:12 57:7 73:4 90:16 94:18 100:21 101:25 102:20 108:13 169:18 172:7 201:23 234:6 237:16 pointed 105:7 120:25 155:11 204:4 pointers 72:25 145:12 points 73:2 policies 80:20 political 149:4,19 150:3 politician 151:11 popular 97:17 132:24 135:1 136:13,15 139:13 140:5, 7 149:3,10,17 150:2,7 151:2,10,14, 21 152:5,12, 23 163:7 234:25 portion 85:10
---	---	---	---	---

119:22 124:25 126:2, 17 130:14 139:4 145:5 portions 122:20,23 123:10 POSA 201:24 position 14:1 132:14 176:20 226:23 positively 94:4 possibility 24:9 185:9 241:14 possible 66:18 110:6 167:21 169:12 199:2 228:3 post 136:10, 11 139:18 151:10 223:7, 9,10 224:1 posted 140:3 posts 152:19 power 45:18, 24 49:25 51:17 52:7 56:21,22 powerful 37:13 45:13 46:14 51:15 52:11 57:2, 13,19 58:2,7, 8 61:24 62:25 63:2 139:14 177:21	practice 62:19 113:24 precise 20:10 111:14,20 147:3,24 176:24 precisely 12:24 102:14, 18 166:25 198:4 predate 11:25 predefined 193:24 194:8 predict 69:16, 22 70:4,14,20 71:3,7,9,11, 13,16 predictable 16:14,15,17, 20 prediction 217:19 218:3 preference 169:11 prepare 7:3 preparing 6:6 112:2 present 28:24 38:13 44:6 119:1 161:5 167:23 168:6 181:4 190:21 227:23 presentation 83:19 84:6,9 presented 59:18 171:14 226:3 239:4,5	presents 118:25 119:13,14 president 135:4,5 pressing 228:3 pretty 82:22 108:12 previous 9:21 36:15 57:12 104:24 145:9 166:24 232:18 previously 40:25 54:1 157:10 189:7 primarily 33:14 135:8 prior 12:16 13:3 14:17 16:24 63:17, 20 76:1,10 77:14,19 78:3,6,9 91:20 92:2,8, 12 169:21 170:1 193:9, 14 205:3,12, 15,24 210:2,6 priority 11:7, 13 12:9 31:21 214:1 234:7 private 139:21 151:15 153:4 probable 214:7,12 probably 17:15 51:15	63:12,13 64:15,24 65:21 68:12 97:17 109:25 114:3 158:6 212:9 214:24 219:5 234:19 problem 26:17 27:11 31:2 32:5 44:10 142:17 182:21 201:18 214:10,25 215:19 219:21 241:2 problems 32:8,20 43:12,18 199:22 215:5, 17,25 216:15 226:13 procedure 168:23 194:16 proceedings 254:14 process 6:6 9:5 35:24 37:11,19 38:3,5,15,16 44:7 45:8 63:10 96:2 107:19,20 109:25 110:2, 4 112:2 113:21 142:25 143:21 159:7, 9,10,12,25 160:10,12,19, 23 161:7,10,	18 162:3 171:12 176:23 processes 158:8 175:24 processing 24:4 56:21,22 128:25 129:2 158:9 159:1 164:3 214:6 processor 41:24 42:11 53:4 100:21, 22 produce 28:12 56:12 57:7 94:10, 14,16 167:20 174:19 175:14 produces 40:6 175:18, 21 producing 135:10 product 17:15 44:20 253:23 professions 150:24 152:14 professor 219:11,14 profile 181:16 204:6 233:14, 15,16 238:1, 4,20,21 239:4,5,8 241:8,9 profiles 186:7
--	---	--	---	---

program 41:9, 15,18,21,23, 24 42:4,7,13, 17,21 43:1,7 56:9 57:3 properties 116:3 118:3, 15,16,20,21, 22 119:1,4, 13,14,24 121:25 122:10 property 119:2,9 propose 26:25 proposed 20:3 27:3 67:22 proposing 46:4 pros 67:24,25 69:4,9 provide 5:22, 24 11:6,12,15 31:11 79:9 86:22 87:1, 21,25 88:5 89:22 90:18, 22 253:7,10 provided 158:9 202:17 231:9 238:6 provides 180:22 providing 80:18 85:25 86:5,13,17 87:4,14 230:19,22	231:4,6 public 139:17 149:3,18 150:2 152:17 153:4 161:24 171:1 publicly 151:9 publish 229:17 published 132:16 pull 143:13 167:22 purchase 228:11 purpose 55:16,21,24 56:3 57:1,22 58:10 83:19 84:6 purposes 141:2 put 24:14 84:14 140:2, 25 167:3 232:12 puzzle 18:16, 20 19:2,13 Q quality 44:5,7, 21 45:3,7,8 57:6,8 58:15, 22 59:4,13, 14,24 60:1, 12,19 61:5,6, 13 62:3,4,5,8, 13,16 63:9,17 79:6 94:10,	14,16 140:8 162:12 168:11 169:20,25 174:19 176:14 178:3 quarter 134:4, 5 queries 147:22 query 145:12, 24 146:2,5, 11,21 168:3 190:3,4,7,9, 11,25 191:4, 11,16,18 192:7,21,23 226:25 query's 190:9 question 7:20 9:20 11:12 13:18 14:2 17:25 21:22 22:22 30:20 35:16,20 36:17,23 39:7,15,16 43:5,17 47:3 48:10,11,25 52:6,14 53:14 54:6,23 55:2, 5 59:11 60:3, 17 61:3 64:11 67:2 74:1,2, 23 76:23 78:2,3,4,5 82:22 86:13 88:3 90:17 92:6 93:24 96:23 97:7,9 98:4,7,17,19 99:13,16,20,	21 100:1,8,9 101:19,24 102:17 103:18,20 112:5 114:2 117:19 119:16,21 120:13,17 127:15 129:4, 5,8 130:2 134:24 135:25 138:25 145:21 149:25 153:22 156:3, 6,20 167:13, 16 170:18 182:11,12,24 183:4 184:16 188:1,12,16 191:15 200:6 201:8 205:10, 18 207:6 214:17 215:16 216:12 218:6 224:9,13 225:18 231:4 237:18,20 243:11 244:13,19 247:11 248:11,21 249:1 251:13 questions 5:13,14 102:14 114:20 115:2 125:20,23 162:18 253:5 quick 162:17, 18 171:15	quickly 146:14 quite 43:10 quote 93:9 quoting 36:16 37:22,25 50:17,24 55:2 166:23 R RAM 42:12 55:25 56:4 randomly 226:5 rang 21:9 rank 35:21 36:4,18,23 37:7 38:23,25 40:9,18,22 44:22,23 59:3 214:7 ranked 37:3 39:18 190:17 227:23 ranking 9:5 17:9 35:24 36:10 37:6, 11,19 38:3,4, 14,16 40:21 44:7,8,22 45:8 56:15 58:15,17,21 59:13 60:11, 19 61:4,5,8, 10,11,16,17, 18 62:6,7,13, 15,22 63:1,10 79:6 96:2 109:24 110:2
---	---	---	---	--

160:9 161:8 168:24 171:12 180:5 197:23 210:14,15,16, 21 211:13,17 212:10,11,15, 18 214:12 221:20 234:9 rankings 211:16 rates 226:24 rating 228:24, 25 231:9,16 241:6 raw 83:24 reach 254:10 read 6:11 8:1, 11,15 11:3,21 12:17 14:25 15:12 16:25 20:4,21 21:20 29:2 41:25 53:1 54:9 55:8 72:5 76:15 77:2 79:14,17 80:6,10,20 82:14,15 83:7 85:16 89:7 90:11,15 91:12 93:13 101:8 103:7 105:16 115:22 116:4, 21,22 117:7 118:2,5,25 119:25 121:6 122:1 126:25 132:25 133:15 134:6 138:2 141:15,	16,20 142:5, 13,18 143:2, 14 144:10 145:2,4,14 146:13,16 149:4 150:24 157:22 158:1, 11 159:4 160:24,25 164:8,15,18 166:21 180:6 181:20 186:9 189:11,13 193:9 194:2 206:5 211:13, 25 212:1,3 213:21 214:2 216:1,16 222:17 223:19 225:21 226:6, 8,25 228:6, 12,20 243:6 249:19,25 readable 41:8,13,22 reading 15:8 20:23,25 53:25 54:11, 12 55:5 76:20,22 82:17 95:14, 22 106:3 115:23 170:10 212:3, 5 real 16:12 111:5 162:17, 18 171:15 219:21 really 75:4 88:18 179:1	197:22 252:24 realtime 147:8 reason 16:23 17:4 90:21 101:1 102:21 149:17 150:1 151:20 152:11 reasonable 56:17,18,21, 22,23 57:7, 14,20 58:3,9 113:10 reasonably 220:11 reasons 102:22 135:15 138:9, 18 139:1 151:1,13 152:22 recall 90:4,11, 16,18 131:4 176:19 recap 173:11 receive 103:16 129:22 203:19 204:10 207:18 208:5 212:1 213:20 241:13 received 40:22 103:14 189:7 203:5, 13 receiver	104:4 106:12 162:14 184:2 224:7 receives 32:3 176:13 recent 147:8 recipient 31:17,18,22 32:2 33:17, 19,20 40:23 85:6,7,11,12, 15,18,22 86:1,3,6,14 89:6,16 104:5 124:20 125:15 127:23 130:8 160:9 162:11 165:14,25 166:3,7,15,19 173:2 176:9, 10,11 183:24 184:25 185:2 203:24 206:14 207:12 211:24 212:1, 2 214:1,8 215:7 245:9, 18 recipients 51:23 121:14 208:3 recognize 75:15 132:2, 8,9 137:1 141:5,6,7 144:25 148:14 157:11 209:25 210:4 215:23	216:14 recollection 6:15 recommend 64:20 65:22 66:2 recommendati on 64:14,20 65:3,4,8,9 66:1,5,11,15 67:7,11,17 217:15 recommended 65:2 record 87:11 99:2 102:9 116:21 143:14 145:5 188:6,18,20, 22 209:3 223:19 249:2, 8,9 251:10 254:9,12 record's 40:17 recorded 133:12,23 records 143:12 Reddit 223:25 reduces 80:17 refer 26:2 44:14 115:3 123:15 156:9 reference 10:19 11:1 73:2 154:5, 10,19 204:21
---	---	---	--	---

210:2,6 235:11,12 referenced 73:1 references 11:19 13:14, 19 14:4,17, 23,24 15:10, 12,17,21 16:2,5,8 18:16,20 19:1,13 referred 70:25 122:19,22 155:16 referring 8:19 14:9 24:11 26:3 36:14 37:16 38:4 39:19 52:17, 23 89:13,14 104:17,21 105:19 106:18 115:5 117:9 121:8 126:2 139:3 164:1 212:8 220:23,24 221:9 242:9 refers 116:7 215:23 216:14 reflected 110:13,20 regard 33:7 116:24 211:11 regarding 249:18 regardless	20:6 registered 133:13 registration 238:7 regulatory 80:20 relate 51:25 related 20:20 21:20 22:11 23:3,18,23 24:10,24 36:21 52:1 103:12 143:2 195:14 relates 117:21 212:7 relating 10:19 11:1,18 84:24 85:3,5,10 86:18 87:15, 21,25 88:6 184:10 253:10 relation 228:10,19 229:4 relational 50:4 51:14 72:4,5,6,18, 23 73:5,11, 13,14,19,21 74:3,5,8,10, 14,18,19,20, 24 75:5,11 76:13,19,25 77:9,14,20 78:12,18,19 79:1,2,8,11, 12,19,21	80:14,25 81:4,11,18, 21,23 83:20 98:23 99:9 relations 72:24 relationship 26:15 123:19 124:3 130:25 relative 169:19,25 relatively 213:25 released 65:1, 19,25 relevance 27:10 37:18 38:2 62:22 71:3,7,11,16 91:5,9 93:19 105:12,15 107:1,2,12 108:1 114:13, 22 115:4 122:24 123:5 144:5,14 173:24 175:8 179:1 212:21 222:14 226:25 relevancies 38:22 relevancy 24:23,24 25:12,13,14, 16,20,22,23 28:6,7,8,9,23 35:24 37:8,9 38:17,19,22 39:11,18 58:25 59:1,2,	17 64:7,8 85:13 92:14 93:16,17,21, 22 104:9,10, 12,16 106:8, 20 107:16,17, 21 108:2,6 109:25 127:17,18 128:7 172:4, 10,13,18,19, 23 173:5,6,7, 8,25 175:7,9, 11,13,17 177:19,24 178:22 215:12,13 217:3 232:15 relevant 10:20 11:2,20 16:24 23:25 31:14 32:10 35:19,21 36:4,17,18 44:23 59:22 60:5,7,8 120:7 123:21 127:22 143:13 181:1 189:18,23 190:8 191:19 198:4,5 250:13 relies 93:20, 21 117:15 122:9 180:9 234:15 rely 122:8 161:3 169:9 remember 23:21 68:5,22 90:15 98:17	101:20 143:19 147:9 156:8 158:5 234:6 remind 54:17 removal 146:25 remove 143:7,24 182:22 removing 80:18 render 89:4 154:5,11 reorder 161:5 rephrase 14:7 68:24 205:17 replace 157:7 replied 164:16 165:4, 20 replier 224:7 replies 60:23 reply 119:10 165:17,18 211:25 224:3 report 84:24 85:10 88:25 89:3 113:3 147:13 153:16 203:4 253:18,19 REPORTER 9:7 16:18 22:3 23:9 25:3,9 27:2,5 39:14 43:25 44:2 56:20
---	--	---	--	---

59:8 94:11 115:21 123:25 131:23,25 132:4 137:13 144:21 159:21,23 181:7 188:14, 19 217:21 219:10,12 232:22 254:12	100:24 101:13 102:4 103:6,9,19, 22,25 104:18 166:18 172:20 192:21 202:12,14 208:7,15,19, 24 209:10 237:12 252:19	resolves 241:9 respect 135:19 137:2 176:25 246:1 250:6 respective 189:8 respond 142:22 143:4, 19 response 56:23 57:13, 20 58:3,8 223:22 224:3, 4 244:20 responses 59:21 responsive 223:11,14,15, 21,23,24 rest 129:4 restrictive 206:4,8,18,20 207:20 restroom 155:25 result 16:14 39:3,17 40:20 44:6,21 45:4 57:6,8 59:19, 24 60:1 61:13 63:10 79:6 140:8 143:11 147:3,17 162:12 170:14,20 172:16 174:19 175:21 178:7,	11 226:15 227:23 results 38:23 40:7,10,18 56:12 58:16 83:18 94:10, 14,16 96:13, 21 118:19 119:2 144:5, 6,15,16 161:4 162:9 168:5, 21 169:10 181:4,6 192:7 226:2 retention 121:14 retrieve 190:1 retrieves 190:12 return 143:11 returned 39:3, 17 review 6:8,19, 24 48:18 54:3 168:16 254:6 reviewed 6:13 8:23 12:20 13:1 15:3 32:18 42:1,9 46:23 47:12, 17 48:3 49:12,22 53:6,20,22 54:1,22 73:25 74:6,22 75:2 80:11,23 82:16,19 85:20 88:16 99:6 115:13, 25 116:5 118:10	120:22 127:2, 6,14 128:2,5 129:7 130:18 131:6 133:7 138:6 141:22 143:6 144:12 145:6,17 146:19 155:21 156:15 163:22 167:2 180:8 181:22 183:12 186:13,23 189:15 191:24 202:3 204:3 206:10 209:5 211:19, 23 212:13 225:17 226:9 229:7 235:7 239:1 242:12 245:16 251:3 253:22 254:2 revised 168:3 rewriting 181:5 right 7:7,10, 17 8:6 9:13, 17,24 10:7,23 12:18 13:5,13 14:11 15:23 19:4,16,21 21:5,16 24:12 27:11,16,20 28:15 30:6 32:7,25 34:1, 3 36:2,19,20 37:4 38:10,15 39:23,25 40:10,19 41:18 44:25 45:13 48:1,10
reporter's 5:23 represent 49:13 76:13, 25 77:10 representation 239:3 represents 116:3 118:3 119:23 121:1 request 199:17 requests 92:11 require 74:13, 20 172:8 174:4,14 175:11 202:20,23 237:8,14 required 46:19 73:22 74:4,5 79:12, 15 91:16,19, 21 92:2,9 94:9,10,15,25 95:3,4,6,9,11, 16,23 96:4,7, 17 98:12	requirement 73:12,15 202:7 248:3 requirements 167:25 requires 50:12 74:10, 23 95:12 96:5 166:18 171:18,22 173:11,18 174:10,21,24 175:2,17 177:11,24 179:8 198:14, 15 206:12,21 207:4,9,21 242:5 reranking 181:6,8 research 44:19 143:13 145:9 researched 13:25 researcher 168:18 residing 180:6			

49:8,15 50:1 52:12,20 54:19 56:10 57:15 58:16, 17,19 59:17 61:1,2,9 63:22 64:16, 21 66:15 67:9 68:15,16 73:6 74:15,24 75:9,13 77:23 78:14 79:7,22 80:2,22 81:19 82:9,13 83:1, 8 84:21 91:8, 18 92:11,15 95:7 96:2 97:4,7 98:2, 11 101:11,12 102:16 103:16,19,24 104:4,20 105:1 106:4,9 108:14,20,23 109:5 112:23 113:16,22 114:20,25 116:18 117:12,13 120:21 121:10,25 123:6,8,17 124:7,8 125:8,21 127:18 128:8, 13 130:10 131:4,12,15, 18 132:5,10, 20 133:24 134:2 135:5, 14 136:3,4,20 137:6 139:7, 22 140:10,17, 22 141:21	143:17,23 146:23 150:25 152:18 153:11,19,25 154:2,8 155:14 156:25 157:13 160:10 163:6, 14,19,21 165:5,8,10,16 166:3 170:17 171:2 172:11 173:2 174:11 175:9 176:13, 15,18 178:19 179:17 182:5 183:4,6,7,9 184:20,22 185:5,11,20, 22 186:3,16 187:1,5 188:25 189:19,24 190:12 191:1, 23 192:19 193:10 194:13 196:25 199:11 200:19 201:2 202:19 203:11 204:5, 16,18 205:2, 20 206:16 207:22,25 208:1,3,4,12 210:5,14,24 211:21 212:15 213:10,15 214:23,25 215:21	216:21 218:11,21 220:4 221:14, 20,21,25 225:1,6 227:1,15,16 228:13 229:2, 15 230:3,11 231:22 232:11 233:5 234:1,19,21, 24 235:3,10, 13 240:3,12, 16 241:6,20 242:7 243:1 244:21,25 249:21 250:1, 4,22 254:8 rigid 218:20 road 5:12 role 35:24 37:18 38:3 94:21 117:1 129:15 160:9 241:10 room 251:7, 11 roughly 132:15 row 126:11 195:6,9 rule 28:18 30:13,18 37:20 38:6,24 39:4,20 40:11 44:16 45:14, 20,21 46:1,16 47:18,24 48:14,21 49:2,20,21 50:14,15,21,	22 51:4,5,19 52:9,10 53:13,19 55:18 56:7 57:4,23 58:11,23 59:9,16 60:2, 15,20 61:7,20 62:9,17,18 63:18,19 66:8,14,25 67:1,13,19 69:10,17,23 70:9,16 73:23,24 74:21 77:16, 21 78:21 79:4 81:7,8,14 83:2,13 91:24 92:4,10 93:7, 15 94:1,8,17 95:17,18,24 96:9 97:10 98:14 99:1, 12,18 100:4, 13,19,25 101:5,15 102:5,11,19 108:16,24 109:15,22 110:22 111:16 112:3, 10,15,20 117:17,23 118:6,13 119:19 120:4, 12,18 121:4,5 122:5,15,25 124:1 126:8, 19 128:1 134:21,25 136:8 138:12, 21,22 139:5 141:14 142:6,	14 144:8,17 146:6 148:2 149:7,11,20, 21 151:5 152:2,15,24, 25 167:5,9,19 168:14 169:22 170:4 171:20,24 172:22 173:14,20 174:6 175:5, 12 177:13 178:2,12 181:11 182:9, 16 183:2,10, 23 184:4,23 185:3,8 186:1 187:19 189:20 191:13,20,25 196:12 200:22 201:5, 7,16 202:1 203:1 204:23 207:13 208:9, 17,21,25 217:5 218:14 219:19,20,24 242:21 245:23 246:19,20,25 247:7,13 248:5,10,14 249:12 250:17,21 251:2,19 252:4,13,17 rules 5:12 96:18 217:5, 24 220:12,14, 17,18 run 52:25
---	--	---	--	---

53:12,17 54:15 55:7,15 56:2,10,25 57:2 96:12,16 98:8 144:3 155:25 179:10 240:17,24 running 227:10,14	250:22 251:21 same 8:13 10:19 11:2, 10,19 18:7,9 20:4 32:2 35:10 38:19 66:20 67:9 68:13 70:5 72:14 77:22, 23 78:19,25 79:2 103:15 114:22 115:10,11 123:2 124:20 125:15 126:6 127:23 129:22 131:11 146:12 150:4 173:2 176:8, 12 181:24 194:22 196:25 197:13 198:23 203:6, 13,18,19,20, 24 204:9,10, 14 206:15 207:18 208:5 209:13 213:19 215:2, 5,17 237:4 240:6,14,15, 20 241:15,20, 22,23 244:4, 11,12,15,16 245:18 249:1	satisfy 103:17 124:18,22 129:16,18,20, 21 203:16,17 204:11,18 205:8 206:17, 22 207:2 209:12 244:21 save 211:25 212:2 saved 72:22 saves 60:24 saw 29:2 73:18 80:12 82:5 85:12 101:9,20 132:16 142:23 194:6 211:2 say 7:12,25 8:9 9:20 10:18 11:18 12:5,14,24 13:7,17 14:20 15:8 16:6,21 18:4,17,23 20:16 21:16, 22 22:3 23:2, 18 24:6 26:5 28:5,22 30:19 31:4 32:15 33:1 34:5 35:1 36:20 40:14 41:19 42:22 43:2,16 44:4 46:10 48:5,12 50:9, 16,20,23 57:25 61:22 64:22 65:15 66:10 67:2	68:3,22 69:19 70:11,23 71:1,5 72:3,9, 25 74:1 76:3, 5,17 77:17 78:23 80:8 81:9 86:25 87:3,12,23 88:3 89:3 92:5,18,20 94:18 98:2 99:3,14 101:17,18 102:15 103:3, 21 104:1,25 105:13 106:4, 15 112:12 116:12 119:11 121:6 122:21 128:17 130:22 132:22,23 133:1,11 136:1 138:14 139:10 140:2 142:3,17 147:7 156:16 158:25 160:16 164:22 166:25 167:1 169:13,23 173:17 175:6 176:4 179:20, 21 180:10,12, 13 183:22 188:7 190:1,4 192:11 194:11,21 195:12 196:20 202:4, 5,13,15,22 204:24	205:21 206:19 208:10,22 209:6 216:8 217:6 218:10, 13 219:18 220:7 223:10, 18,20 224:6, 10 227:19 228:9,25 229:10,14 233:7 235:4 237:1,2,13 238:11 239:11,12 240:7,12 243:19 244:13 246:21 247:18,19,21 249:13 250:4, 7,8 252:19 saying 9:11 10:25 11:8 13:22 17:24 18:11 20:6 23:7,12 29:18 33:12 46:10 47:22 48:22, 23 51:16,20 52:6,13 61:3, 15 62:4,12 63:15 67:15, 17 73:11,14, 21 74:3 83:14 84:17 85:7 86:11,12,21, 22 93:8 94:9, 22,24,25 95:5,19 101:2 102:20,21 108:25 109:1, 5 116:1 119:3 120:9 121:22
S				
said 7:21 8:1, 10,15 15:7 25:5 28:19 32:19 35:12 36:15 37:16, 21,25 39:8 41:13 42:22 50:17,24 57:12,19 58:2,7 59:1, 12 68:5 87:9 88:7,19 105:6 107:3 109:19 110:18 111:24 129:18 138:14 139:7 162:5 165:24 167:20 173:11,21 190:23 192:8 198:20 201:10 208:6, 12 209:13,21 223:17 230:24 231:2 232:13 233:9 244:18 245:24 247:3, 22 248:18				
	satisfactory 175:23 176:1 satisfied 172:15 204:19 207:9			

124:23,25 141:11 146:8 156:23 160:3 161:6,8 167:15 171:4 172:12,17 177:3,5,15,23 178:3 180:13 184:15,16 189:21 192:4, 6,11 195:19 196:9 197:14 198:14,15 199:19,21 201:18 204:1, 4 207:3,8 219:3 220:19 223:13,17 228:18,22 229:2,12 231:15 236:11 240:19,23 241:19 242:23 244:6, 8 248:13,17 249:4 251:25	22 159:25 160:19 161:18 162:3 164:1,2,5,13 165:16,18 181:18 186:5 189:5 193:8, 21 195:13 206:3 211:1, 10 213:19 215:22 216:13 221:6 225:19 226:1, 19 228:2 235:11,14 238:24 243:4 249:22 250:25 scaleability 51:8,9,18 52:5,8,11 97:7,15 98:4, 17 99:20,22 100:1,6,8,14 101:25 102:22 scaleable 44:15 scenario 96:20 200:10, 12 science 20:18 21:18,23,24, 25 22:4,6,8,9, 10,14,18,19 23:1,5,13,15, 19,21 170:13 science/ engineering 20:19 21:19 scope 97:24 109:17	159:15 score 59:2,17 104:15,16 108:1,2 110:3 169:4 210:15, 16,22 212:10, 11,15,17 216:3 217:8, 9,14 218:12, 13,14,15,20, 22 219:3 222:14 232:16 233:25 234:3, 14 236:25 237:4,6,8 scores 212:19 234:12 scoring 63:1 110:4 173:22 175:14,21,22 176:1 177:20 178:4 search 9:2,17, 23 10:3 33:10 35:18,19,25 36:3,16 38:4, 7,9,23 39:3,8, 10,17,23,24 40:6,10,18,20 52:1 142:18 143:9,11 144:3,6,15 145:11,12,24 146:1,5,11,20 147:1,2,5,17, 22,23 148:1 159:20,21,22 160:4 161:2, 3,22,23 162:25 167:22 168:4,	8,9 169:9,10 180:19,20,21, 23,25 181:1 189:8 191:11, 16,18 192:2, 3,5,7,9,10,12, 13,14,15,19, 21,23,24,25 193:1 226:4, 15,19,20,23, 25 227:3,4,7, 8,20 229:18 234:8,9,12, 15,17 240:25 241:9,15,20 242:14,15 search-based 36:25 37:1 117:3 searched 189:7 searches 227:10,14,21 240:17,25 searching 180:5,24 second 9:2 16:21 19:25 20:15 21:5 28:23 31:25 32:1 65:11 66:21 67:11, 15 85:12 89:2 91:5,9 92:14 103:4,7,10, 11,14,19,23 104:19 108:12 114:13,22 115:3 122:24 123:4 124:19 125:12,14	127:21 130:10 152:1 172:13,17,18, 23,25 175:6, 9,10,13,16 177:19,24 179:25 182:10 203:5, 12,23 204:2, 8,17 205:23 206:13 207:5, 16,17 211:17 221:3 222:12 226:18 228:2 230:24 233:16 second-to-last 145:8 secondary 253:8 section 84:24 85:6,18 86:8, 15 87:5,16, 18,20,24 88:5 89:21 129:8 133:3 153:18, 22,23 154:10, 25 155:17,20, 22 156:9,12, 18,22 203:7 236:3,6 246:11 Sections 156:23 Secure 132:14 see 8:2,17 11:4,22 19:23 22:21 28:22 29:4 35:25 41:7,10 42:8 51:16 53:5,7
--	--	---	---	--

56:15 60:10 63:14 64:18 68:3,8 72:21 75:23 76:6,12 80:7 82:1,3, 12 85:2 89:2 91:4,7,13 103:1 104:2 105:2,17,22 106:13,21,24 107:17,24 108:5,8 114:12,18 115:14,18 116:9 117:8, 20 118:8 129:24 133:16 134:7 138:3 139:18, 22 140:2 142:19,21 143:15 145:15,20,21, 24 146:2 147:4,25 151:9,19 152:17 156:23 157:15 158:12,15 159:5,6,18 160:24 161:2 163:17 164:3, 9,20,24 178:6 180:7 186:10, 11 189:12 190:5 192:1 193:11 194:3 195:4,10,17 197:11 203:7, 12 206:6,11 213:7 214:8,9 220:25 221:6 222:12 224:5	225:22 226:7 227:11 228:7, 21 230:6,8,10 232:12,17,18 235:24 240:2 243:7 247:10 249:20 251:4 seeing 6:15 seek 138:1 seems 108:12 141:10 seen 137:10, 19 select 206:25 selectively 197:24 198:1 seller 228:5 semiprivate 153:4 send 33:18,23 139:21 166:2 185:12 223:4 228:10,16,20 229:5,11,22 sender 31:9, 16 33:17,20 35:22 37:7,17 38:1 63:3,5 64:6 104:4 106:11 121:13 160:8 162:11,14 165:13 166:3, 7,14,19 169:1 178:20 183:24 184:1, 24 185:2 210:13 211:4 214:24 215:11 217:3,	10 221:12,17 222:2,17 223:4,6 224:7 sending 31:17 228:14 sends 31:9 72:9,10 sense 5:19 92:22 199:9 sensitive 201:20 sent 73:2 121:14 164:16 165:4, 17,18,21 168:3 171:14 211:4 214:24 222:17 228:4 229:2,9,11,20 sentence 8:9 14:7 15:13 16:21 42:5 76:21,23 80:16,22 102:25 126:25 137:9 141:18 145:8 150:15,17 158:8,22 179:25 182:10 206:3 226:18 228:2 sentences 213:18 separate 35:13 154:10 212:11,15 separation 220:7 September	12:9 server 46:8 47:5,16,20,21 48:5,10,12, 13,20,22 49:1,14,19 50:2,4,7,8,13, 18,25 51:12, 14,17 52:7,11 53:3 96:25 97:17,18 98:8,9,10,13, 21,23 99:5,7, 9,17 100:2, 12,16,18,22, 23 101:9,10, 11,13,14 102:4,17,18 servers 50:3, 10,19 51:1, 13,15 99:8 service 137:25 set 15:23 18:7 19:3 23:1,3, 16 25:2 38:12 60:21,22 95:19 96:11 111:17 118:21 121:20 125:12 142:3, 12 172:25 177:10 179:6 197:18 198:5 199:13 201:20 206:22,23 207:11 220:6 221:6 245:20 246:14 247:9 249:23 252:6,	8,10,12,16 sets 23:14 141:11 219:17 220:3, 4 setting 167:21,22 177:6,8 190:7 199:23 201:18 223:1, 2 shake 5:22 share 78:14, 18 138:1,11, 20 139:3 shared 65:17 shares 103:4 Sharing 132:13 sharp 136:9, 16 146:24 she'll 251:5 shooting 147:15 short 141:19 142:4,12 151:7 153:2,3 251:14 252:24 short-cut 177:2 shortened 141:24 150:6 shorthand 141:25 should 13:25 17:11 28:20 31:4 32:13
---	---	---	---	--

34:13 45:3 82:14 134:22 142:9 148:8 149:22 169:7 172:1 176:8 184:8 187:20 196:7 209:7 218:15,23 219:4,5 220:8 239:8,10,11 244:25 show 6:12,14 26:5 32:15 63:6 84:2 90:12 168:21 191:10,15,17 197:7 showed 97:21 125:11 showing 163:13 shown 31:14 36:12 52:25 53:11,17 54:15 55:7,14 62:23 210:12 216:10 shows 48:6 62:25 107:23 110:23,24 193:8 208:2 238:1 252:6 side 46:8,18 50:1,13 53:3 121:10 signal 24:4 significance 25:24 significant 24:12 94:20	134:11 136:1 significantly 45:9 80:17 silence 21:10 similar 6:15 66:3 94:19 150:23 152:13 187:18 196:15 214:25 215:19 239:9 249:24 similarities 186:8 187:7 similarity 116:24 187:12 193:24 194:1, 8,15 196:16 226:2 233:14, 16 239:13,16, 19 247:24 simple 39:7, 16 52:6 82:22 90:17,24 93:24 226:2 simpler 16:3 Simultaneous 207:10 simultaneousl y 103:17 124:7,22 204:11 205:8 206:17 207:2 245:20 since 26:18 32:19 90:17 104:11 149:2 152:17 160:3	182:6,13,24 single 53:3 78:1 186:16 187:1 singly 117:5 singular 234:2 235:12 sir 177:18 225:25 sitting 90:13 six 20:20 23:16 size 199:20 201:25 202:4, 7 250:6 252:9,10,12, 16 skill 7:25 8:10,12,14 9:22 10:9 15:16,20,23, 25 16:4,7,10, 23 17:19,23 18:7,12,15, 19,25 19:3,9, 12 20:2,7,11, 16,17 21:17, 23 22:8 23:1, 3,13,14,16 42:19,24 43:5,19 45:18,24 81:3,10 95:14,19,21 96:6,11,16 111:11,17 156:10 157:2 178:24 179:6 200:19 215:22 216:13	239:18 slang 142:25 slightly 60:7 61:19 236:24 slow 56:13 slowly 18:17 69:25 small 199:15 252:11 smaller 199:14 250:5, 6 252:9,10 social 132:14, 23 135:1,6,9 136:18,19,21, 24 139:22 147:7,11,16 148:25 149:4, 19 150:3,17, 18 software 42:13 56:9 sold 229:15 solutions 215:25 216:16 solve 22:22 24:25 25:7, 10,20,22,24 26:13,15,17 27:19 31:3 32:6,9 34:21 35:7 43:13,20 63:7 111:23 142:17 199:25 214:10 226:14 solved 26:19	30:3 solver 46:5 solving 27:14 some 5:12 9:5,7,15 16:22 17:14, 20 18:3,4 19:23 22:21, 22 23:8,10,16 26:11,14,18 27:12,25 29:20 30:1 31:11 38:11 40:20 44:11, 24,25 56:17 57:8 63:6,12 64:4,18,21,22 85:3 92:21 93:3,13 94:9, 11 96:2 100:9 110:4,8,9 111:2,4 114:20 115:2 120:6 121:24 122:17 124:13 125:2 129:15 132:16 140:1, 20,24 141:1 147:6,15,20 151:13 153:2 155:1,12 158:1 160:9 161:4 162:18 166:8 168:13, 15,20 169:14 171:13 172:15 179:11 182:22 185:10 194:15 196:3 197:12
---	---	--	---	---

203:21,22 210:13 211:21 217:8 219:1,3,11,14 228:18,23,24 229:12,16,21 231:9 234:9 236:18 239:16 242:5, 7 253:4 somebody 13:8 22:13 33:18 140:3 218:21 224:2 somehow 103:12 something 36:21 37:21 52:2 60:8 61:22 65:24 67:3 71:20 84:16 100:21 102:15 111:4 126:16 136:12 138:8, 14,17 167:1, 12 188:7 204:22 211:21 218:10 219:6 223:11,20 251:15 sometime 222:7 sometimes 60:4 140:24 170:14 185:16 somewhat 9:12 somewhere	97:21 130:1 208:23 sorry 5:9 6:1 7:23 9:7 13:17 15:7,18 16:6,18 18:23 19:21 21:3,4, 7 22:3 23:9, 11 24:22 25:9 27:2 32:14 34:5 35:1 37:21 42:22 43:25 48:8 52:22 53:14 58:5 59:8 60:17 66:10, 25 67:2 69:19 73:13 76:5 82:23 93:10 94:8,11 106:2,16 107:1,9 115:17,21 122:21 123:2 125:24 132:4 134:18 137:6, 13 138:14,25 146:18 152:3, 4 155:6 157:18 160:14 169:23 173:6, 24 174:22 175:19 177:16 179:2 181:7 184:4 193:6 204:24 207:7 211:8 214:17 217:21 219:10,12,13 225:15 231:6 232:22,23 235:5 239:8	249:16 252:24 253:3 sort 26:11 38:12 129:15 140:1 144:6, 15 169:14 181:4 189:17 192:7 196:3 219:1 sorted 185:7 189:10 210:21 sorting 189:23 sorts 225:6 sotto 7:15 21:15 24:16 115:20 133:9 source 136:4 147:20 171:5, 7 253:22 254:2,6 space 239:7 spam 213:25 spark 135:13 speak 6:5,22 7:2 115:22 speaking 188:3 209:2 224:10 248:19,21,24 249:7 specific 14:2 33:24 48:17 85:25 86:5,18 87:4,7,12,14, 21,25 88:5 89:22 90:19, 22 141:18	161:17 174:20,23 175:1 176:1 177:10 189:6 199:20 202:6, 21,23 226:20 240:1,5,11 specifically 5:17 34:16 98:6,19 104:10 116:2 227:6 228:19 251:24 specification 111:20 202:10 208:23 246:11 252:5 speed 44:11 56:17 88:18 97:15 spent 55:3 231:10,16 spread 136:14 153:2 stable 92:25 94:3,6 stage 27:24 standard 26:20,23 62:19 66:15 113:24 168:23 194:16 start 29:11 39:23 58:5 64:20 92:16 105:11 143:22 179:18	249:17 started 21:7 67:23 68:10, 14 101:24,25 147:13 starting 29:24 41:7 114:12 127:7 128:18, 20 148:22 150:16 153:18,23 203:4 starts 20:1 27:25 91:4 114:13 126:25 232:25 stated 29:3 statement 53:7,24 54:20 55:9 57:12 58:1 77:7 95:7 109:7,8 133:18,21 134:9 138:5 159:25 160:22 166:24 216:17 225:24 226:11 static 238:4,6, 9,11,12 statistic 176:15 statistical 194:1 201:1, 12 status 152:7 stem 143:24
--	---	---	--	---

stemming 142:24 143:8	strangers 213:25	98:23 99:10 116:8 118:5 119:25 120:5 121:12,21,22	suppose 249:17	53:1,10,12, 16,18 54:14, 16 55:6,8,14, 15 56:25 57:22 58:10 59:21,23 62:7,14 63:23,24 64:1,14,19, 20,24 65:3,4, 5,8,9,21 66:15,20,21 67:7,12,18 72:14,15,20 73:5 76:13, 14,18,25 77:1 79:19 80:5,16 81:17,21,23 83:10,17 84:12 92:16, 24 93:2,5,10, 11 94:3,5,19 103:6,10,22 104:18 105:14,25 112:25 135:20 139:20 152:10 158:23 162:24 163:13 164:2 169:5,8,9 170:25 171:2, 5 176:19 179:7 180:15, 22 184:7 190:6 191:19 193:9 198:11 199:10 206:13 212:25 213:8 214:23 218:17,18
step 107:13 145:9	streaming 135:10,13	submit 190:7	sure 5:20 21:14 29:8 35:5 37:24 40:17 44:23 46:22 47:22 56:24 57:2 67:6 82:15,23 84:20 97:13 100:10 103:14 114:5 116:23 118:9 125:24 127:1 143:20 156:4 166:12 171:16 209:20 221:5 222:8 233:3 245:2,6 253:6	
steps 29:7 36:6 108:10	strength 69:5 197:23	submitted 6:10,16 147:22		
Sterling 248:16	strike 58:5 75:18 87:19 91:19 107:5 155:6 164:25 170:19 192:5 212:19 220:1 246:3	subscribers 150:22 151:3, 22		
still 5:18 38:12 52:17, 23 158:6 218:22	strong 135:12 196:1	subsection 154:1		
stipulate 253:15,17	structure 22:9 129:14,16,18 130:7 153:15	subsections 114:24 159:2		
stop 142:25 143:24 165:16 188:4, 5	student 137:7,8	subsequently 180:2		
stopped 148:8	study 62:20 63:12 94:19 95:13 96:5,8, 12,16 109:11, 14,20,21 112:1,8,14, 17,19 113:3, 11,12,15,17, 21 168:20 170:22 174:2 199:17 200:20	subset 38:25 39:2,17 40:6	survive 23:6	
storage 41:8, 13,22 72:15, 22 73:9	sub 72:9	substantive 11:13 136:15	Susan 157:24,25	
store 73:6,9 74:7 164:7 249:23	subject 8:1,5, 10,15,19,24 9:11 10:5	successful 135:15 138:10,18 139:2	suspect 182:19	
stored 50:5 79:11 98:24 99:10 189:11	submessage 72:9	such 40:13 83:6 116:24 149:1 159:1 160:1,13 165:3 186:6 193:25 228:11	sworn 5:3	
stores 80:5	submessages 50:4 72:11	sufficient 60:12,19	symmetric 195:18	
stories 136:14		suggesting 145:13	symmetrical 196:24 209:17	
storing 41:8, 15,23		support 79:10 158:23	system 8:25 10:2 17:8,9, 11 28:12 29:10,21 31:8 33:13 36:25 37:1,14 40:16 42:10,11,15, 16 44:9,15,25 46:3 51:21 52:18,24	
story 142:5, 13				
straightforward 216:25				

222:13 223:11,12,20, 24 224:22 225:8,9 227:18 228:16,25 229:4,9,11, 14,16,21 230:14 232:3, 13,14 239:24 240:17,24,25 242:19 249:22 systems 10:7, 10 66:5,11 163:5,7,9 193:13	38:19 71:23 111:1 114:6 157:9 166:15 219:1 222:10 225:8 231:13 245:3 takes 63:2,3,4 106:20,22 166:13 172:10 176:2 235:9 taking 37:10 107:23 110:25 111:5 talk 24:21,22 33:10 39:13 42:10 46:17 47:7 50:8,10 52:4 54:7 57:9 61:24 63:8,20 65:12 67:20 73:8 74:17 79:17 85:12 111:9 118:18 123:24 124:15,16 125:19,22 126:12,15 137:25 138:11,19 139:2 153:15 157:3 173:4,5 188:13,17 197:2 203:10 204:7 209:16 232:19 236:5 252:23 talked 7:4 39:10 100:5 106:25 107:2 talking 33:5,6	44:18 62:3 63:21 64:5,7 72:8 75:7,8,9 88:20 96:24 97:16 105:11 112:25 113:1 123:4,7 138:9,17 141:8 145:22 147:18 154:19 156:16 194:12 209:18 232:5 244:23 250:9 talks 51:13 62:20 73:18 74:18 79:19 101:9 104:5 108:5,6 124:10 127:17 128:6 140:3 148:4 156:18,21 159:19,20 166:13 172:14,23 192:1,2 197:2 204:5 214:22 215:9,14 218:9 tall 168:25 task 140:9 teach 13:5,15, 20 14:5 89:4 154:5,11 teaches 12:16 14:17 103:3, 6,22 teaching 12:22 13:11 14:9,14 15:11	teachings 14:24 18:15, 19 19:1,12 technique 69:15,21 70:3,14,18 124:12,13 215:24 216:15 techniques 66:6,12 67:22 186:7 187:4,6 technology 135:12 tell 49:5,23 58:20 109:12 111:7 171:17 176:17 telling 84:16 88:20 term 9:2,23 13:2 79:1 85:6,11 86:6, 18,23 87:6, 15,22 88:1,6, 19 147:1,21 180:19,20,21 189:9 190:12 215:23 216:14 226:4 terms 9:17 63:11 64:1 74:7 85:3 88:7,8 147:5, 21 168:17 180:21 226:23,24 test 59:25 testified 5:3 89:3 90:3	98:22 184:9, 17 191:4 testifying 167:3,17 testimony 50:12 85:5 86:1,5,14,18, 22 87:1,4,14, 21,25 88:5 89:22 90:19, 22 93:10 166:1,17 174:23 183:19 202:18 Texas 6:4 text 48:18 49:10 83:23, 24 108:9 119:8 139:10 141:24 225:5 226:21 227:2, 7,8,10,14 than 7:2 45:13 92:19 200:4, 16 202:22 206:4 239:20 Thank 27:5 44:2 55:11 251:6 thanks 102:23 that's 9:1,25 13:11 14:1,15 17:9,25 22:19,23 24:14 29:1 32:5 38:14 40:3,12 47:1 50:1 51:11 52:5,12,14,15 56:17 60:3
T				
table 88:24 tag 180:16 tagged 180:2 181:20,23 tailored 51:22 take 24:17 46:21 47:1 48:15 49:4 56:14 62:21 71:19,21 79:20 81:5,12 85:19 111:17 128:3 143:17 155:25 157:8 162:10 166:18 175:8 178:19,21 209:7 216:5 222:6,8 225:9 235:15 245:1 taken 24:18				

62:23 63:12 64:25 65:2,4 66:1,18 72:23 74:8 77:8,12 78:3,4 80:22 83:22 85:17 86:21 87:17 89:8,24 90:21 94:18 97:7 98:2,4 101:2, 10 103:20 104:4,8,14,17 106:7,15 107:6 110:1,6 113:14,24 115:4 125:4 127:23 128:12 130:2 134:24 135:14 136:15 139:13 141:23 143:8 150:6 151:10 152:10,22 155:4,11,16, 18,22 156:20 159:16 164:2 166:11 168:23 169:12 173:3 175:14 176:14 179:5 181:5 183:4, 13 188:3 190:3 192:17 194:18 195:17 197:1, 20,22 199:1,2 204:13 205:10 206:17,18,25 208:15 209:10	210:23 211:5 215:13 216:23 218:5, 16,18 220:18 225:14 229:2, 3 233:17 235:2 239:10 242:23 244:24 248:6 250:9 them 5:14 16:1 28:16, 24,25 29:19 35:13 44:24 77:25 78:2 93:25 94:6, 10,11,25 95:2,4,5,11 96:2,3 104:14 123:17 141:20 145:10 148:12 196:22 214:25 229:22 234:13 247:19 then 9:4 13:4, 8,9 17:15,16 23:4 25:15 27:15 28:8,11 30:3 31:19, 20,24,25 33:19,21 35:20 36:4,9, 10,17,23 37:5 38:11,17,18 39:10 40:9, 16,21 42:12 43:12 44:9 45:1 48:24 50:6 51:12	53:2 54:25 55:25 56:4,16 59:19,22 63:8 64:8,19,25 65:7,19 67:3, 11,24,25 68:13 72:15, 25 75:4 92:19 93:18,21 96:11,13 98:21,24 99:10 101:3, 10 103:13,18 104:11 106:4, 10 107:16 108:22 111:3, 13,18,19 118:17 119:3, 7,8,16 121:11,13,21, 23 125:11 127:21,22 128:24 130:15 133:11,23 139:21 140:15,21,25 143:9,10 144:2,5 145:23,25 146:25 147:2, 12,22 151:17 153:3,5,16 154:1,8,25 156:3 158:11 161:4 164:1, 25 165:13,15 167:23 168:1, 3,5,14,21,25 169:2,10,13 172:13 173:1, 4,8,25 175:8 176:5 177:1 178:14,19,21,	22 179:4,9,12 180:15,18,20 181:3,6 182:19 183:17 184:8 185:9 190:7, 17,25 194:15 195:19 196:4 199:8 200:8, 11 201:2,12, 19 204:15 206:23 207:17 208:6 210:14 215:11 216:3, 5 217:3,8,12, 13,14,16,19, 21,24 218:4 219:2,17 220:9,10,15, 18 223:12 224:2 225:6, 7,8 228:16,24 229:1,16,17, 18,19 231:10 233:17,20,21 236:13 239:4, 6,12,13 240:23 241:7, 8,9,24 242:15,16,18 244:16,17 246:12 247:20 250:8 theory 168:19 there's 23:20 24:8 25:6,21 26:16,18 29:15 32:1 33:16 34:2,8 46:17 48:6 65:7 108:20 114:2 121:20	124:21 125:21 137:23 146:17 153:23 161:22 163:17 165:25 166:3 174:20 176:7 179:13 184:24 186:21 187:22 192:12,22 198:25 202:6 203:22 208:4 210:24 212:11,15 223:15 228:18 229:12,14,19 235:24 237:18,20 239:19 241:14 therefore 13:24 63:25 135:7 237:6 244:11,13 therein 52:25 53:11,17 54:15 55:7,15 these 23:14 24:24 26:15 27:7 28:11 29:22 34:3,8 38:7,8 39:9, 18 42:14 51:22 64:9 66:5,11 69:9 93:3,13,22 95:8,15 103:4,16
--	---	--	---	---

104:7 107:25 108:21 109:20 117:5 121:25 122:19,23 123:21 151:13 154:11,15,22 155:2,12 157:6 171:9 172:15 176:10 200:25 204:11,15,18 211:3 213:24 216:5 220:14 230:17 239:16 241:13 they'll 36:21 they've 149:17 thing 5:21 13:9 16:19 18:8,9 25:4 33:21 54:10, 11 66:3 142:10 152:8 153:1 158:19 178:22 179:10,20 224:4 things 10:1 15:20 16:1 24:22 25:17 35:16 39:5 42:14 44:5 56:1 57:17 58:14 61:25 135:11 140:16 182:23	207:21 210:14 215:12 229:1 think 24:4 44:11,19 45:2,6 47:8 51:24 57:5,9, 10 65:15 68:12 73:20 84:10 88:18, 19 93:1 94:20 100:14,20 102:1 105:3 106:4 109:18 111:23 112:5 113:9,24,25 114:3 120:24 121:19 128:6 135:3 139:17 151:16 152:17 155:18 159:14 165:6 166:6,8 169:5 177:19 185:4 187:22 210:17 211:20 223:25 225:4, 5 230:10 233:10 234:25 244:25 247:8 thinking 35:15 97:12, 14,15 third 9:4 25:15 206:2 this 6:11,16 7:8,9 8:22,24 11:7 14:8 16:3,22 17:14	18:2 19:3,6, 14 22:7,12,24 23:15 24:15, 25 25:25 26:2,19 29:14,22 31:15,18,24 32:15 33:5 34:19 35:24 37:10,18 38:2,8,12,17 39:6,11,16 40:25 44:3,12 45:1,6,12 46:3 47:1,2 51:10,20,25 54:1,3,9 57:5 60:7,8,21 61:4 62:4,20, 25 63:7,9,17, 22 67:22 68:1,6 70:22 72:11,12,17, 18,25 73:1 74:7 75:16, 18,20,23,25 76:6,9,24 77:4,5,6,9,13, 18,19,22 78:6,9,11,19, 25 79:21 81:19 82:7 83:9,15,19 84:24 85:18 88:17,18 90:16,24 92:23 93:3,12 94:3,18 101:24 102:1 103:11 104:8, 14 105:11,13 107:14,18 111:9 113:4,5 114:21 115:3	117:15,21 119:22 120:5, 10 121:6,19, 21,23 123:17 124:17,19,24, 25 126:2,14, 17 127:16,25 128:6,8,11 129:6,8,12,13 131:15,22 132:5,9,10,15 134:2 135:25 137:2,3,6,14, 24 138:8,16 139:4,17 140:23 141:2, 15,16 142:2, 17 143:7,21 144:20 146:4, 8,14 147:13, 14,18,19,25 148:4,11,12, 14 149:14 150:12 151:9, 16,17 152:8 153:18 154:6 156:17 157:10,11 158:2,25 159:18,19 160:9,10 162:11 164:13 165:5, 11 166:4,6 168:24 169:6 171:13 174:16 177:2, 20 178:7,17 179:7 180:9, 18,20 181:25 190:1,6 194:14,16,22 196:5,14,15, 23 197:8	198:7,12,21 200:1,6,18 201:1,20 202:11 203:10,16,23 204:6,7 205:6 206:3 209:1 210:18 215:1 216:7,8,11 217:1,2,5,14 218:5,7,19 219:1,2,6,15 220:15,16 221:1 223:3 224:22 228:22,24 230:3,15 231:8,11 232:1,19 233:2,4,7,13, 22 234:1,11, 15 235:21 236:3,6,9,15, 17 237:3 238:17 239:7 240:5 241:10, 11,16 242:13, 14 244:11 248:11,21 249:5,13,24 250:5,11,13 251:13 252:9 254:9 those 11:13 14:24 16:13 22:14 24:10 25:24 26:10 29:10 35:21 36:18,24 37:2 40:9,22 51:14 56:1 60:24,25 61:24 81:5,13 101:8 111:2 113:8,11
---	---	--	---	---

121:17	129:10,24	163:8 164:6,	26:2,3,11,13,	63:7,8 64:5,
122:10	130:3,6,11,	17,18 169:6	14,15,16,17	15,20 65:2,22
123:15 125:1	16,17,20,23	176:4 177:21	27:14,15,19,	66:2 67:1,4,
135:11	131:9,13,19	179:8 181:16,	22,25 28:2,	23 68:1,21
140:15	148:19,20	24 185:6	16,17,24	69:8,15,16,
145:23 157:6	150:9 153:16	188:14	29:11,12,13,	17,21,22,24,
163:5,7	154:14,18,21	203:19 204:9	20 30:12,22,	25 70:3,4,7,
166:14 168:3,	155:1 170:8	206:15	25 31:3,9,17,	10,14,17,20,
21 170:10	229:20	213:15	23 32:2,4,6,9,	25 71:1,3,7,9,
178:21	249:16	231:10,16	12,23 33:4,7,	11,13,16,23,
182:23 187:6	thus 80:17	232:12,19	8,19,23,24	25 72:10,11,
190:17		240:7 246:21	34:4,7,9,11,	12,17,23
198:24	time 5:16 8:6	251:14	16,19,21,24	73:6,9 74:7
199:22	9:20 13:17	252:24	35:7,15,16,20	75:14 76:3,
207:21	16:6,24	times 60:23,	36:12,14,22,	13,25 77:10
209:14	18:17,23	24 146:21	24 37:2,3,7,	79:9,12,20
210:14	19:23 22:19	147:13 168:2	14,15,16	80:19 81:4,5,
212:18,20	23:20,21,25	179:11	38:4,13,23,25	11,12,25
215:11,12,22	24:1,3 28:2	232:13	39:5,19,21	82:6,7 83:18
216:13 217:5,	33:1,9 35:1	248:18,22	40:3,5,9,17,	84:4,19,21,24
24 225:6,9	38:20 42:12,	timing 68:22	18,22,24	85:3,4,5,11,
230:15	23 43:16,21	title 132:12	41:2,17,20,23	13,14,19
241:11	44:19 45:22	to 5:13,16,17,	42:4,6,20,25	86:18,19,20
though 213:4	46:24 47:1	21,22,24	43:6,7,12,14,	87:10,15,21,
221:4 233:2	50:23 52:12	6:14,15 7:3,4,	20,22 44:6,7,	25 88:2,6,11,
thousand	55:23 56:14,	7,12,17,18,	14,17,23,25	12,17,24
199:9	23 57:14,20,	23,25 8:10,	45:18,19,21,	89:7,13,14,17
three 93:22	25 58:4,9	15,21,24	24,25 46:2,21	90:6,9,24
101:7 146:13,	61:14 62:11,	9:10,16,23	47:1,4,16,20,	91:2,20 92:2,
15 198:8	21 64:25	10:1,12,19	25 48:13,15,	8,12,16,22
247:1 248:18	66:16 67:23	11:1,14,19	18,20,22	93:1,2,5,9,10,
through 5:15	68:4,5,6,13	12:5,11,19,23	49:1,4,5,13,	11,12 94:5,
35:19 36:16	69:2,19 70:11	14:9,14,24	19,23 50:1,7,	10,15,18,19
67:14 101:8	72:13 74:2	15:11,17,20	11,13,18,25	95:15,22
104:22	77:17 78:23	16:1,4,7,10,	51:8,11,22,25	96:1,16,21,22
115:11,12	81:9 84:10	17,24 17:9	52:1,16,17,23	97:8,11,18,
116:15	87:23 88:3	18:9 19:16,	53:2 54:6,9,	23,24 98:2,3,
120:23 121:1	92:5,23 94:20	21,22,25	10,13 55:12	7,13,16,18,
123:14	96:12 97:16	22:19,22 23:3	56:2,10,15,24	21,24 99:5,7,
124:25 126:1,	99:3,25	24:11,18,25	57:2,7,11,17,	11,13,16,17,
2,7,22,24	100:10 111:5	25:7,9,10,13,	21 58:4,5,9,	19 100:2,11,
128:14	114:4 128:3	20,22,24	14,21 59:1,	12,17 101:3,
	130:22		18,22 60:11,	13,14,17,18,
	134:14 151:8		18 62:4,23,25	25 102:1,14,

17,18,20,21, 22,24 103:4, 6,10,12,13, 14,19,23 104:4,6,15, 18,21,23 105:2,7,19 106:11,15,18 107:1,3 109:13,20 110:1,7 111:6,12,13, 14,20,22,24, 25 112:8,14, 19 113:3,11 114:6,8,14, 20,23 115:2, 3,5,9,22 116:1,2,3,7, 12,14,16,18, 21,22,24 117:9,18,21, 24 119:16 120:7,11,19, 25 121:2,8 122:7,15,19, 22 123:1,15, 21 124:2,4,8, 10,15,17,20 125:5,6,14,15 126:2,9,11,21 127:3,17,21 128:13,25 129:1,14 131:22 133:11,14 134:2,4 135:13,19 136:12,14 137:3,25 138:1,8,10, 16,19 139:2, 3,11,21 140:7,25	141:10,17,20, 23 142:1,4, 10,12,16,17, 21,25 143:2, 4,13,19 144:2,6,15, 18,20 145:10, 11,12,13 146:7,13,16 147:1,2,4,5, 13,22 148:3, 6,8,9,10,19 150:8,10,20 151:2,8,12, 17,21 152:12 153:1,3,6,13, 15 154:8,25 155:15,16,25 156:9,11,16, 17,20 157:4, 7,9,15 158:2, 5,9,20,25 159:11,16 160:7 161:5, 12,13,25 162:17,18 163:10,24 164:1,15,16, 22 165:4,12, 17,18,20,21 166:12,18,25 167:3,6,7,11, 13,23 168:3, 6,13,19 171:2,4,5,15 172:7,25 173:1,10,12, 19 175:4,6, 20,23 176:11, 17,23,25 177:14,22 178:2,5,11,13 179:3,4,6,10, 20,22 180:2,	4,11,12,14,23 181:4,10,14, 15,16,18,20, 23 182:2,4, 18,21 183:14 184:10 185:12 186:2, 4 187:23 188:7,15,19, 22,23 189:8, 10,17 190:1, 3,5,7,17,24 191:2 192:5, 6,21 193:3, 16,19 194:16, 22 195:2,7,9, 11 196:1,11, 15,20,25 197:5,21,23 198:20,24 199:15,25 200:19,20,24 201:1,3,10, 12,13,14,20, 21,22,24 202:2,7 203:3,16,17, 19,20,21 204:1,2,6,8,9, 10,11,16,17, 18,21,22 205:4,6,8,10, 13,16,25 206:2,9,15, 16,18,22,23, 25 207:2,9, 14,16,17,18, 23 208:4,7,11 209:3,11,20, 22,23 210:11, 21 211:6,11, 12,16,25 212:2,7,8,9, 21 213:2,5,	10,18,20 214:1,5,7,10, 12,24 215:7, 8,10,16,17, 20,23 216:4, 10,14 218:4, 6,10,11 219:16,18 220:2,21,23, 24 221:3,9, 16,22,23 222:1,10,11, 17 223:4,6,19 224:3,10,14 225:11 226:14,25 227:23,25 228:9,10,11, 17,20 229:2, 4,11,12,16, 20,21,22,23 231:24 232:1, 5 233:1,13 234:2,6 235:5,14 236:9 237:3, 9,15,16,22 238:15 239:11,12,22 240:1,5,6,9, 11,15,24 241:1,22 242:6,9,16 243:2,5,9,12, 15,20 244:4, 8,15,18 245:3,4,6,10, 11,19,20 246:1,2,4,18, 24 247:11,14, 25 248:13,15, 16,18 249:9, 11,13,15,18, 23,24 250:2,	6,13,15,19,22 251:1,4,8,13, 14,15,16,17, 21 252:2,19, 20,22 253:4, 11 254:8,9,10 today 45:13 90:13 today's 7:3 together 5:15 10:1 16:11 18:16,20 19:1,13 28:12,14,17 29:17,18 84:11 107:25 156:24 174:17 204:13 217:13 233:10,22 234:11 239:9 told 109:10 174:2 206:24 208:10 242:14 too 68:1 70:19 142:4,12 214:11 226:2 234:11 tool 189:8 tools 149:3 top 44:24 59:22 63:8 108:5,21 143:12 195:11,12 221:6 222:12 225:19 249:17
--	--	--	---	--

topic 142:5,9, 13 143:2 226:5 topics 9:25 track 165:20 181:25 182:7, 14,18,19,22, 25 tracked 181:10,14 182:4 tracks 163:20 183:8 traditional 22:6 37:14 72:13 193:8 traffic 213:8 training 142:3,11 transcript 6:20,21 transmitting 110:1 travel 180:17, 18,25 224:1 treaded 209:1 treat 78:2 tree 129:13, 16,18 130:6 trend 135:11 143:10 tried 9:10 51:8,25 68:1 72:17 97:18 102:1 104:6 111:6 156:16 175:6 183:14 190:24 195:2	206:18 244:18 trivial 201:2,3, 13,14 TRM 242:10 trouble 146:18 true 126:6 try 16:17 22:22 49:23 64:5 72:23 201:1,12 239:11,12 247:24 trying 29:13 31:3 32:6,9 34:7,21 35:7 62:3 69:8 98:7 100:17 106:15 125:5 176:23 199:25 205:6 turn 7:18 21:11,13 55:12 71:25 96:22 114:8 115:9 117:6 153:6 210:11 225:11 turning 116:2 249:18 tweet 142:24 143:17,22,24 144:2 tweets 141:12,19,24 142:4,12 tweets' 142:3, 11	Twitter 133:12,23,25 134:11 135:4, 5,6,7,9,15 136:1,10 137:10,18 138:9,18 139:1,13,23 145:10,22,25 146:22,23,24 147:4,7,11, 15,19,20 148:1 149:1,9 150:1,19 151:1,7,20 152:6,8,11,23 153:3,5 253:22,24 254:1,3 two 8:21 11:13 24:22, 24 25:11 26:11,15 27:7 36:6 63:23 65:15 69:9 82:18 101:7 103:16 107:25 114:24 122:19,23 123:10,12,13 124:21 144:11 146:13,15 148:11 155:12 157:6 166:3 171:14 172:24 194:21 195:11,12,16 198:8 204:11, 13,16,18 205:7 206:16, 22 207:1,9	209:12,20 211:15 212:18,20 213:18 231:2 241:13 247:1, 20 two-ranking 212:17 type 15:22 52:25 53:12, 17 54:15 55:7,15 60:24 61:10 63:22 66:3 122:10, 11 135:11 147:14 151:16 152:8 158:19 168:7 182:13,25 199:22 203:15 210:14 215:12 220:8 224:4,22 types 15:16, 19 16:1 17:7 25:17 140:16 158:10,17,18 159:8,17 183:6,9 211:15 215:5, 17 238:24 U UC 219:14 uh-huh 8:8,18 10:11,16 11:17,23 12:4,13 14:10 17:1 21:21 24:2 40:8	41:4,16 53:9 61:23 67:10 75:22,24 76:2,16 79:16,24 80:12,21 82:2 83:8 85:1 89:1,18 90:8 91:1,6 103:2 105:18 114:17 115:1, 6 116:10 117:10 133:6, 10 134:8 137:5 142:20 143:3,16 146:3 153:14, 20 154:3 157:18 158:13,21 163:14 164:21 170:16 189:1 200:18 203:8 210:3,8 221:8,21 222:16 225:23 228:1, 8 230:21 231:23,25 233:6 238:5, 22 uncommon 213:19 under 14:15 20:4,15 46:19 68:21 92:7 100:24 102:14 114:24 121:11,13 124:9 126:10 172:18
--	---	--	--	--

208:16,19,24 250:15,18 251:20 underneath 79:9 83:20 135:12 understand 5:14 8:25 9:16,23 10:10 11:11,24 12:2,8,19,21 14:1,13,21 15:1,2,9 17:18,22 18:10,14,18, 24 19:11 42:20,25 43:6 45:11 50:12 53:21 69:13 75:25 76:9 77:13,18 78:5,8,10,11, 14,17,24 81:16,22 86:4 88:15 89:19 90:9 91:15 92:1,7 96:1 97:23,24 98:3 118:11 140:10,14 201:1,12 211:3 224:12, 14 227:17 239:19 253:7 understandin g 12:22 13:2, 11 14:15 15:15,19 18:8 19:5 52:1 58:17 63:13 126:10 139:24 169:16	204:20 205:3, 12,15 understands 88:18 understood 69:3 Unfortunately 213:24 unified 217:14 236:25 unintelligible 22:2 25:2 56:19 132:3 137:12 unique 37:7 63:1 unit 56:22 unknown 30:1 142:25 150:23 152:13,20 unless 5:17 24:7 34:15 56:9 unnecessary 80:18 unsolicited 213:25 214:11 up 20:14 29:10 44:8,22 45:7 62:6,14 88:18 96:13 115:22 140:20 168:19 169:4 173:21 175:22	177:20 178:4, 25 179:12 182:20 197:23 216:6 217:9 218:25 219:24 220:11,13,16, 17 221:1 224:3 231:11, 14 233:25 234:14 236:25 242:6 update 107:23 110:25 111:2, 4 217:20,23 218:4 updated 36:11,12 108:3 111:3 217:25 us 13:5 136:18,19 147:20,23 usability 62:19 63:12 usage 187:13, 18 230:8,20 231:20 235:15 use 11:14 44:25 49:14, 24 51:10 57:7 59:23 60:10, 18 64:15 66:19 67:23 69:15,21 70:3 72:23 74:10, 13 79:11,12 81:4,11 92:22 96:1 106:14 112:7,13,18	113:12,14,20 125:13 129:13 135:6 137:25 144:2, 5 147:5 163:8 166:9 192:8, 10,11,12,13 193:1 196:6,7 227:4 239:12, 13 240:24,25 241:1 242:6 251:22,24 used 25:25 40:9,18 46:11 64:12,17 71:3,7,11,16 78:19,20 79:1,2 83:20 84:6,8 91:16 97:18 100:18 104:9,10 117:1,5 118:1,14,15 119:17 120:1 122:3,11,14 124:17 141:25 158:5 176:2 183:20 184:12,21 191:11,16,18 192:5,6,23 204:25 205:19 219:8, 16 220:2 221:16 223:11,12,20 232:1 238:9, 12,24 239:3, 20 241:17 243:5,9,12, 15,19 useful 22:24 24:5 34:10,21	35:8,12 45:1 56:17 59:23 141:2 147:16 useless 34:22 35:9,13 44:9 226:3,14 user 17:12,17 31:8,9,10,11, 12,13,19,23, 25 32:1,3,4 33:24 35:22 36:9,13 37:16 38:1 44:6,8, 23 45:9,10 49:24 51:23 59:19,20 60:4,22 61:1, 9,12,16 62:6, 14,23,24 64:3,4 69:16, 22 70:4,6 71:2,4,6,8,9, 10,12,13,15, 17 85:21,24 86:19,20 87:6,16 89:7, 17 103:4,5,7, 10,11,12,13, 14,15,19,23 104:15,19,25 110:8 111:1 118:17 119:9 120:7 121:19, 21,22 122:9 124:8 125:14 127:21,22 128:10 129:21 136:10 137:11,19 139:8 145:13 150:20 158:10 166:6
--	--	---	---	--

167:24 169:7, 11 172:10,11, 25 173:1,13, 19 175:8 176:13,17 177:1 178:5, 17,18 181:13, 16 182:1,18, 19 186:21 190:20 194:20,21,22, 24,25 195:10, 11,12,13,14, 15,16,22,23, 25 196:1,6, 10,20,21,22, 23,24,25 197:4,5,8,10, 17,18 198:5 199:13 200:2, 3,16 203:5,6, 12,14 204:2, 8,9,15,17 205:23 206:13,16 207:5,17,18 208:11,12,13 211:11,17,20, 21 212:14 213:3 216:4, 8,10 217:16 222:17 223:4, 6 226:3,6 227:22 228:3, 6,11,15,22, 23,25 229:19 230:10 231:9, 13,22 232:3, 4,11,13 233:14 234:24 235:3, 8,10,22,25 236:7 237:6 238:1,4,6,21	239:4,7,8 242:1,2,17 243:4,9,12,24 244:1,3,5,9, 14 245:10,20, 25 246:2,3,4, 12,14,15,16, 17,18,21,22, 23,24 247:4, 5,6,9,11,14, 19 248:12 249:10,23,24 250:2,5,11, 12,14,15,19 251:17 252:2 user's 62:20 163:20 177:1 194:19 210:19 215:7 226:16 241:6, 7 249:24 users 31:21 46:6 51:11 59:18 64:3 76:14 77:1,10 85:15 89:5,15 93:20 104:4,6 110:9 121:20, 24 124:17,19 125:12 130:6 131:11 133:13 134:13 135:3, 4 137:25 138:10,19 139:2,14 151:12 161:5 167:24 168:6 172:25 176:11,25 178:22 181:9, 14 182:4,7,14 183:1,9	194:21 195:16,21,25 196:6,13 197:6,25 198:2,4,6,8, 10,20,21,24 199:8,11 200:4,5 202:5,8 203:20,21,23, 24 204:7,16 206:3,24 208:7 214:24 215:10,11 219:23 231:19 235:3, 10 237:2,3,5, 9 240:1,4,8, 11,19 245:9, 11,17 246:5, 12 247:9,12, 15,17,21 248:7,13 249:11,14,23 250:3,7,13, 16,20,22 251:1,18,21, 22,24 252:3, 6,7,11 uses 38:21 73:5 76:13, 19,25 81:18 118:12 135:4 192:19 220:21 222:1 using 36:3 38:16 39:18 68:10,14 70:14,20 80:13 81:21, 23 83:9,15 104:11 120:10,14,16	129:16 144:14 145:23 146:1 147:4,21,25 187:3 196:16 216:6 217:12, 13 221:22 226:20,21 227:2 242:20 usually 22:17 97:14 113:1,6 136:10 162:1 179:17 183:17 196:14,19 216:20 252:9 utilize 26:21 40:13 92:15 93:2,5,12 109:25 110:2 135:12 140:7 159:20 161:2 197:6 217:2, 3,4 234:6 239:17 utilized 93:19 147:18,19 160:4 utilizing 161:24 V vague 44:12 102:15 167:1 valid 192:25 value 29:19, 25 30:4 92:22 104:8 117:4 211:11,16 221:23 230:9,	19,22,23 231:1,3,4,5,8, 11,15,21 232:2 233:21 235:23,25 236:2,3,9,16 238:10,13 241:1,2,4,5, 18,24 242:3, 7,8,17,20 243:16,20,21, 25 values 28:7,8, 10 29:9,23 93:3,13 104:7 111:3 212:20 231:19 233:10 236:8, 20,22 238:4, 6,9,12 variable 234:20 variables 221:16 222:1 233:5,18 234:17 variation 218:24 various 29:3 38:17,21 51:13 92:17 124:12 158:8 176:3 180:6 221:11 232:20 241:10 vary 110:7 vector 194:14 238:20 239:3, 4,5,14
--	---	--	--	---

vector-based 193:25	209:12 218:19 219:19,22,24, 25 220:7,10, 11,13,16,17 222:12 224:22 225:9 239:9 250:13 252:11	135:23 136:14 139:9, 11 151:8,12 153:1,15 155:25 159:16 162:18 166:25 167:6 179:20 180:10,11 182:18 187:20 190:1, 5 195:11 197:5 204:14 208:11 209:7, 20 216:4 218:10 219:18 227:22 237:16 245:6	79:14 84:4 98:2 101:17 118:25 119:14 129:12 152:19 153:3 160:25 167:3, 24 168:24 170:17 171:7 176:16,18,22 177:20 182:2 187:16 190:21 193:22 195:5 196:7 197:3, 24 204:14 216:7 217:8 218:17,18 219:18 223:3 227:23,24 246:10 248:6 252:5	79:20 82:6 84:18 85:4, 12,21,23 86:20 93:2,12 96:24 103:14 104:6 106:4, 6,10,14,25 107:2 110:13, 20 113:1,25 117:11 118:2 123:4,7,10, 13,14 124:11, 15 138:8,17 141:18 142:1, 17,24 143:1, 9,13 145:8,9 146:20 147:6, 17,19,21 150:14 154:8, 14,25 155:11, 24 156:3 163:24 166:5, 6 168:18 171:15 173:4 175:8 178:11, 19 190:1 195:2,16 198:20 201:22 203:3, 10 204:4,7, 14,18 209:16 211:6 218:4 221:1 222:6,8 231:24 237:10 240:4, 19 241:3 243:2 244:25 246:16,17,23 249:8,17 250:9,12 251:10 254:9, 10
verbal 5:22,24 153:21 158:14 190:15 194:5	via 186:6	wanted 85:3,4 180:12	ways 65:7 69:8 124:12 189:17,23	
verbally 142:22 143:4, 19	vice 25:8,23	wanting 167:11	WCMK 236:16	
versa 25:8,23	video 158:19	wants 178:5	we 5:15 8:12 13:3,6,7 17:4 19:16 24:14 25:13 26:9, 11,14,16,22 30:3 31:12, 19,20,24 33:10 35:4 38:16 42:10 44:18 46:4 50:9 52:16 55:12 57:12, 13,19,20 58:2,3,7,8,25 59:17 61:5 62:21 66:19 71:19,21 75:7	
version 163:10	videos 159:10	warming 29:10		
versus 233:16	viewed 164:17	waste 72:15		
very 9:9 17:20 18:4 22:18 25:4 29:3 31:16 37:6,13 45:7,10 51:15 56:13 60:3 62:25 63:1 113:5 118:16 124:14 134:24 135:1 136:13,14,15, 16 137:2,8 139:13 140:7 141:2,19,20 147:16 150:6 151:7,10 153:2 160:5,6 163:7 166:10 167:20,21 168:8,23,24, 25 169:6 173:21 175:23 176:15,20 177:5,6,9,21 195:5 196:1 197:7 208:22	viewing 180:5	wasting 99:24		
	visualization 83:18 84:2	watch 64:18, 22,25		
	voce 7:15 21:15 24:16 115:20 133:9	way 16:25 17:12 27:23 28:22 31:13 37:7 38:13 40:3,4,5,12 50:7 51:24,25 60:8 61:13 62:24,25 71:1 72:11,22 78:18,19		
	volume 32:21 33:3			
	voluntary 140:16			
	W			
	wait 225:14			
	want 6:14 25:20 26:17 29:11,12 31:5 35:20 37:6 44:25 48:18 56:15 57:17 58:14 68:21 71:13 72:12 97:11 101:17, 18 122:7			we'll 128:24 153:16

178:21	weights	35:19 42:22	176:14	26:2 27:24
we're 13:22	145:10	43:16,25 44:3	178:10,24	29:2 33:9
33:5,10 62:3	179:12,13,15	46:10,24	181:7 182:12	40:13 43:19
72:7 75:8	well 6:13	48:16 50:16	184:15	44:4,22 62:6,
112:25 113:1	96:20 113:5	52:12 53:14	186:18	14 64:3,15,18
114:22	116:7 124:18	54:17 56:20	189:21 194:7	67:22 68:6
147:16 153:8	125:14	59:4,11,13,24	195:12 198:1,	86:25 87:3,7,
176:23,24	139:14	60:17 63:15	9 199:4,5	12 88:7,19
189:25	141:17 149:3,	64:12 65:20	201:8 202:4	89:13 91:15
194:12	18 150:3,22	72:6 75:14	203:9 204:24	94:3 96:24
209:18 245:7	160:5,6	76:18 77:17	205:14 206:8,	98:12 99:4,15
250:22	167:21 168:8	78:7 80:22	18 208:6	100:11
we've 14:13	169:6 170:18	83:14 86:10,	209:17,22,24	101:12,24
48:2 55:3,13	175:24 177:7	21 87:3,7	210:11,25	102:16
62:1 79:13	180:10 205:9	88:7,8,20	214:15,17,18,	104:17
131:2 155:24	219:19,25	89:25 90:10,	20,21 216:4,	107:22
weakness	220:11	14 92:5 93:14	11,19,23	110:25 113:2
69:5	224:23 225:9	94:12 97:8,11	217:1 218:7,8	115:3 124:16
web 33:8,11	well-equipped	99:3,13	219:10	125:11
82:4 83:1,3,4,	160:5	103:9,19,25	220:19,23	128:17 141:1
5,9,16 84:7	well-trained	104:24	222:18,20	151:10
132:25	160:5	105:19	223:12,14,24	156:17 160:7
140:18 159:2,	went 7:23	106:15,17	224:8,15	164:14 165:3,
9 222:25	98:13,21 99:5	107:12 113:9	225:13,18	20 166:12
223:5,6	100:2 101:8,	115:4 116:16	229:2 230:24,	168:8,11,18
230:15,17	14 102:18,20,	117:19 119:2	25 232:8	169:21 170:1,
website 33:15	21 123:10,13,	120:13,20,24	236:10,13	8 176:8 185:7
140:11,12,17	15	121:6 124:3	238:11 241:3,	194:23
websites	what 6:1 8:19	125:4 126:1,	20,21 242:23	195:20 196:2,
150:19	9:3,8 11:6	23 127:20	243:11 247:6	9 202:20
weeding 32:9	12:22,24	129:5,9	248:11	208:6 219:21
weight 179:13	14:13 15:6,7,	130:25 132:5,	250:25	220:16
180:3 217:25	13,15,18,19,	12 133:1,25	252:12,16	235:22 236:7
218:5 220:15,	22,24 16:1,18	136:4 137:13	253:7,11	239:3 247:3,
25 221:1	17:2,5,7	138:14,25	254:1	19
233:23	19:18 21:23	139:24 142:7,	what's 218:7	where 16:13
234:10,13	22:7,25	9,10 145:21	224:9	20:23 26:5
weighted	23:16,23	146:8 148:21	whatever 36:8	32:15 33:2,18
233:11	24:5,19 25:3,	149:25	135:23	37:16 41:7
239:12	10 27:2,23	153:22 156:6,	139:18 176:9	47:13 50:4
	30:19 31:2,11	17 162:1,9	178:5	56:11 58:20
	32:3 33:24	167:15 170:5,	when 14:21	60:6 79:10
		7 173:11,17	15:9 17:10	80:8 91:4
		174:22		98:23 99:9

101:11,14 105:11,22 106:2 110:2 117:25 119:11 124:21 125:2 127:10 136:1 139:9,20 140:2 152:8 154:17 156:9, 12 157:20 158:10 159:25 161:3, 18 169:9 172:19 182:10 189:9 190:5 191:16 192:2 193:15 216:24 229:14 239:25 242:1, 10 247:18 250:12 where's 105:21 whereas 72:4 whether 10:19 11:2,8, 9,20 12:15 14:23 15:10 42:3,6 47:4, 20 48:25 53:23 55:22 60:4,11,19 61:5 66:20 67:8 77:6 86:13 97:17 98:7,12 99:16 100:2,18,23 101:13 102:4, 16 111:22 119:10 129:21	136:19 162:2 166:12 175:25 220:8 242:3 248:12 which 8:1,10, 15 11:13 13:23 19:22 26:17 34:9,10 35:3 37:13 38:14 41:3 42:2 47:15 60:6 73:16 75:20 79:18, 24 82:3 83:25 89:8 94:15 95:11,15,23 96:3,7,17 105:25 107:4 108:22 109:5, 7,9,13,20 110:23 111:24 112:1 117:5 120:13 121:1 123:12 133:3 141:20 154:4,19 156:12 162:3 164:10 171:17,21 172:5 174:1, 3,4,8,10,14 191:10,17 192:1 201:23 208:14 212:4 226:4,5 236:16 245:5, 7,13 while 211:12 251:10 who 31:17 198:25 231:6 240:5,11	whoever 152:19 196:20 whole 8:5 10:2 13:8,9 14:19 18:8 33:21 36:12 42:5,11 54:10,11 107:21 150:12 160:24,25 244:19 wholly 13:3 why 22:23 24:14 48:24 51:9 56:6,17 64:25 90:21 96:25 98:4,17 100:10 101:2, 3,10 102:9 103:3 104:14 134:16,19 136:15 139:13 150:6 151:10 154:4, 10,15,22 155:2,5,7 157:1 159:16 175:14 183:13 184:11 192:17 197:20,22 206:17 223:9 246:9 250:25 widely 25:25 84:6,8 219:8 239:3 Wikipedia 139:25 140:10,23	142:18 143:9, 11 144:3,6 Wikipedia's 144:15 wishes 228:11 with 6:5,22 7:2 18:7 20:1, 20 22:5 29:11 33:7,11 38:9 39:9,23 44:8, 21,22 45:7 50:2,13,18,25 51:11 53:23 54:20 55:9 61:9,16 65:1, 16 66:3,7,13 69:4 80:19 84:4,12 91:4 96:13 99:7 100:21 103:5 119:17 120:1 122:3,14 127:7,11 128:3 133:18, 21 134:9 135:19,21 136:16 137:2 138:5 139:11 140:20 141:11 142:8 143:22 146:5, 11 147:1,5 148:22 149:6 150:6,16,21, 23 151:2,21 152:13,20 153:2,8 156:18 158:16 159:24 160:8, 22 161:14,16, 18 162:8	163:21 164:6, 18 166:3 168:1,19,20 169:4,8 173:21 175:22 176:25 177:20 178:4 179:1,6,11,12 180:11,17,19 182:1,20 185:7 189:9 190:2 191:1, 6,11,19 192:15 195:25 197:23 200:25 201:11,21 212:10 213:13,14,22 214:3 215:10, 24 216:2,6, 17,18 217:9, 18 218:1,23, 25 219:4,24 220:11,13,16, 17 221:1 224:3 225:9, 24 226:3,11 231:11,14 232:14,25 233:25 234:14 236:25 242:7 246:1 250:6, 11 within 34:2,6, 19 35:2,6 63:5 83:10,16 123:8 159:3 172:7 221:11 226:15 230:14 238:9
---	---	---	---	--

242:17 without 29:12 96:8 169:7 171:5 190:3,9 191:4 192:14, 24,25 212:3 witness 8:23 12:20 13:1 15:3 21:10,14 28:20 32:13, 18 34:13 42:1,9 46:23 47:12,17 49:12,22 53:6,20,22 54:22 71:19 73:25 74:6,22 75:2 80:11,23 82:16,19 85:20 88:12, 16 94:13 114:5 115:13, 23,25 116:5 118:10 120:22 127:2, 6,14 128:2,5 129:7 130:18 131:6 133:7 134:22 138:6 141:22 143:6 144:12 145:6, 17 146:19 149:22 152:4 155:21 156:15 159:22 163:22 167:2 172:1 180:8 181:8,22 183:12 186:13,23 189:15 191:24 202:3	204:3 206:10 209:4,5 211:19,23 212:13 222:6 225:17 226:9 229:7 232:23 235:7 239:1 242:12 245:2, 16 248:16 249:3 251:3 WMCK 235:24 women 250:8 wondering 48:24 word 17:2 39:24 48:5 49:14 64:12 86:1,14 148:21 165:6 190:13 204:25 205:19 217:7 251:22,24 wording 30:20 70:7 words 142:25 143:1,24 217:7 work 5:15 9:5 10:1 28:11, 13,14,16 29:16,18 33:22 40:22 42:13,18 58:24 113:10 126:13 151:18 157:6 158:5 167:21 168:8 169:6 174:16 176:23 177:6	190:6,25 192:14,24 213:20 219:19 220:11,16,18 224:22 225:9 worked 9:17 works 8:25 9:2,23 10:10 29:4,6 65:8 113:5 122:24 137:8 160:5,6 218:18 workshop 132:17 world 150:22 151:4,23 worldwide 132:25 worried 57:10 worry 148:9 write 139:11 140:15 148:8 168:18 writing 134:2 162:5 168:1 202:9 226:17 239:21 written 27:23 62:24 97:22 159:15 164:15 171:8 223:4 wrong 47:22 95:7 105:8 167:1 wrote 187:16	X XML 84:1 Y yeah 5:20 7:19 8:4 9:15 10:3,8,14,24 11:5 12:1,19 14:12,15 15:5 16:12,15,17 17:4 18:13 19:10,20 20:5 21:11 23:8, 11,15,17,20 26:5,8,25 27:12,17 28:21 29:18 30:2,7,19 34:14 36:6,20 37:24 41:6 42:18 43:8 46:13,17 47:15 53:9 55:24 56:1,5 61:19 64:18 65:6 68:2 69:2 70:23 73:6,8,18,20, 23 74:17 75:17 77:8 78:10,11 79:19 80:4, 10,12 82:5, 11,14,21,23 83:3 84:1,3, 23 87:2,12 88:14,23 89:11,12,24 91:3,14 92:11 93:18 94:25 95:7 98:17	102:2 104:23 105:4,10,21 106:19 107:8, 11,22,24 108:3,17 114:19 116:6 121:3 122:17 123:19,20 124:6 125:2 126:24 127:24 128:4, 10,12 129:12, 15 130:10,19 131:11,18 132:11,16 133:4,8,17, 19,20,22 134:2,8,10, 13,15,20,23 136:9 137:2, 3,7,17 138:4, 7 139:19 140:1,12,18 141:7,23 142:15,20,23 143:8,20 145:1,7,19,21 147:6 148:4, 11,12 149:16, 23 150:5,7 151:24 153:12,22,25 155:18 156:16 157:6, 13,22,23 158:1,4,15 159:10 160:21 162:5, 8,15 163:2,4, 6,8,9,11,16, 23,25 164:4, 12 165:18 167:15 172:2 177:16 178:8,
--	---	--	--	--

9,17 179:24 181:23 183:7, 13,25 184:5 185:14,21 186:14 187:2, 5,9,16 189:3, 13 190:16,19 191:9 193:15, 18 197:17 198:7,20 199:7,8 202:10,13 203:8 205:2, 20 206:7 209:11,17 210:5,17,19 211:2,8,14 212:9,10,14 213:14,17 214:9,14 215:19 216:18 221:10,14,17 222:4,24 223:4,8 225:15,16,18 226:10,12,17 227:4,8,9,12, 13,22 229:8, 10 230:12,15 231:23 232:1, 4,6,7,24 233:20 234:4, 5,19 235:1,8, 11,13,20 236:17,20,23 237:25 239:21,24 240:3,13,14 241:5,12 242:13 243:14 244:2 248:2 253:19, 25 254:13	year 68:25 years 18:3 20:20 23:17 24:8 213:9 Yep 114:11 yes 7:12,14, 16 8:14,16 9:14,15 10:11 11:15,23 12:5,7,10,14, 21 15:14 16:9,12,15 17:20 18:1,6 19:4 20:9,13 21:6,7 23:21, 22 26:9 27:13 29:23 30:10, 23 31:1 32:14,19,22 33:14 40:12, 21 41:12 43:8,11 45:16 49:16 52:15 53:9 54:2,5,9, 20 55:4,10,21 66:17,18 69:12 70:24 71:18,21 72:3 74:12 76:3,8, 11,17,18,22 78:13,16 80:15,24 81:2,15,20,24 82:10 83:3 85:9 88:13 89:9,20 97:3, 5 103:8 105:4,21 111:22 114:16 115:7, 8 116:12,13, 19 118:14 121:9 123:18	126:20 127:9, 12 128:16 129:12,15 136:17 137:21,22 142:21,23 143:7,18 144:19 148:4, 16,18 149:5, 8,13 150:11, 25 154:24 155:4 156:1, 20 158:4 160:18 162:5 163:15 164:22,24 165:22 172:9 174:12 178:16 183:7 184:25 187:15,16,20 188:8,21 190:14 192:21 193:2, 8,15 194:6 200:11 206:1 210:1,3,6,10, 20,23 213:10, 11,12 214:4, 14 215:4,19, 22 216:22 221:18 223:1 224:21 225:25 226:17 227:8 228:15 229:10 230:4, 7,10,16 234:25 235:19 238:3 239:21 240:22 244:6, 16 250:23 251:12	yes-or-no 120:17 200:6 yet 127:8 244:6 yield 16:14 York 147:13 younger 136:13 139:14 yourself 115:22 145:4 Z Z-A-D-E-H 219:15 Zadeh 219:9, 15 zero 28:2 29:25 30:2 239:10
---	---	--	--