

DECLARATION OF DR. LATIFUR KHAN

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.

Petitioner,

v.

STERLING COMPUTERS CORPORATION

Patent Owner.

Case IPR2025-00430

U.S. Patent No. 7,716,217

DECLARATION OF DR. LATIFUR KHAN

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DECLARATION OF DR. LATIFUR KHAN

LATIFUR KHAN hereby Declares as follows:

1. I hold a Ph.D. in Computer Science from the University of Southern California. I hold an M.S. in Computer Science from the University of Southern California. I hold a B.S. in Computer Science and Engineering from the Bangladesh University of Engineering and Technology.

2. I have been retained by Sterling Computers Corporation (“Sterling”) and Sterling’s counsel in connection with Patent Trial and Appeal Board proceedings relating to certain patents owned by Sterling. I understand that these proceedings are *inter partes* reviews relating to Sterling’s U.S. Patent Nos. 7,716,217.

3. I am being compensated for my time at a rate of \$350 per hour. My compensation is not contingent on the opinions that I express or on the outcome of these proceedings.

4. The statements made in this Declaration are based on my own personal knowledge unless otherwise indicated.

I. Professional Background

5. I earned a B.S. in Computer Science and Engineering from Bangladesh University of Engineering and Technology in November 1993. I graduated First Class with Honors. I earned an M.S. in Computer Science from the University of Southern California in December 1996 and a Ph.D. in Computer Science, also from the University of Southern California in August 2000. I am presently a Professor in the Computer Science Department at the University of Texas at Dallas, a position I have held since September 2012. Before that, I served as an Assistant Professor and Associate Professor at the University of Texas at Dallas from September 2000 through August 2006 and from September 2006 through August 2012, respectively.

6. The quality and significance of my research has been recognized by many of my field's top awards including the IBM Faculty Award (Research) in 2016 (Fundamental Research on Data Analytics (Stream Mining)); IEEE (Institute of Electrical and Electronics Engineers) Technical Achievement Award in 2012 (IEEE Systems Man and Cybernetics Society and the IEEE Transportation Systems Society); the Fellow of Institute of Electrical and Electronics Engineers (IEEE), American Association for the Advancement of Science (AAAS), Institution of Engineering and Technology (IET), and British Computer

Society(BCS). My co-authors and I received a number of Best Paper Awards from various IEEE and ACM (Association for Computing Machinery) conferences. I have been recognized as one of the ACM Distinguished Scientists since December 2012. Other awards I have received include the UTD Inventor Award (April 2010 & December 2011), the UTD Author Recognition Award (October 2009), and the Chancellor Award from the President of Bangladesh.

7. I also serve my communities in various leadership positions through my role as editor, including serving as Associate Editor of ACM Transaction on Knowledge Discovery and Data (TKDD), (2021 -); ACM Transaction on Internet Technology (TOIT), (2019 – 2023); IEEE Transactions on Artificial Intelligence (TAI), (2021-2023); IEEE Transactions on Knowledge & Data Engineering (TKDE)(2011-2015); Associate Editor of International Journal of Data Mining, Modeling and Management (IJDMMM), Inderscience Publishers, Switzerland (since 2008); Associate Editor of International Journal of Security Informatics, Springer ISSN: 2190-8532; and Associate Editor of Computer Standards and Interface Journal by Elsevier Publishing (2006 – 2009).

8. As part of my service to the community, at academic and industry conferences hosted by IEEE, ACM and SIAM (Society for Industrial and Applied Mathematics) over the past few decades, I have served numerous leadership roles,

including as the keynote speaker, chair/co-chair, program committee member, presenter of tutorials, session chair, and panelist. I have been invited to present at Universities around the world and have been invited to review many books and journals. I have given lectures at Boeing, AT&T, IBM, TI, Raytheon, and Verizon.

9. My research has been recognized through the award of research grants, and I have served as principal investigator on over three dozen research grants from federal funding agencies and major corporations on the subjects of Data Mining, Data Management, Information Extraction and Retrieval, Cyber-Security and Data Sciences.

10. My research has been published in over 50 technical journal articles in top peer-reviewed journals, including in ACM Transactions and IEEE Transactions journals. My work has been cited more than 16,000 times and my h-index is 69 (meaning I have at least 69 publications that have been cited 69 or more times) according to Google scholar (<https://scholar.google.com/citations?hl=en&user=8Qt10f4AAAAJ>). I have authored five books namely, (a) Design and Implementation of Data Mining Tools, (b) Big Data Analytics with Applications in Insider Threat Detection, (c) Data Mining Tools for Malware Detection, (d) Analyzing and Securing Social

Networks, and (e) Secure Data Science: Integrating Cyber Security and Data Science (<https://www.thriftbooks.com/a/latifur-khan/2403464/?srsltid=AfmBOoqX9orqfM2rYz-aPeIkDLDgmtkBT7RjgQ7z5MRXCwAjpOaLofI5>).

11. In addition, my research has resulted in my (co)inventing many technologies in my areas of research. As a result, I have filed patent applications, three of which are now fully issued patents, including: US 61/944,304: System and Methods for Automated Detection of Application Vulnerabilities, Latifur Rahman Khan, Bhavani Marienne Thuraisingham, Just Sahs, Zhiqiang Lin, (U.S. Patent and Trademark Office (USPTO) (granted); US 8965974: Systems and methods for determining user attribute values by mining user network data and information, Satyen Abrol, Vaibhav Khadilkar, Latifur Rahman Khan, Bhavani Marienne Thuraisingham (U.S. Patent and Trademark Office (USPTO) (granted); and US 9,165,051: Systems and methods for Detecting a Novel Class, Mohammad Mehedy Masud, Latifur Rahman Khan, Bhavani Marienne Thuraisingham, Qing Chen, Jing Gao, and Jiawei Han, U.S. Patent and Trademark Office (USPTO) (granted).

12. My research interests include Data Mining/Machine Learning, Generative AI, Cyber Security, Big Data Analytics and Management, Semantic

Web, Multimedia Information Management, Cloud Computing, Healthcare Analytics, and Database Systems.

13. I am an acclaimed global educator and scholar in the big data analytics area. I have served as a Distinguished Visitor of the IEEE Computer Society for 2021-2023 and ACM Distinguished Speaker, 2020 – 2022. With remarkable achievements in research and technology, I have served as Program Chair for several prestigious data analytics/mining conferences including IEEE International Conference on Data Mining (ICDM), one of flagship conferences in Data Mining and IEEE Big Data, flagship conference on Big Data.

II. The Level of Ordinary Skill in the Art

14. I understand that a person of ordinary skill in the art is a hypothetical person who has ordinary skill in the art to which the claimed invention relates.

Based on my experience, a person of ordinary skill in the art of computer science would have at least a bachelor's degree in electrical or computer science/engineering, or a related field, with at least six years of experience in the design or implementation of content management and analysis systems or a masters degree in electrical or computer science/engineering, or a related field, with at least two years of experience in the design or implementation of content

management and analysis systems. A higher level of education or skill can make up for less experience, and vice versa.

However, I understand that the Board found that a person of ordinary skill in the art at the time of the purported inventions of the '217 Patent would have had a bachelor's degree in electrical engineering, computer engineering, or a similar field, and two to three years of experience with systems estimating relevance for various types of content; more work experience could substitute for education and vice versa..

Although the Board's definition of a person of ordinary skill in the art differs from the definition I had proposed, my opinions are the same under both definitions. In fact, because a skilled artisan under the Board's definition would be less skilled, that is even more reason why a skilled artisan would not be able to, for example, successfully combine the Rose and Bieganski references to make an operable system.

For convenience, I may refer to a person of ordinary skill in the art as "one of skill in the art," "a person of skill in the art," "a person having ordinary skill in the art," "one of skill," "POSA," or similar terms.

III. Abbreviations

15. For convenience, I will use the following abbreviations in this Declaration.

<u>Document/Proceeding</u>	<u>Abbreviation</u>
IPR2025-00430	IPR-430
U.S. Patent No. 7,716,217	the '217 patent
U.S. Patent Application Publication 2007/0016553A1	Dumais
U.S. Patent No. 6,202,058	Rose
U.S. Patent No. 6,334,127	Bieganski

IV. Legal Standards

A. Obviousness

16. I understand that a patent claim is obvious if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

17. I understand that the obviousness analysis takes place at the time the patented invention was made. I understand that the relevant date for the '217 Patent is at least as early as June 7, 2005, and that, therefore, Dumais is not prior

art to the '217 Patent. Nevertheless, for my analysis of obviousness with respect to the Dumais reference (Ground 1), I have been asked to assume that the Dumais patent is prior art to the '217 patent, and that the relevant date for the '217 Patent is sometime between June 30, 2005, and January 13, 2006 (the filing date of the provisional patent that led to the issuance of the '217 Patent). My obviousness analysis relating to Dumais reference would be the same whether the relevant date is June 30, 2005, or January 13, 2006. For my obviousness analysis relating to the Rose and Bieganski references (Grounds 2-3), I have applied the relevant date for the '217 Patent of at least as early as June 7, 2005. However, my obviousness analysis relating to the Rose and Bieganski references would be the same whether the relevant date is June 7, 2005, or January 13, 2006.

18. I understand that as part of the obviousness analysis one must consider whether prior art teaches away from the claimed invention.

19. I understand that when an obviousness challenge is based on a combination of references one must consider whether there is a motivation to combine the teachings of those references. There must be some motivation, reason, or incentive that would cause one of skill in the art at the relevant time to combine the prior art in the way embodied by the patent.

V. Claim Construction

20. I understand that claim terms should carry their “ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question” at the time of the invention. Unless otherwise stated herein, I have applied the ordinary meaning of such terms to one of skill in the art in light of the patents’ disclosure.

21. Dr. Fox argues that the “computer program modules” do not convey to a POSA a specific structure for performing the functions recited in the claim and, therefore, a POSA could not program any computer to perform the claimed functions. EX1004, ¶¶ 72-82. I disagree.

22. It is my opinion that a POSA would understand that “*monitoring module*,” “*first relevance measurement module*,” “*second relevance measurement module*,” “*relevance analysis module*,” “*content presentation module*,” and “*search module*” require structure.

23. For each module, the claim sets forth a sufficient structure to allow each component to perform its role in the invention. The structure may be in the form of software instructions, such as programs or code.

24. Claims 1 and 6 of the ‘217 Patent require storing a “*computer program*” or “*computer program modules*” on a “*computer-readable storage*

medium.” A POSA would understand the “*computer program*” or “*computer program modules*” stored on a “*computer-readable storage medium*” refers to software instructions or code, which, to a POSA, is structure.

25. The ‘217 Patent states that the “*monitoring module*” is “*configured to track actions by a plurality of users associated with an application for managing electronic content.*” By at least 2004, the use of software instructions (e.g., programs or code) to track use actions in systems for managing electronic content was known in the art. Monitoring by tracking use actions was a known feature of systems involving sent electronic content. At the time of the invention, there were existing or off the shelf systems that could provide this monitoring.

26. A POSA would recognize that the “*monitoring module*” in the claims requires implementing such structures. A POSA would be able to implement the claimed invention using known and available techniques.

27. The claims also discuss a “*relevance analysis module,*” which may have a sub-modules a “*first relevance measurement module*” and a “*second relevance measurement module.*” With respect to the “*relevance analysis module,*” “*first relevance measurement module,*” “*second relevance measurement module,*” the claims also contain sufficient structure for each module to do its intended job.

28. The claims state that the “*relevance analysis module*” is “*configured to determine the relevance score of the piece of electronic content sent from the sender to the user, the relevance score being determined based at least in part on the first determined measure of relevance and on the second determined measure of relevance.*” A POSA would recognize that software instructions (e.g., programs or code) are structure used to determine the relevance score.

29. The claims disclose sufficient structure for the “*relevance analysis module*” to determine a relevance score based at least in part on the first and second measures of relevance.

30. A POSA would be able to implement the “*relevance analysis module*” using known and available techniques. A POSA would recognize that the claims are directed to structure, not some “black box.”

31. The claims state that the “*first relevance measurement module*” is “*coupled to the monitoring module and configured to determine a first measure of relevance of the piece of electronic content based at least in part on one or more actions of the user on the piece of electronic content.*”

32. The claims state that the “*second relevance measurement module*” is also “*coupled to the monitoring module and configured to: identify at least one other of the plurality of users that is a recipient of the piece of electronic content*

and that is cognate to the user, and determine a second measure of relevance of the piece of electronic content” as based at least in part on one or more measures derived from the group consisting of: (1) “a local importance describing an importance of the sender to the user,” (2) “a global importance describing an importance of the sender within an organization with which the plurality of users are associated,” (3) “a content relevance determined responsive to content of the piece of electronic content,” and (4) “one or more actions on the piece of electronic content of the at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.”

33. The “coupling” of the modules to the monitoring module provides the relevance analysis modules with access to user actions. The claim explains how each “module” is engineered, built, or implemented to determine each relevance measurement. A POSA would recognize that software instructions (e.g., programs or code) are structure used to perform the necessary relevance determinations.

34. The claims also discuss a “*content presentation module.*” EX1001, Claim 2 & 13. The claims contain sufficient structure for the “*content presentation module*” to do its intended job.

35. The claims state that the “*content presentation module*” is “*configured to present the piece of electronic content to the user in accordance with the*

determined relevance score and to present to the user a value describing the determined relevance score.” A POSA would recognize that software instructions (e.g., programs or code) are structure used to present the piece of electronic content to the user in accordance with the determined relevance score and to present to the user a value describing the determined relevance score.

36. The claims disclose sufficient structure for the “*content presentation module*” to present the piece of electronic content to the user in accordance with the determined relevance score and to present to the user a value describing the determined relevance score.

37. A POSA would be able to implement the “*content presentation module*” using known and available techniques. A POSA would recognize that the claims are directed to structure, not some “black box.”

38. The claims also discuss a “*search module*.” EX1001, Claim 3 & 14. The claims contain sufficient structure for the “*search module*” to do its intended job.

39. The claims state that the “*search module*” is “*configured to search the electronic content in accordance with the determined relevance score.*” EX1001, Claim 3 & 14. A POSA would recognize that software instructions (e.g., programs

or code) are structure used to search the electronic content in accordance with the determined relevance score.

40. The claims disclose sufficient structure for the “*search module*” to search the electronic content in accordance with the determined relevance score.

41. A POSA would be able to implement the “*search module*” using known and available techniques. A POSA would recognize that the claims are directed to structure, not some “black box.”

42. For each relevance measurement “module,” the ‘217 Patent claims disclose sufficient structure to perform the required relevance measurement.

43. A POSA would be able to implement each “module” using known and available techniques. A POSA would understand that the claims are directed to structure, not some “black box.”

44. The provisional patent application contains an enabling disclosure of the invention. EX1003. With that disclosure in hand, and using tools and techniques that were known or conventional in the art by 2004, a POSA would be able to practice the claimed invention.

VI. Summary of Opinions

45. The opinions expressed in this Declaration are summarized below.

46. It is my opinion that claims 1-3, 5-9, 13-15, 18-19 and 22 of the ‘217 Patent are not obvious in view of Dumais.

47. It is my opinion that claims 1-3, 5-9, 13-15, 18-19 and 22 of the ‘217 Patent are not obvious in view of Rose.

48. It is my opinion that claims 1-3, 5-9, 13-15, and 18-22 of the ‘217 Patent are not obvious in view of Rose and Bieganski.

VII. The ‘217 Patent

49. The ‘217 Patent is entitled “Determining relevance of electronic content.”

50. One of the problems addressed in the ‘217 Patent is the volume of email, including that “many email users receive hundreds of different emails a day.” EX1001, at 1:21-27. Even after weeding out “junk” mail, users “must still take the time to go through those emails to determine which ones are more important than others.” EX1001, at 1:28-34.

51. The ‘217 Patent explains that solutions that came before failed to solve the problem. In typical email applications, in order to find the important

emails, users were forced to mine through email using “unintelligent mechanisms (e.g., keyword, sender, recipient, and/or date range searches).” EX1001, at 1:40-44.

52. To address this problem, the ‘217 Patent determines a “relevance score” for each “piece of electronic content that is sent from a sender to a user.” EX1001, at Claims 1, 6, 7.

53. In determining the “relevance score” of a piece of sent electronic content, the ‘217 Patent tracks not only actions by a single user on the communication, but also “track[s] actions by a plurality of users.” EX1001, at Claims 1, 6, 7. The ‘217 Patent refers to these actions of other users as part of the “communal elements of the system.” EX1001, at 8:34-36. The claims of the ‘217 Patent all require “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*” EX1001, at Claims. “[O]ne or more embodiments ... may determine the relevance and/or importance of an instance of electronic mail based on ... other user actions (e.g., what did other users do with that piece of electronic mail).” EX1001, at 3:36-42. “Users’ actions **86** represent the ways users interact with the electronic mail system, e.g. reading mails, replying to mails, changing settings” and encompass “other users’ actions.” EX1001, at 8:32-35. “[B]y monitoring a collection of user actions and then performing an analysis of those actions, valuable

information may be learned for subsequent use in an electronic mail application in accordance with one or more embodiments.” EX1001, at 6:18-23. “The electronic mail system **250** has a monitoring module **252**, which generally monitors and registers user actions **and those [actions] of users associated or corresponding with a particular user.**” EX1001, at 6:39-42.

54. The system also tracks the first user’s actions, including, but not limited to: “a user composes an electronic mail object; a user reads an electronic mail object; a user forwards an electronic mail object; a user replies to an electronic mail object; a user deletes an electronic mail object; a user files an electronic mail object in a custom folder; a user prints an electronic mail object; a user saves a local copy of an electronic mail object; a user copies an electronic mail object to their clipboard; a user links an electronic mail object (or part of a submessage) to a context; a user finds an electronic mail object as part of a search; a user includes an electronic mail object in a visualization; a user opens or saves an attachment; and a user forwards an attachment.” EX1001, at 11:10-23.

55. The ‘217 Patent determines relevance and importance values by monitoring users’ actions. EX1001, at 6:1-3. “Such monitoring may occur as part of an automatic, background process. As will be apparent from the description herein, users’ actions may indicate valuable information about both content and

entities in the system. For example, if a user receives an electronic mail object, saves the electronic mail in a custom folder and subsequently forwards it to three other users, then the electronic mail is likely to be much more relevant to those users than if the sending user had just deleted the electronic mail as soon as he or she had finished reading it.” EX1001, at 5:11.

56. The “*relevance score*” is determined based on two separate measures of relevance. EX1001, at Claims 1, 6, 7 (“*the relevance score being determined based at least in part on the first determined measure of relevance and on the second determined measure of relevance.*”).

57. The “*first measure of relevance*” is “*based at least in part on one or more actions of the user on the piece of electronic content.*” EX1001, at Claims 1, 6, 7; *see also* EX1001, at 5:45-48 (“an electronic mail relevance application helps users make sense of vast quantities of electronic mail by inferring a user's interest in content and other users based on **monitoring that user's actions** with in the application.” (emphasis added). This measure looks at “what did the user do with that piece of electronic mail” (EX1001, at 3:40), such as “reading mails, replying to mails, changing settings.” EX1001, at 8:32-34.

58. The “*second measure of relevance*” is “*based at least in part on one or more measures derived from the group consisting of: [i] a local importance*

describing an importance of the sender to the user, [ii] a global importance describing an importance of the sender within an organization with which the plurality of users are associated, [iii] a content relevance determined responsive to content of the piece of electronic content, and [iv] one or more actions on the piece of electronic content of the at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.”

EX1001, at Claims 1, 6, 7.

59. The “*local importance*” measure focuses on the “*importance of the sender to the user.*” EX1001, at Claims 1, 6, 7. For example, “it is likely that a user's direct manager will be important to the user because the user will typically read messages from their manager in a timely manner, will often reply to those messages, and will send their manager a significant number of electronic mail objects.” EX1001, at 6:12-17.

60. The “*global importance*” measure focuses on the “*importance of the sender within an organization with which the plurality of users are associated.*” EX1001, at Claims 1, 6, 7. Specifically, “users’ actions ... reflect how significant a given entity is to a given user or set of users.” EX1001, at 8:46-47.

61. “[*A*] *content relevance*” measure is “*determined responsive to content of the piece of electronic content.*” EX1001, at Claims 1, 6, 7. “Relevance **84** may

have as inputs the mail data **80** (properties of the content in question)....”

EX1001, at 8:58-59.

62. The final measure that makes up the second measure of relevance is “one or more actions on the piece of electronic content of the at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.” EX1001, at Claims 1, 6, 7.

63. The ‘217 Patent explains that users themselves can provide feedback: “users may themselves rate various aspects and entities in the system to improve an accuracy of the relevance analysis engine. For example, a user may provide feedback regarding the relevance of any given piece of content, and/or the user may provide feedback regarding the importance of any given entity. Moreover, a user may also change various weighting factors used to determine settings of the relevance analysis engine, where such settings may otherwise be self-adjusting.” EX1001, at 7:64-67.

64. The ‘217 Patent involves systems and methods relating to person-to-person communications. For example, every claim of the ‘217 Patent requires electronic communications, including “a sender,” a “sent” “piece of electronic content,” and a “recipient.” EX1001, Claims 1, 6, 7. The ‘217 Patent describes that electronic mail (e-mail) is one type of “piece of electronic content.” EX1001, at

3:43-44. However, the ‘217 Patent recognizes that its embodiments “may be applicable to other forms of electronic messages and content,” including other types of communications, such as “instant message (IM) communications and/or short message service (SMS) messages.” EX1001, at 3:48-51.

65. The ‘217 Patent is focused on how different users interact with the same piece of sent electronic content. For example, every claim of the ‘217 Patent requires tracking the actions of multiple users with respect to those electronic communications. EX1001, Claims 1, 6, 7 (“*track[ing] actions by a plurality of users associated with an application for managing electronic content*”). In order to do so, every claim of the ‘217 Patent requires “*identify[ing]*” at least one other “*recipient*” of the same piece of electronic content. EX1001, Claims 1, 6, 7.

66. The systems and methods claimed in the ‘217 Patent require “*identify[ing]*” other users that are “*cognate*” to the first user – e.g., “other users considered to be the most similar to the user concerned.” EX1001, at 33:58-62; *see also* EX1001, at 17:10-14 (“the relevance analysis engine may allow for the determination of similar or ‘cognate’ entities and users by automatic analysis of users’ actions”); *id.* at 42:62-63 (a cognate group consists of “users most similar to a given user/recipient”).

67. The ‘217 Patent allows for the determination of relevancy at least in part based upon the actions of other users that are “*cognate*” to the first user. For example, every claim of the ‘217 Patent states that one measure that can be used to determine the second measure of relevancy is “*one or more actions on the piece of electronic content of the at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*” EX1001, at Claims 1, 6, 7. “Cognate importance is based on purposefully biased samples, but still involves the views of a significant number of individuals rather than just one user.” EX1001, at 37:12-14.

68. In order to determine a relevancy score, the ‘217 Patent identifies other recipients that received the same piece of electronic content and then monitors “the direct actions of the cognate group on this particular electronic mail object.” EX1001, at 36:29-31; EX1001, at Claim 1 (“*second measure of relevance*” can be based upon “*one or more actions on the piece of electronic content of the at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user*”); EX1001, at 36:59-62 (“[I]t may be particularly useful to a given user to know what, for example, cognate users, have done with the electronic mail object soon after it arrives.”).

69. The ‘217 Patent also monitors “*cognate*” users to determine “how the cognate group in general has rated the sender[.]” of a piece of electronic content. EX1001, at 36:28-29; EX1001, at Claim 1 (“*second measure of relevance*” can be based on “*a global importance describing an importance of the sender within an organization with which the plurality of users are associated*”).

VIII. The ‘217 Patent Specification Discusses Why Its System Needs to “*identify ...*” a Second User That Is Both “*a recipient*” and also Is “*cognate to the [first] user*.”

70. A requirement of every claim of the ‘217 Patent is the requirement to “*identify at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user*.” EX1001, at Claims.

71. In the ‘217 Patent, “*identify[ing]*” a second “*user*” that is both “*cognate*” and a “*recipient*” is one of the steps required for assessing “*determining a relevance score of a piece of electronic content*.” EX1001, at Claims.

72. The ‘217 Patent discusses why it imposes this “*identify ...*” requirement in every claim.

73. First, the ‘217 Patent explains that “*identify[ing]*” other “*recipients*” is important because the actions of other “*recipients*” can help determine “the relevance of content in a given user’s folders.” EX1001, 12:27-30. For example, if “most of the recipients reply to the electronic mail object, forward the electronic

mail object, and/or copy the electronic mail object to custom folders, the electronic mail object is **more likely to be generally or globally relevant** than if the recipients immediately deleted the electronic mail object.” EX1001, 12:35-41. In contrast, **“if most other recipients of an electronic mail object delete it** as soon as it arrives in their ‘inbox,’ then the recipient in question will probably not find the content particularly relevant.” EX1001, 12:41-44.

74. **Second**, the ‘217 Patent explains why identifying “*cognate*” users is important:

In regard to recognizing “cognate” entities are referred to above, an electronic mail system in accordance with one or more embodiments may identify a “cognate group” for a user, based on historical actions. More particularly, for each user, over time, the system may identify **a cognate group** of the *n* other users regarded as most similar. Such a group may be defined by similar past user actions and assessments, and/or a direct input by a user. ...Accordingly, it may be assumed in certain instances that **the actions of this particular group on an electronic mail object will give more indication of its relevance to the user than would a global reaction to the electronic mail.**

EX1001, 14:59-15:11.

75. **Third**, the ‘217 Patent explains that its “relevance analysis engine” uses information about the users in the “*cognate*” group to calculate values, including:

7. Cognate Relevance Value: a cognate relevance value is a relevance score for a piece of content respective to a given recipient based on a weighted average of the IRC's of the n users considered to be the cognate group for that recipient. [symbol: ${}^xR_r^c$ for the relevance input from the cognate group c of recipient r , on electronic mail object x sent by senders $\{s\}$ to recipient r]
8. Cognate Importance Value: a cognate importance value is an importance score for an entity respective to a given user, based on a weighted average of the IIC's of the n users considered to be the cognate group for that recipient. [symbol: I_{sr}^c for the sender s to recipient r in cognate group c]
- ...
11. Local Relevance: a local relevance value is the relevance value for a piece of content to a given user that is shown to this user through the interface; it is a function of the user's own IRC, the global and cognate relevance scores, and the combined importance relating to that mail. [symbol: ${}^xR_{\{s\}r}^1$ for content x sent by senders $\{s\}$ to recipient r]

EX1001, 25:37-26:52. As shown by the emphasis added above, calculating each of these “values” requires that the system first “*identify*” the first user’s “*cognate*” group.

76. **Fourth**, the ‘217 Patent teaches that whether the “*cognate*” group finds a sender to be important is taken into consideration when determining “importance”:

Still further, as described above, **the importance of the sender to the cognate ... group** within which a recipient is located may be

considered. Accordingly, this means that there may be at least three factors for consideration as to importance:

...

3. I_{sr}^c is the “cognate importance” of the sender to a particular recipient, which is the sender's importance to the cognate ... group within which the recipient is located. This may be thought of as a more focused element of communal importance than the global importance, which is universal.

EX1001, 29:59-30:15.

77. **Fifth**, the ‘217 Patent teaches that both the actions the “*cognate*” group and also the actions of all the other “*recipients*” on the electronic mail object are taken into consideration when determining relevance value:

Additionally, it is noted that an aim of one or more embodiments is to produce a “good” figure for local relevance, which is the relevance value seen by the recipient when they are browsing through the interface. The system offers a rapid effect of actions on the mail of (in, for example, decreasing order of importance and so rapidity of change): the actions of user r him/herself on electronic mail object x ; **the actions on the electronic mail object x of the group cognate to r** ; and **the actions of all the other recipients** on the electronic mail object.

EX1001, 36:33-41.

78. **Sixth**, the ‘217 Patent teaches that “actions of those in [a user’s] cognate group” is one of the factors used to calculate each user’s local importance values:

Calculation of each user's local importance values for other entities is based on their own actions, and also **actions of those in their cognate**

group. An individual importance component value (IIC) or individual value inputting into the cognate importance component (I_{sr}^c) may be assigned when a user has interacted with an entity.

EX1001, 44:64-43:3.

79. **Seventh**, the ‘217 Patent teaches that “a cognate relevance value is now input into the final figure for local relevance,” which “**is based on the actions of those in the group cognate** to the recipient on the particular electronic mail object.” EX1001, 43:4-7.

80. **Eighth**, the ‘217 Patent teaches that “[a]s to communal filtering, this mechanism may **use the behavior of other recipients** of a given piece of content to determine the content's relevance to the user in question—communal relevance.” EX1001, 43:61-64 (emphasis added).

81. For all of these reasons, the specification explains that the purpose of “*identifying*” a second user that is both “*a recipient of the piece of electronic content*” and also “*is cognate to the user*” is for the purpose of tracking that second user’s actions to assist in determining a relevancy score for a piece of electronic content.

IX. Mechanisms and Mathematics Disclosed in ‘217 Patent to “*identify at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*”

82. The ‘217 Patent teaches the mechanisms and mathematical formulas involved in “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*”

83. The system describes a process to analyze the relevance of electronic mail objects to the receiver with respect to the sender of the respective mail objects. **EX1001.** Regarding this concept, the ‘217 Patent defines the following components to analyze the relevance. **EX1001.**

84. The patent defines a layered framework for computing importance and relevance of electronic mail. At the base are Mail Data Components (MDC), inherent features like flags or recipients. **EX1001**, 25:40-45. User behavior drives two individual scores: Individual Relevance Components (IRC) (*id.* 25:45-49), reflecting how a user interacts with a content, and Individual Importance Components (IIC) (*id.* 25: 50-54), reflecting how important an entity is to that user, based on the actions of that user. So, IRC pertains to mail object with respect to a user and the IIC pertains to an entity such as a sender or job code with respect to a user. The global Importance averages IICs across the system (*id.* 25: 55-58), and Global Relevance averages IRCs weighed by global importance (*id.* 25:59-64).

85. To capture personalization, each user has a Cognate Group of similar users, leading to Cognate Relevance and Cognate Importance based on group averages. The system identifies these cognate groups for each of the users individually based on the past actions of the user in question (*id.* 25:65: 26:10). This group contains n other users who are considered most similar based on their past action or historical data. Here, each user is assigned to one or many cognate groups which are dynamically determined. It is also not mandatory that the users in the system are divided into mutually exclusive cognate groups. Rather, these groups are updated over time based on user's action for which the system determines the most similar collection.

86. Now, these values feed into Local Importance (*id.* 26: 24-30), the user-specific importance of a sender, combining IIC, cognate, and global importance (*id.* 29: 64--30: 15). For multi-sender threads, Combined Importance aggregates local importance across all contributors (*id.* 26: 51-52). So, the Local Relevance shown in the interface blends a user's own actions (IRC), global and cognate relevance, and combined importance, giving a personalized, socially aware measure of how much an email matters.

87. Now, to compute the Individual Importance Component (IIC) for a sender, the system evaluates significant local user actions on past emails, applying

a time-based weighting so that recent actions count more. Key factors include: (1) the percentage of unsolicited emails deleted or stored unopened, reflecting disengagement which is quantified using the following function

$\frac{1}{n_s} \sum_{x=1}^{n_s} f^t(\text{del}_x, \text{no}_x)$ (eq. 1 [31: 30-35]); (2) the attention ratio, measured as the time spent reading an email relative to its length, averaged over opened messages and defined as the following $\frac{1}{m_s} \sum_{x=1}^{m_s} f^t\left(\frac{t_x}{L_x}\right)$ (eq. 2) [31: 40-45]; and (3) any past relevance scores explicitly assigned by the user to emails from that sender, which decay in influence over time and is defined as $R_{rs}^{\text{assigned}} = \sum_{x=1}^v f^t(R(T_x))$ (eq. 3) (id. 31: 60). This can also be extended to incorporate user-assigned importance values, defined as $f^t(I_{rs}^{\text{assigned}})$ for broader entities. Taking all these components into account the IIC now can be calculated as following (eq. 4) (id. 32:30-35):

$$IIC_{sr} = w_1 \frac{1}{n_s} \sum_{x=1}^{n_s} f^t(\text{del}_x; \text{no}_x) + w_2 \frac{1}{m_s} \sum_{x=1}^{m_s} f^t\left(\frac{t_x}{L_x}\right) + w_3 \sum_{x=1}^v f^t(R(T_x)) + w_4 f^t(I_{rs}^{\text{assigned}}) \dots \dots (eq. 4)$$

88. Using this value, the system can begin computing global importance value, which can be a weighted aggregate of the IICs, such as

$f\left(\sum_{r=1}^n f\left(IIC_{sr}^{(k-1)}; I_r^g\right)\right)$ (eq. 5) (id. 32: 60-65). Here, k-1 is the global value in

the previous period of calculation for this value and I_r^g is the global importance of

the recipient. An additional element of the calculation is related to the receipt of mail objects from a more important sender, which increases the importance of the recipient. This can also be used to identify shared importance based on who are the other recipient of the same mail object. This can be a function of number of mail objects received and a weighted average (size m ; where m is the number of recipients of the same mail object sent by the important sender) of value shared importance. This component can be calculated as a function of both these elements,

$$f\left(\sum_{j=1}^m \frac{(k-1)I_s^g}{N_j}; \frac{1}{m} \sum_{j=1}^m \frac{(k-1)I_s^g}{N_j}\right) \dots\dots(eq. 6) (id. 33:11-18)$$

as described by the above function (eq. 6). Here, the second term is the weighted average of the shared importance. Now, considering all these components in computing Global Importance, the system can incorporate directly assigned values from organizational authorities such as Human Resources, where interventions may be fixed at a given time. Overall, the global importance update mechanism adjusts each sender's importance score at iteration k based on the prior value ($k-1$) can be calculated as the following (eq. 7) with α indicating how much the value should change with time:

$$I_s^{g,(k)} = \alpha I_s^{g,(k-1)} + (1 - \alpha) \left[w_1 f \left(\sum_{r=1}^n f(IIC_{sr}^{(k-1)}; I_r^g) \right) + w_2 f \left(\sum_{j=1}^m \frac{(k-1)I_s^g}{N_j}; \frac{1}{m} \sum_{j=1}^m \frac{(k-1)I_s^g}{N_j} \right) + w_3 f(^oHR_s^l) + w_3 f(^oHR_s^p) \right] \dots\dots(eq. 7)$$

Id. 33:40-50.

89. Additionally, using the individual IIC for each of the cognate groups, the cognate importance for a particular sender can be calculated. In such cases, the value can be derived from the available components, while assigning a reduced weight to it in the final local importance calculation, $I_{sr}^c = \frac{1}{n_c} \sum_{i=1}^{n_c} f(IIC_i)$ (*eq. 8*) (*id.* 34: 5-10), where n_c is the count of non-zero IICs in the cognate group. So, The Local Importance of a sender to a given recipient is computed as a function of three factors (*id.* 34:18-24):

- (1) *the Individual Importance Component (IIC)*, reflecting the recipient's own actions toward that sender,
- (2) *the Cognate Importance (I^c)*, derived from the IICs of users in the recipient's cognate group, and
- (3) *the Global Importance (I)*, based on the organization-wide values determined in the latest system review.

The local importance here depends on the cognate importance or other

similar users, as well as the global importance in the system. This is different

from frameworks which do not consider the effect of the group on a particular user.

This framework can be expressed as the following (*eq. 9*) which considers the values calculated in *eq. 4*, *eq. 8*, and *eq. 7*:

$${}^k I_{sr}^1 = f \left(IIC_{sr}^{(k-1)}, {}^{(k-1)} I_{sr}^c, {}^{(k-1)} I_s^g \right) \dots \dots (eq. 9)$$

Id. 34:25.

90. Finally, the system also explains that global importance changes slowly, reflecting long-term organizational perception of an entity, with adjustments typically made through periodic reviews or queued updates, while new entities may change more quickly. Cognate importance evolves faster than global values, as it reflects averages across a user's cognate group, and local importance is the most responsive, adjusting at run-time to user actions but stabilizing once sufficient history exists (*id.* 36: 12-67). For relevance, global values also update moderately, more rapidly for newer content, whereas cognate relevance is recalculated more frequently and serves as the most immediate guide for prioritization. Local relevance combines personal, cognate, and global signals, updating dynamically with user actions and through periodic refreshes. Together, this hierarchy ensures that recent interactions and new content are reflected quickly, while established patterns change more gradually.

X. The Alleged Prior Art**A. Dumais**

91. Dumais is titled “Sensing, Storing, Indexing, and Retrieving Data Leveraging Measures of User Activity, Attention, and Interest.” EX1006.

92. Dumais describes a data manipulation system comprising one or more data items. EX1006, [Abstract]. Dumais discloses that data items that can be searched and retrieved include “documents, files, email messages, calendar appointments, web pages, sub-sections within the data items or cross-item abstractions.” E.g., EX1006, [0031].

93. Dumais uses associated tags, which capture a user’s interactions with or attention to these items. EX1006, [Abstract]. These tags can represent various user engagement metrics, such as the last access time, the total number of times an item has been accessed, the frequency of access over a defined past period, or the frequency within one or more arbitrarily specified time frames. EX1006, [0031].

94. The focus in Dumais is on how data is retrieved in response to a search. E.g., “Sensing, Storing, Indexing, and **Retrieving Data** Leveraging Measures of User Activity, Attention, and Interest.” EX1006 (emphasis added); EX1006, at Abstract (discussing “items returned in a search”). The system employs

an information retrieval architecture that processes user activity data. EX1006, [0040].

95. A personalization component integrates a user model based on user interactions and incorporates processing mechanisms, such as retrieval algorithms adapted according to the user model. EX1006, [0040]. This component refines search results by modifying either the search query and/or the returned results. EX1006, [0040].

96. A user interface facilitates query generation and receives modified or personalized results based on adjustments made by the personalization component. EX1006, [0040].

97. In Dumais, “query modification” encompasses both changes to query terms and alterations in the algorithm used to match queries with documents, ensuring more personalized search results. EX1006, [0040]. Query modification ensures that a subset of items is delivered to a user in a specific order or ranking.

98. Ranking in Dumais is a two-step process. First, after query modification and submissions to a search engine and results will be returned from the search engine; and second, the returned results are modified through “query modification.” EX1006, [0040]. The “query modification” in Dumais is focused on a single user, including a single user’s interest, via tags. EX1006, [0040].

B. Rose

99. The Rose patent is titled “System for ranking the relevance of information objects accessed by computer users.” EX1006.

100. The application that led to the issuance of the Rose patent was filed on April 25, 1994.

101. The Rose patent relates to an information access system that presents information to a user “ranked according to a prediction of the likely degree of relevance to the user’s interests.” EX1006, Abstract.

102. The Rose patent addresses the problem of information overload in systems such as email messaging, electronic bulletin boards, and text retrieval from static databases. EX1006, 1:10-63. Rose explains that, in these types of systems, “the amount of information presented to users can reach the point of becoming unmanageable.” EX1006, 1:42-43.

103. Traditional information access systems often rely on content-based filtering mechanisms that, on one hand, may miss relevant messages or documents and, on the other hand, may retrieve too many irrelevant ones. EX1006, 1:64-2:5. The Rose patent highlights the shortcomings of purely content-based filtering approaches. *Id.*

104. To improve relevance determination, the Rose patent proposes ranking the predicted relevance of documents using two factors: (1) content-based filtering and (2) collaborative filtering (community feedback). EX1006, at 2:35-50.

105. The first factor that the Rose patent uses to rank documents is content-based, or attribute-based filtering. For content-based filtering in Rose, a user's likely interest in a document is predicted by measuring the similarity—typically using cosine similarity—between the document's vector and the user's profile vector. EX1006, at 6:5-58 & FIGS. 5A & 5B. Documents with vectors closely aligned to the user's profile are ranked higher, while those with significant differences receive lower rankings. EX1006, at 6:51-58.

106. The second factor that the Rose patent uses to rank documents is community feedback or collaborative filtering – i.e., “the prediction of a user's interest in information ... based upon a correlation with the indications provided by others.” EX1006, 6:59-61.

107. In order to rank the relevance of each document, the Rose patent uses a hybrid approach to determine the final ranking score, combining (1) content-based (attribute-based) and (2) correlation-based predictions. EX1006, 8:20-40. For instance, a final ranking score can be determined by calculating a weighted

sum of scores derived from both content and correlation predictors. EX1006, at 7:37-40.

108. The Rose patent also discusses alternative methods that incorporate the two prediction factors (i.e., attribute-based and user-correlation information). EX1006, 7:39-41. For example, multiple regression analysis can be employed to combine various predictive factors. EX1006, 7:42-44. This approach uses regression techniques to identify the most influential attributes—such as key terms in a document or users with similar feedback patterns—and to determine their respective weights. EX1006, 7:43-47. Additionally, principal component analysis (PCA) may be utilized to uncover underlying latent factors that contribute to user preferences. EX1006, 7:47-50.

109. In addition to considering content as one “attribute” of a document, the Rose patent discusses considering other attributes of the document. EX1006, 8:12-13. For example, the age of the document may be considered, where older items might get lower scores. EX1006, 8:13-17.

110. In assigning a ranking for each document, the Rose patent is focused on predicting relevance for a first user, where the first user has not yet accessed or read the document in question. E.g., EX1006, Abstract (“Information presented to

a user via an information access system is ranked according to **a prediction** of the **likely degree of relevance** to the user's interests.”).

111. The Rose patent uses information about the first user’s actions on the document (e.g., whether the first user gave the document a “thumbs up” or a “thumbs down”) for two reasons: (1) to predict relevance for **other** users (EX1006, 5:56-60) and (2) to adjust the first user’s profile to better predict the relevance of future documents for the first user. EX1006, 5:15-23, 5:43-46 & 5:56-60.

112. The Rose patent does not discuss or disclose using the first user’s actions on the document as a factor in calculating a relevance ranking. *See generally* EX1006.

113. The Rose patent does not discuss or disclose re-ranking the relevance of documents after the first user has accessed, read, or taken action on the document. *See generally* EX1006.

C. Bieganski

114. The Bieganski patent is titled “System, method and article of manufacture for making serendipity-weighted recommendations to a user.”

115. The application that led to the issuance of the Bieganski patent was filed on July 17, 1998.

116. The Bieganski patent seeks to provide a “reliable computerized process for estimating the quality of the content of most items that are the subject of a recommender system.” EX1007, 1:47-49. The Bieganski patent is focused on how a recommender system recommends “non-textual multimedia content such as movies and videos.” EX1007, 1:49-50.

117. The Bieganski patent explains that existing recommendation systems often tend to suggest the most popular items to users – i.e., “the highest-ranking positive preference values.” EX1007, 3:1-3. The Bieganski patent explains that this technique does not always provide a desirable effect because the recommendations can be obvious to the user, such that the system has provided the user with no value. EX1007, 3:3-8; 5:22-25. For example, a recommendation to purchase milk at the grocery store would be an obvious recommendation, and not very helpful, because the customer already had that knowledge. EX1007, 3:8-20.

118. The Bieganski patent addresses this limitation of existing recommender systems by introducing serendipity into recommendation systems. EX1007, 3:30-33. A serendipitous recommendation system suggests items that a user would not normally encounter, thereby enhancing discovery and diversity. EX1007, 5:13-22. Traditional systems typically provide obvious, expected

recommendations, but they often lack the element of novelty that serendipitous suggestions offer. EX1007, 5:22-25.

119. The recommendation system described in the Bieganski patent includes three core components:

- (a) the recommendation engine,
- (b) the serendipity control function applicator, and
- (c) the serendipity integration unit.

EX1007, 5:55-58.

120. The outputs of the recommendation engine and the serendipity control function are fed into the serendipity integration unit. EX1007, 5:59-61. This unit produces a final set of recommendations that are both serendipity-weighted and filtered, resulting in a balanced mix of accuracy and novelty. EX1007, 5:61-63.

121. The recommendation engine uses automated collaborative filtering to generate candidate items. EX1007, 6:27-29. It groups users with shared interests into affinity groups or neighborhoods. EX1007, 6:29-31. To form a neighborhood for a target user, the engine identifies users with preference profiles most similar to that of the target. EX1007, 6:31-34. Similarity is typically measured by counting the number of shared items between profiles. EX1007, 6:34-36.

122. The Bieganski patent uses two thresholds to limit the neighborhood size: minimum neighbor similarity and maximum neighborhood size. EX1007, 7:16-19. Once a neighborhood is identified, the engine generates a set of candidate items by selecting all items found in the profiles of the neighbors, excluding any already present in the target user's profile. EX1007, 7:66-8:3.

123. The serendipity control function is a mathematical function that maps an item's popularity in the community to a probability value. EX1007, 9:54-57.

Several strategies are proposed, including:

High-frequency cutoff

Low-frequency cutoff

High-frequency dampening

Mixed functions

EX1007, 9:64-11:67.

124. Finally, the serendipity integration unit combines the predictive accuracy of the recommendation engine with the serendipitous value of the items to produce a refined list of recommendations. EX1007, 15:34-37.

XI. Opinions Regarding IPR-430 (U.S. Patent No. 7,716,217)

125. In the paragraphs below I detail the bases for my opinions relating to IPR-430. I address each ground of invalidity asserted by the petitioner in IPR-430.

A. Ground 1: Claims 1-3, 5-9, 13-15, 18-19 and 22 of the ‘217 patent are not obvious based on Dumais

1. Differences Between Dumais and the ‘217 Patent.

126. The inventions in the ‘217 Patent are very different from the invention in Dumais, in many ways.

127. One way in which Dumais and the ‘217 Patent differ is that Dumais is primarily used for query modification. If there is no query, Dumais does not apply. In contrast, the ‘217 Patent focuses on assigning a relevance score to inter-person communications, such as emails and other types of sent messages. The ‘217 Patent assigns a relevance score to content in the absence of any query. Although Dumais mentions email in passing (as a type of document that can be queried), communications are not the focus of Dumais. For example, unlike the ‘217 Patent, Dumais does not focus on the importance of the “sender” or identifying “recipients.”

128. Another difference between Dumais and the ‘217 Patent is that the focus in Dumais is on a single user (user centric) at a time, whereas the ‘217 Patent focuses on inter-person communications and cognate users.

129. Another difference between Dumais and the ‘217 Patent is that Dumais does not incorporate a relational model for objects or items, whereas the ‘217 Patent emphasizes a relational model specifically for email messages. Dumais also does not consider sub-messages. Sub-messages introduce additional challenges—such as management and search—that are entirely ignored in Dumais’ approach.

130. Another difference between Dumais and the ‘217 Patent is in the way that groups are formed. In Dumais, the group is not predefined but formed based on similarity measures, such as correlation coefficients, vector-based similarity calculations, and statistical Bayesian methods. In contrast, the ‘217 Patent forms a group of users who are recipients of a given piece of electronic content and are cognate to a targeted user. Here, the primary factor determining group formation is the relationship between recipients and the electronic content.

131. Another difference between Dumais and the ‘217 Patent is in the level of detail provided. The ‘217 Patent discloses a multi-dimensional relevance system that evaluates the importance of each message based on user actions, collaborative user interactions, and administrative settings. In the ‘217 Patent, several equations are introduced to model message importance, with the Gauss-Seidel algorithm employed to solve them. EX1001, 28-37. This approach is presented in a detailed

and structured manner, without reliance on vague explanations. In contrast, Dumais lacks similar technical depth, often relying on broad, less-defined descriptions. For instance, the scope of “items” in Dumais patent is very broad.

132. Another difference between Dumais and the ‘217 Patent is that Dumais employs a two-step process, which differs from the approach in the ‘217 Patent. Unlike Dumais, the ‘217 Patent does not incorporate query rewriting, a key component of the method in Dumais.

2. Dumais Does Not Teach, Disclose, or Render Obvious the Limitation of “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*”

133. Every claim of the ‘217 Patent includes the requirement to “*identify at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*” EX1001, at Claims. This requires not just that another “*user*” be identified, but also requires that the other “*user*” being identified must be **both** (1) “*a recipient*” and (2) “*cognate to the user.*”

134. Dr. Fox opines that Dumais “teaches” and “explicitly discloses” the limitation of “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*”

EX1004, ¶ 240. I disagree. Dumais does not teach or disclose this limitation, and it would not have been obvious to add this limitation to the invention in Dumais.

135. With respect to “identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content,” Dr. Fox argues that Dumais “explicitly discloses” the “identify[ing]” limitation “because the personalization component builds ‘user models,’ in part, using ‘collaborative filtering techniques’ that analyze ‘similarities among...groups of individuals...based on the content *and/or usage of items.*’” EX1003, ¶ 120 (citing EX1005, ¶52). I disagree.

136. It is apparent that Dr. Fox is defining “*recipient*” to be any user that “interact[ed]” with, or “used,” a data item. EX1003, ¶¶ 120. That definition is incorrect. A POSA would understand that, in the ‘217 Patent, “*a recipient*” is another user that received a piece of sent electronic content from a sender. EX1001, at 2:26-28 (“an electronic mail object may be sent to external recipients”); EX1001, at 5:1-2 (same); EX1001, at 5:3-5 (“a user ... sends ... to recipients”); EX1001, at 5:12-14); EX1001, at 5:21-23); EX1001, at 10:15-18 (discussing whether a user was “one of fifty other recipients” or “the sole recipient”). Thus, a POSA would understand that, in the ‘217 Patent, a “*recipient*”

is a user that received a sent piece of electronic content from a sender; not just any user that interacted with, or used, a piece of electronic content.

137. Dumais does not teach or disclose the requirement to “*identify ... a recipient ...*” EX1004. In particular, there is no discussion in Dumais that the system or method must be able to “*identify ...a recipient*” – i.e., another user that received the same piece of sent content from the same sender that a first user received. EX1004.

138. Dr. Fox asserts that “a POSITA would have understood Dumais contemplates ... identifying all of those receiving an email message based on inclusion in the TO or CC fields.” EX1003, ¶ 121. I disagree. Dumais does not discuss any e-mail fields, including that Dumais does not discuss using the information in the TO or CC fields of e-mails. *See generally* EX1003. I note that Dr. Fox does not cite to any portion of Dumais in support of this statement.

139. Dr. Fox asserts that “Dumais contains robust disclosures discussing emails and integrating with a user’s ‘e-mail system.’” EX1003, ¶ 121 (citing EX-1005, ¶¶31, 36, 56, 65). Dumais does mention e-mail, but Dumais does not discuss “*a recipient*” at all, including in the paragraphs cited by Dr. Fox.

140. In the Institution Decision, the Board pointed to the discussion of emails in Dumais and Petitioner’s assertion that, “when considering other users’

‘usage of items’ in the context of email, especially in the context of collaborative filtering, a POSITA would have understood Dumais contemplates users receiving and interacting with the same email.” Decision, at 35. The fact that Dumais discusses e-mails, however, does not show that Dumais teaches or suggests this limitation. In particular, Dumais does not teach the active step of “identify[ing]” another user (or group of users) that received the same piece of content as the first user (i.e., “*that is a recipient of the piece of electronic content*”).

141. Dr. Fox asserts that “Dumais discloses that ‘a user could have their desktop phone messages linked to their e-mail system or other message system’ such that an incoming phone call could “automatically” initiate a search query of the user’s email messages associated with that caller. EX1003, ¶ 121 (citing EX1005, ¶ 65). The paragraph that Dr. Fox cites to relates to linking desktop phone messages to an e-mail system, and it discusses one way to search and retrieve content – i.e., “implicit” “queries” in a “retrieval service application[.]” EX1005, ¶ 65. I do not know why Dr. Fox believes that paragraph supports his conclusion that Dumais discloses “*identify[ing] ... a recipient.*” Dumais does not disclose “*identify[ing] ... a recipient.*”

142. Dr. Fox states that “a POSITA would understand that it is very common for emails to have more recipients than senders, as every email will go to

at least one recipient, but many emails specify more than one recipient in both the ‘TO’ and ‘CC’ fields.” EX1003, ¶ 121. I do not know why Dr. Fox thinks that supports his conclusion that Dumais discloses “*identify[ing] ... a recipient.*” Dumais does not disclose “*identify[ing] ... a recipient.*”

143. Dr. Fox states that “[i]t is common for collaborative filtering techniques to take advantage of other recipients listed in these fields, since their being grouped on the same email suggests that input from one user reflects how others would likely react to that email.” EX1003, ¶ 121. I note that Dr. Fox does not cite any evidence in support of this statement. Dumais discusses collaborative filtering only in the context of creating profiles for new users. EX1005, [0052] & [0055]. Dumais does not disclose using collaborative filtering “to take advantage of other recipients listed in these fields.” Dumais does not discuss any e-mail fields.

144. Moreover, even if Dr. Fox were correct that collaborative filtering in Dumais groups together “*recipients,*” nothing in Dumais teaches or suggests the desirability of “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content*” – i.e., the desirability of “*identifying*” a second user that received the same piece of content as the first user. Instead, in

Dumais, the purpose of collaborative filtering is to create profiles for users that are new to the system.

145. In sum, Dumais does not teach or disclose the requirement to “*identify ... a recipient ...*”

146. The “*identify*” limitation requires not only that the second “*user*” be a “*recipient*,” but also that the “*user*” be “*cognate to the [first] user*.”

147. Dumais does not teach or suggest a need to “*identify*” another user that is “*cognate to the [first] user*.”

148. Nothing in Dumais shows an appreciation of the desirability of, or mathematics required to, “*identify*” another user that is “*cognate to the [first] user*.”

149. The ‘217 Patent requires that the “*at least one other of the plurality of users*” being “*identif[ied]*” must be “*cognate to the user*.” The reference to “*the user*” refers to the first user that is doing the searching (i.e., the user for which relevancy is being determined), and the second user being identified must be “*cognate to the [first] user*.” Dumais, however, does not discuss “*identify/ing*” a second “*user*” that is “*cognate to the [first] user*” and “*a recipient*.” Dumais also does not discuss the desirability of “*identify/ing*” a second “*user*” that is “*cognate to the [first] user*.”

150. Dumais focuses only on the target user (the user doing the searching), not on “*identify[ing]*” “*cognate*” users. In Dumais, a query is modified based on the target user’s interests, via tags.

151. Dr. Fox opines that collaborative filtering in Dumais is the same as “*identify[ing]* ...*at least one other of the plurality of users that is cognate to the user.*” EX1003, ¶ 120. I disagree. This is because cognate users in the ‘217 Patent are more restricted than the generic collaborative filtering described in Dumais. This is because every claim requires that the system “*identify*” a second, “*cognate*” “*user*” **that is also** “*a recipient of the piece of electronic content.*” EX1005, Claim 1; EX2001, ¶ 100. Moreover, the ‘217 Patent explains **why** the system needs to “*identify*” this “*cognate*”/“*recipient*” user. *Supra* ¶¶ 70-81. Collaborative filtering in Dumais does not do any of this. Instead, Dumais uses collaborative filtering to “predict likely or possible profiles for new users.” *Id.* (citing EX1006, [0055]). For these reasons, “*cognate*” users in the ‘217 Patent are more restricted than the generic collaborative filtering in Dumais.

152. In the ‘217 Patent, the purpose of identifying other “*cognate*” users is so that the actions of those “*cognate*” users can be monitored and considered in determining a relevance score. E.g., EX1001, at Claim 1 (“*second measure of relevance*” may include “*one or more actions on the piece of electronic content of*

the at least one other of the plurality of users ... that is cognate to the user"). In contrast, collaborative filtering in Dumais is used to "develop profiles" for individuals or groups. EX1006, [0052]. In Dumais, collaborative filtering is used to "predict likely or possible profiles for new users of a system." EX1006, [0055]. This is different from the '217 Patent "*identify ...*" limitation.

153. As discussed above, the '217 Patent requires "*identify[ing]*" a second "*user*" that is both (1) "*a recipient*" of the same "*piece of electronic content*" that the first user received and also (2) "*is cognate to the user.*" Dr. Fox argues that the limitation is met because Dumais discusses (1) emails (sent content) and (2) collaborative filtering. Those disclosures, however, do not teach or disclose "*identify[ing]*" a second "*user*" that is **both** (1) "*a recipient*" of the same "*piece of electronic content*" that the first user received and also (2) "*is cognate to the user.*" Dumais does not disclose "*identify[ing]*" either of these types of users – i.e., another user that is "cognate to the [first] user" or another user that is "*a recipient*" of the same "*piece of electronic content*" that the first user received. Most importantly, Dumais certainly does not disclose identifying another "*user*" that is **both** "*a recipient*" of the same "*piece of electronic content*" that the first user received **and also** "*cognate to the [first] user.*" For example, even if (1) collaborative filtering were to group "users receiving and interacting with the same

email” (recipients of the same content), as Dr. Fox contends and (2) collaborative filtering were to also group together “groups of individuals” with “similarities,” as Dr. Fox contends, it is still the case that nothing in Dumais discloses “identifying” some user that is part of **both** of those groups.

154. In sum, Dr. Fox relies upon collaborative filtering in Dumais to satisfy the “*identify ...*” limitation, but collaborative filtering in Dumais does not serve that purpose. Collaborative filtering in Dumais is not used to “*identify*” users **both** that are similar to the user doing the searching (i.e., another “*user*” that is “*cognate to the user*”) **and also** received the same content as the first user doing the searching (i.e., another “*user*” that is “*a recipient*”).

155. Dumais does not appreciate – or lay out the math that would be required to take into account – the relationship between the primary user and another user, including that Dumais does not attempt to “*identify*” another “*user*” that is **both “a recipient” and also “cognate” to the first user.**

156. In sum, Dumais does not disclose “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*” EX1001, at Claims. Because every claim of the ‘217 Patent requires this limitation, Dumais does not render obvious any claim of the ‘217 Patent.

B. Ground 2: Claims 1-3, 5-9, 13-15, 18-19 & 22 of the ‘217 patent are not obvious based on Rose.

157. Claims 1-3, 5-9, 13-15, 18-13, and 22 of the ‘217 patent are not obvious based on Rose.

1. Differences Between Rose and the ‘217 Patent.

158. The inventions in the ‘217 Patent are very different from the invention in Rose, in many ways.

159. Rose and the ‘217 Patent differ in terms of the inputs provided in calculating a relevance score. In the ‘217 Patent, the relevance score is determined based at least in part on the first determined measure of relevance and on the second determined measure of relevance. EX1001, at Claims. The first measure of relevance consists of “actions of the user on the piece of electronic content.” EX1001, at Claims. The second measure of relevance may include “one or more measures derived from the group consisting of: a local importance describing an importance of the sender to the user, a global importance describing an importance of the sender within an organization with which the plurality of users are associated, a content relevance determined responsive to content of the piece of electronic content, and one or more actions on the piece of electronic content of the at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.” EX1001, at Claims.

160. In contrast, in the Rose patent, only two “relevance factor[s]” are considered in ranking or scoring items of information: attribute-based predictions (i.e., predictions based upon the documents’ content, such as keywords or date) and correlation-based predictions (i.e., predictions based upon other users’ feedback). EX1006, at Claims.

161. Rose and the ‘217 Patent differ in terms of whether they consider the actions of the first user – i.e., the user for which a score is being determined – when determining a relevance score. On the one hand, the ‘217 Patent considers the actions of the first user when determining a relevance score. Specifically, in the ‘217 Patent, “*the relevance score being determined based at least in part on the first determined measure of relevance,*” which is “*based at least in part on one or more actions of the [first] user on the piece of electronic content.*” EX1001, at Claims. On the other hand, Rose does not consider the actions of the first user when determining a relevance score. Specifically, in Rose, “information **to be presented** to a [first] user via an information access system is ranked according to a **prediction** of the **likely** degree of relevance to the user's interests.” EX1006, at 2:25-28 (emphasis added). This language demonstrates that Rose is all about predicting whether the first user will find the information relevant at a time when the information **has not yet been read by** (“presented to”) the first user. Because

Rose ranks information that has not yet been presented to the first user, Rose does not consider the actions of the first user in determining a score/rank.

162. The Rose patent and the ‘217 Patent differ in terms of the type of information being audited. In Rose, the system considers only explicit feedback from users in the systems – e.g., when a user gives a thumbs up or thumbs down to indicate whether a document is relevant. In contrast, the ‘217 Patent discloses and discusses monitoring using both explicit feedback (“direct user input”) and also implicit feedback (“monitoring may occur as part of an automatic, background process”). EX1001, at 6:1-22, 15:12-41. With respect to explicit feedback, the ‘217 Patent discusses that users can interact with the relevance results by adjusting a slider (a graphical control element) on a per-email or per-sender basis to help the system learn and refine its relevance assessments. EX1001, at 15:12-41; 17:41-18:60; 19:15-33; 22:12-20. With respect to implicit feedback, the ‘217 Patent discloses monitoring and tracking users’ actions to see what actions they take on a piece of electronic content – e.g., whether they read it, delete it, respond to it, save it, or print it. EX1001, 6:1-22, 11:4-12:27.

163. In the ‘217 Patent, the types of information may be extracted from an electronic mail system: keywords, creation dates, recipient information, job codes, the number of times an electronic mail has been read, the number of times an

electronic mail has been forwarded. EX1001, 7:50-59. “Further, users may themselves rate various aspects and entities in the system to improve an accuracy of the relevance analysis engine. For example, a user may provide feedback regarding the relevance of any given piece of content, and/or the user may provide feedback regarding the importance of any given entity. Moreover, a user may also change various weighting factors used to determine settings of the relevance analysis engine, where Such settings may otherwise be self-adjusting.” EX1001, 7:59-67.

164. The ‘217 Patent considers relational structure. EX1001, at 3:52-4:4. Due to this relational structure, messages and submessages are considered in content based. EX1001, 10:65-11:3. The ‘217 Patent states that, in relational architecture, a message will be stored exactly once (one copy in the framework). EX1001, 3:54-56. The ‘217 Patent discusses how sub-messages may play role in the ranking process. For example, in the ‘217 Patent, “if a sub-message A does not contain a given keyword, but many Sub-messages that were sent in replying to and forwarding Sub-message A do contain the keyword, then sub-message A is likely to still be relevant in a search for the given keyword.” EX1001, 10:65-11:3. In contrast, in the Rose patent, there is no discussion of any relational structure, and submessages are **not** considered. *See generally* EX1006.

165. Another difference between the ‘217 Patent and the Rose patent is that the ‘217 Patent considers multi-dimensional relevance. In the ‘217 Patent, an electronic mail relevance “infer[s] a user's interest in content and other users based on monitoring that user’s actions with in the application.” EX1001, 5:47-48. “Such relevance may be thought of as having at least two components: relevance, which applies to content (e.g., submessages); and importance, which applies to entities (e.g., users and job codes).” EX1001, 5:48-51. “An ‘importance’ component may used to rate an entity in order to reflect a user's likely interest in content involving that entity.” EX1001, 5:59-61. “For example, a high importance value may indicates that a given job code is likely to be of significant interest to the user in question, while a low importance value may indicates that a job code is likely to be of little interest to the user.” EX1001, 5:61-64. As used in the ‘217 Patent, “a ‘job code’ may be thought of as metadata used to track the process to which a particular electronic mail object relates.” EX1001, 5:64-67. In contrast, the Rose patent considers only simple collaborative filtering, and job role does not play any role. *See generally* EX1006.

166. The ‘217 Patent contains an in depth description of compliance rules for messages. EX1001, 5:28-43, Fig. 5, 42:50-54, 9:51-10:9. For example, in the ‘217 Patent, “electronic mail content may be managed according to rules specified

in a compliance model.” EX1001, 5:28-30. “Such a model may be used to determine, for example, how long content is kept for, who can access content, where content should reside, and other allowable actions to be carried out by users.” EX1001, 5:30-33. “FIG. 5 shows an example, in unified modeling language (UML) representation.” EX1001, 5:33-35 & Fig. 5. “Using such a compliance model, search rules may be layered over a content system, determining, for example, who has the right to search different pieces of content in the system.” EX1001, 5:35-38. “For example, in the case of an investment bank, an analyst might have the right to search all content related to analyst processes written by other analysts; however, the same analyst may not have the ability to search content that does not pertain to his/her role in the bank.” EX1001, 5:38-43. In contrast to this discussion in the ‘217 Patent, the Rose patent contains no discussion of compliance rules. *See generally* EX1006.

2. Rose does not teach, disclose, or render obvious “*determin[ing] the relevance score ... based at least in part on the first determined measure of relevance*” (1[h])

167. In the ‘217 Patent, after determining “*a first measure of relevance*” based upon the user’s own actions, the ‘217 Patent then uses this “*first measure of relevance*” to “*determine[]*” “*the relevance score.*” Every claim of the ‘217 Patent requires that “*the relevance score being determined based at least in part on the*

first determined measure of relevance” – i.e., based upon “*one or more actions of the user on the piece of electronic content.*” EX1001, at Claims 1, 6 & 7.

168. Rose does not teach, disclose, or render obvious this requirement of using a “*first measure of relevance*” (i.e., a user’s own actions) to “*determine[]*” “*the relevance score*” for a piece of electronic content.

169. Dr. Fox opines that after the first user interacts with an item and the first user’s profile is updated accordingly, then that updated profile is a “*first measure of relevance.*” Even if that updated profile could be considered a “*first measure of relevance,*” that “*measure*” (the **updated** profile) is **never used** in Rose to “*determine[]*” “*the relevance score.*” This is because Rose to “*determines*” “*the relevance score*” for an item **before** the first user has rated the item. Therefore, Rose uses the first user’s profile to “*determine[]*” “*the relevance score*” **before** the profile has been updated to reflect the first user’s rating of the item. This is known because Rose repeatedly states that the “ranking score” being “determined” is a “**predictive**” score.

170. As the following passages demonstrate, Rose is focused on **predicting** whether electronic content that the first user has not yet read **will be** relevant to that first user:

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- “Information presented to a user via an information access system is ranked according to a **prediction of the likely degree of relevance** to the user's interests.” EX1001, at Abstract (emphasis added); *id.* at 2:25-28 (same).
 - “The **prediction of relevance** is carried out by combining data pertaining to the content of each item of information with other data regarding correlations of interests between users.” EX1001, at Abstract (emphasis added).
 - “to generate a **prediction of relevance**” EX1001, at Abstract (emphasis added); *id.* at 2:45 (same)
 - “It is desirable, therefore, to employ a system for **predicting the likely relevance** of items of information to a particular user, so that the items of interest can be ranked and the need to deal with large amounts of irrelevant information can be avoided.” *Id.* at 2:5-9 (emphasis added).
 - “In this regard, it is particularly desirable to provide an information **relevance predicting technique** which utilizes community feedback as one of the factors **in the prediction.**” *Id.* at 2:20-22 (emphasis added).
 - “The **prediction of relevance** is carried out by combining data pertaining to one or more attributes of each item of information with other data regarding correlations of interests between users.” *Id.* at 2:35-38 (emphasis added).
 - “The **relevance predicting technique** of the present invention is applicable to all different types of information access systems.” *Id.* at 2:51-53 (emphasis added).
 - “Once the user's profile is retrieved, all of the messages **to be provided** to the user are ranked on the basis of **a predicted degree of relevance** to the user.” *Id.* at 4:38-41 (emphasis added).
 - “the color, size and/or intensity of each displayed message can be varied in accordance with **its predicted relevance.**” *Id.* at 4:65-67 (emphasis added).

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- “**One factor in the prediction of a user's likely interest** in a particular piece of information can be based on the similarity between the document's vector and the user's profile vector.” *Id.* at 6:51-54 (emphasis added).
 - “**A second factor in the prediction of a user's interest** in information is based upon a correlation with the indications provided by other users.” *Id.* at 6:59-61 (emphasis added).
 - “Subsequently, when a user accesses the system, the feedback table **42** and the correlation matrix **44** are used as **another factor in the prediction of the likelihood that the user will be interested** in any given document.” *Id.* at 7:7-9 (emphasis added).
 - “As one example of an algorithm that can be used for this purpose, **a prediction score**, P_{ij} for the i -th user regarding the j -th document, can be computed” *Id.* at 7:9-11 (emphasis added); *see also id.* at 7:20-21 (discussing “**prediction** score for User C regarding Document 1” (emphasis added)).
 - “In accordance with the invention, **a combination of attribute-based and correlation-based prediction** is employed to rank the relevance of each item of information” *Id.* at 7:35-37 (emphasis added).
 - “For example, a weighted sum of scores that are obtained **from each of the content and correlation predictors** can be used, to determine a final ranking score.” *Id.* at 7:37-40 (emphasis added).
 - “In this [multiple regression analysis] approach, regression methods are employed to identify the most important **attributes that are used as predictors**” *Id.* at 7:43-47 (emphasis added).
 - “Alternatively, principal components analysis can be used to identify **underlying aspects of content-based and correlation-based data that predict a score**.” *Id.* at 7:47-50 (emphasis added).
 - “The result of this combination is a program that describes **the data which can best be used to predict a given user's likely degree of interest** in a message.” *Id.* at 2:59-61 (emphasis added).

- “For example, the particular attributes of a message which are to be utilized to define the prediction formula can be established ahead of time, and employed in the algorithms.” *Id.* at 8:5-8 (emphasis added).

171. Because Rose is about predicting whether content will be relevant to the first user, Rose contains no disclosure of using the first user’s own actions on the document as a measurement of relevancy used to “*determine[]*” “*the relevance score*.” Instead, in Rose, the first user’s “*actions*” “*on the piece of electronic content*” (e.g., whether the first user gave the document a “thumbs up” or a “thumbs down”) are used for different purposes. First, the first user’s “*actions*” “*on the piece of electronic content*” can be used to predict whether “*the piece of electronic content*” will be relevant to “other users.” EX1006, 5:56-60 (emphasis added). Second, the first user’s “*actions*” “*on the piece of electronic content*” can be used to adjust the first user’s profile to better predict the relevance of future documents for the first user. EX1006, 5:15-23, 5:43-46 & 5:56-60. Rose, however, contains no disclosure of using the first user’s “*actions*” “*on the piece of electronic content*” to “*determine[e] a first measure of relevance of the piece of electronic content*.”

172. When Rose determines a relevance score or rating, Rose does not use “a user’s own actions” as an input. Instead, in Rose, two different measurements

are used to calculate a relevance score/rank, including “[1] attribute-based [prediction] and [2] correlation-based prediction.” EX1006, 7:35-37.

173. One input used to calculate a relevance score/rank in Rose is correlation-based predictions. Correlation-based predictions are based upon community feedback – i.e., “indications provided by **other** users.” *E.g.*, EX1006, 6:61-52 (emphasis added); *id.* 6:60-7:34. Using community feedback on a document to determine a relevance score is not a “*first measure of relevance*” in the ‘217 Patent.

174. The other input used to calculate a relevance score/rank in Rose is correlation-based predictions. In Rose, attribute-based predictions are based upon the attributes, or content, of the document. EX1006, 6:11-25; 6:51-59; EX1006, 8:12-16. For example, attribute-based predictions in Rose may include the words/terms that appear in a document or the date/age of a document. *Id.*; EX1006, 8:13-17. Attribute-based predictions in Rose also are not based upon “*actions of the [first] user on the piece of electronic content*” because, at the time that Rose is **predicting** whether content will be relevant to the first user, the first user has not yet rated (“*act[ed]*” upon) the content.

175. Dr. Fox asserts that Rose “*determine[s]*” “*the relevance score based upon “actions of the [first] user on the piece of electronic content”*” because, Dr.

Fox opines, Rose re-ranks (i.e., determines a **new** relevance score) an item after the first user has rated that item. In particular, Dr. Fox asserts that when the first user “rates electronic content, the system updates weights for ‘significant terms in that document’ in the user’s profile, which then increases (or decreases) the relevance **of that document** for that user.” EX1003, ¶ 182 (emphasis added & citing EX1006, 6:36-43; *id.* 3:51-62, 4:11-20, 5:1-23). I disagree. The citation that Dr. Fox relies upon states: “Each time a user provides a new response to a retrieved message, **the profile vector is modified** in accordance with the results of the indication”; “[f]or example, if the user indicates interest in a document, all of the significant **terms** in that document can be given **increased weight in the user's profile**.” EX1006, 6:36-43 (emphasis added). This citation states only that user feedback (for example, giving a document a “thumbs up” or a “thumbs down”) is used to update the user’s profile. It says nothing about updating (i.e., recalculating) the relevance score or re-ranking that particular document based upon the first user’s feedback on that particular document. There is no discussion in Rose of using the user’s feedback on a particular document as a measure used to determine a relevance score for that particular document.

176. Importantly, Rose is about “**predicting** the **likely** relevance of items of information to a particular user.” EX1006, 2:6-7; *see supra* ¶ 170. Rose does not

discuss or disclose re-ranking the relevance score for a document **after** a user has read and provided feedback on the content. And, it would not have been obvious to a skilled artisan to add that feature to Rose, because, in Rose, after a user has indicated that a document is relevant (or not), there is no longer a need to **predict** the likely relevance of that document by calculating a relevance score. While the feedback of the user on a particular document may be used to update the user's profile, Rose does not disclose using the first user's feedback on a particular document to rank that particular document.

177. The Board found that, because Rose states that “all of the messages addressed to that user are ranked” (EX1006, at 40-42), it must be the case that “Rose calculates a relevance score between a user's profile vector and a **previously rated** [by the first user] document.” Decision, at 22 (emphasis added). As the following passages demonstrate, however, Rose calculates a ranking score of predicted relevance for each message **before** it is presented to the first user (at a time when it is unread or “to be presented” to the first user):

- “Items of information **to be presented** to a user are ranked according to their **likely** degree of relevance to that user and displayed in order of ranking.” EX10006, at Abstract (emphasis added).
- “In accordance with the present invention, information **to be presented** to a user via an information access system is ranked according to a **prediction** of the **likely** degree of relevance to the user's interests.” *Id.* at 2:25-28 (emphasis added).

- “[I]tems of information **to be presented** to the user ... are ranked according to their **likely** degree of relevance and displayed with an indication of their relative ranking.” *Id.* at 2:30-33.
- Once the user's profile is retrieved, all of the messages **to be provided** to the user are ranked on the basis of a **predicted** degree of relevance to the user.” *Id.* at 4:38-40 (emphasis added).
- “...repeating steps b, c and d for each item of information **to be presented** to said particular user” *Id.* at Claim 1 (emphasis added).
- “a first database containing items of information **to be provided** to users of said system” *Id.* at Claim 14 (emphasis added).

The language “to be provided” demonstrates that Rose only ranks messages that have **not yet** been “provided to” the user (i.e., unread messages). Because Rose ranks each incoming message before the user reads it (i.e., at a time when the message has not yet been “presented to” the first user), it is true that, in Rose, at one point in time, “**all** of the messages addressed to that user are ranked.” EX1006, at 40-42 (emphasis added). Rose does not, however, teach, disclose, or render obvious **re**-ranking (i.e., re-calculating a new ranking score) that same message **after** the first user reads (and rates) the message. *See generally* EX1006. As discussed above, given Rose’s focus on predicting relevancy, it would not make sense to re-rank a message after the first user already rated the message.

178. The sentence that comes just before the sentence quoted by the Board provides context for the sentence quoted by the Board. The sentence states: “Once the user's profile is retrieved, all of the messages **to be provided** to the user are

ranked on the basis of a **predicted** degree of relevance to the user.” EX1006, at 4:38-40 (emphasis added). Again, the language “to be provided” demonstrates that Rose only ranks messages that have **not yet** been “provided to” the user (i.e., unread messages). The language that messages are ranked “on the basis of a **predicted** degree of relevance to the user” further demonstrates that Rose does not rank messages that the user has already read and rated (i.e., messages that the first user already determined were relevant (or not)).

179. For all of these reasons, Rose does not disclose “*determin[ing] the relevance score ... based at least in part on*” “*one or more actions of the user on the piece of electronic content*” (i.e., *the first determined measure of relevance*”).

3. Rose does not teach, disclose, or render obvious the limitation of “identify at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user”

180. Every claim of the ‘217 Patent contains the following limitation: “*identify at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*” Rose does not teach, disclose, or render obvious this limitation.

181. The ‘217 Patent requires steps to *identify* a set of *cognate users* for a given user. From this correlation matrix, a specific set of cognate users is determined for the first user. The ratings provided by these cognate users on the

same electronic object received by the first user are then used to compute the *cognate relevance* of that electronic message (x), as illustrated in Figure 22 of Patent 217.

182. Additionally, in the final *local importance* calculation, the *Cognate Importance* of sender *s* to recipient *r* is derived from the non-zero *Individual Importance Components (IIC)* of the cognate users:

$$I_{sr}^c = \frac{1}{n_c} \sum_{i=1}^{n_c} f(IIC_i)$$

(EX1001, 34:5–10), where n_n represents the count of non-zero IICs within the cognate group.

183. In the ‘217 Patent, the cognate users may vary across different first users, and the list of cognate users can be asymmetric. Two key conditions must be met for inclusion:

The user must have interacted with the same electronic message, and

The user must exhibit similarity to the first user.

EX1001, at Claims.

184. The ‘217 Patent adopts a more selective and user-specific collaborative filtering approach than the approach in Rose.

185. In Rose, the second similarity measure employs correlations and ratings from **all users** across the system for the same item or electronic object. This results in a broader, less selective approach than the '217 Patent. Specifically, in Rose, a user's interest in information is predicted based on correlations with preferences expressed by **all other users** who retrieved that same message. *E.g.*, EX1006, at Abstract ("The user correlation data is obtained from **feedback information provided by users** when they retrieve items of information." (emphasis added)); *id.* at 2:46-48 (same); *id.* at 2:20-22 ("[I]t is particularly desirable to provide an information relevance predicting technique which utilizes **community feedback**" (emphasis added)); *id.* at 6:6-11 (discussing use of "correlations of indications provided by **users who have retrieved the message**" (emphasis added)); *id.* at 6:59-62 ("A second factor in the prediction of a user's interest in information is based upon a correlation with the **indications provided by other users**." (emphasis added)); *id.* at 8:26-27 ("[E]ach individual can benefit from **the experiences of others**." (emphasis added)); *id.* at 8:30-32 ("The invention takes advantage of the fact that a **community of users** is participating in the presentation of information to users." (emphasis added)); *id.* at 8:37 ("In the system of the present invention, ... the relevance score of a particular message takes into account ... **feedback from the community**." (emphasis added)); *id.* at

Claim 1 (“determining a measure of correlation between the particular user’s interests and that of **other users who have accessed the said item of information**” (emphasis added)); *id.* at claim 6 (“generating a correlation matrix which indicates the degree of **correlation between respective users** based upon commonly accessed items of information” (emphasis added)); *id.* at claim 17 (“the correlation between indications provided by the given user and **other users who have had access to said item of information**” (emphasis added)).

186. In Rose, a first user’s interest in information is predicted based on correlations with preferences expressed by **all other users** who retrieved that same message. As stated in Rose (EX1006, 7:24), a prediction score P_{ij} for the i -th user regarding the j -th document can be computed as:

$$P_{ij} = \sum_{k \neq i, j} (R_{ik} \times V_{kj})$$

where R_{ik} represents the correlation between users i and k , and V_{kj} denotes the weight or feedback provided by user k on document j . Thus, when predicting the interest of the first user (i) in a particular electronic object (j), correlations from all users **except** the first user (i) are considered, and all users’ ratings on the same object are factored into the calculation.

187. Figure 6 in Rose illustrates the generation of a correlation chart. EX1006, at 3:9 & Fig. 6. The table **42** stores the results from “each time a user retrieves a document and subsequently provides an indication of interest.” EX1006, at 62-63. “From this table, a correlation matrix R can be generated, whose entries indicate the degree of correlation between the various users’ interests in commonly retrieved messages.” *Id.* at 6:64-66. The system calculates “a measure of correlation between the i-th user and the j-th user.” *Id.* at 6:67-7:1. This correlation matrix is illustrated in Figure 6 at **44**. *Id.* at 7:1-3.

188. Rose discloses an algorithm that can be used for correlation-based prediction. EX1006, at 7:7-34. The algorithm calculates a “prediction score for User C regarding Document 1.” In doing so, the algorithm considers each one of the other users – i.e., A, B, and D in the example. *Id.* The algorithm considers all of these other users’ feedback regardless of whether the other users had similar historical feedback as the first user. For example, in the example matrix, the feedback of all other users (here, Users A, B, and D) is considered, even though, for example, User D almost always provided opposite feedback as compared to User C (their feedback was opposite for five of the six commonly-rated documents). *See* EX1006, at Fig. 6, Table 42. Thus, Rose considers the feedback of

every user that accessed the item, regardless of whether the other users are similar to (or historically provided similar feedback as) the first user.

189. Because Rose considers the feedback of all users who retrieved that same message, Rose's use of correlation-based prediction does not "*identify*" another user (or group of users) that is both "*a recipient*" of the piece of electronic content being scored and also is similar to ("*cognate*" to) the first user – i.e., the user for which information objects are being ranked. *See generally* EX1006.

190. In conclusion, both the '217 Patent and Rose analyze the same electronic message, but their collaborative filtering/correlation strategies differ significantly. Rose uses correlations and ratings from all users in the system, while the '217 Patent employs only a subset of users – i.e., "*cognate*" "*users*" (those most relevant to the given first user) – resulting in a more refined and adaptive filtering process.

191. Dr. Fox opines that Rose "uses a correlation matrix to identify cognate users." EX1003, ¶ 187. I disagree. Rose uses a correlation matrix to "indicate the degree of correlation between the various users' interests in commonly retrieved messages." EX1006, at 6:64-66 (emphasis added). As discussed above, Rose does this for all users that retrieved the same document (not only for the users who provided similar feedback as the first user in the past). Rose does not use a

correlation matrix to “*identify*” a second user (or group of users) that is “*cognate*” to the first user.

192. For this limitation, Dr. Fox points to language in Rose stating that “multiple regression analysis can be utilized to combine the various factors,” and that, “[i]n this approach, regression methods are employed to identify the most important attributes that are used as predictors, e.g., salient terms in a document and users having similar feedback responses, and how much each one should be weighted.” EX1006, at 7:39-47; EX1003, ¶ 187. For several reasons, this passage does not disclose “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user*” – i.e., one of the limitations required by the ‘217 Patent but missing from Rose. First, in this passage in Rose, the word “identify” is used to discuss “identify[ing]” “**attributes**”; it does not teach or suggest “identify[ing]” **another “user”** (or group of users) (i.e., “*identify[ing] at least one other of the plurality of users ... that is cognate to the user*”). Second, the passage discusses “identify[ing]” “attributes,” but attribute-based prediction in Rose **relates to the item** in question (e.g., the item’s content). E.g., EX1006, at 2:35-37 (attribute-based prediction uses “data pertaining to one or more **attributes of each item**” (emphasis added)). Finally, although the passage mentions other users’ feedback responses, it does not teach or

suggest the need to “identify” those specific users (i.e., “*identify[ing] at least one other of the plurality of users ...*”); it does not teach or suggest that the other users must be similar to the first user (i.e., “*cognate to the [first] user*”); and it certainly does not teach or suggest the need to “identify” other users that are similar to the first user **and also** received the same piece of content as the first user (i.e., “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the [first] user*”).

193. Dr. Fox opines that “[t]o the extent Rose does not explicitly identify a group of users based on this correlation, in my opinion, a POSITA would have found it obvious to group users based on correlations, to improve results and reduce the work required to process recommendations.” EX1003, ¶ 188. He opines that grouping users based upon correlation would be obvious because it would help with scalability issues. I disagree that grouping users based upon correlation would improve scalability. This is because, in order to identify a group of users based on this correlation, the system would still need to track all of the other users’ responses in order to determine which users’ responses are most similar to the first user. I disagree that grouping users based upon correlation would “improve results.” Dr. Fox cites to no evidence supporting his opinoin that doing so would

“improve results.” To the contrary, Rose teaches that feedback from all other users is valuable.

C. Ground 3: Claims 1-3, 5-9, 13-15, 18-19, and 22 of the ‘217 patent are not obvious based on Rose and Bieganski.

194. Claims 1-3, 5-9, 13-15, 18-19, and 22 of the ‘217 patent are not obvious based on Rose and Bieganski.

195. Combining Rose and Bieganski would not result in the ‘217 Patent inventions. This is because combining Rose and Bieganski would not result in “*determining the relevance score ... based at least in part on*” “*actions of the user on the piece of electronic content.*”

196. As discussed above, every claim of the ‘217 Patent requires “*determining the relevance score of the piece of electronic content sent from the sender to the user, the relevance score being determined based at least in part on the first determined measure of relevance and on the second determined measure of relevance.*” EX1001, at Claims (emphasis added). As set forth above, however, Rose does not disclose a “*first determined measure of relevance*” because Rose does not disclose “*determining a first measure of relevance of the piece of electronic content based at least in part on one or more actions of the user on the piece of electronic content.*” Therefore, Rose also does not teach or disclose

determining a relevance score “*based at least in part on the first determined measure of relevance.*”

197. Dr. Fox does not claim that Bieganski discloses “*determining a first measure of relevance of the piece of electronic content based at least in part on one or more actions of the user on the piece of electronic content.*” Therefore, the combination of Rose and Bieganski does not disclose this limitation.

198. Also as discussed above, every claim of the ‘217 Patent requires “*identify[ing] at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the [first] user.*” As discussed above, this limitation is missing from Rose. Dr. Fox opines that “a POSITA would have known to combine the teachings of Rose with those of Bieganski to improve predictions by organizing users into groups based on their prior actions and assessments (*identify at least one other of the plurality of users that is a recipient of the piece of electronic content and that is cognate to the user.*)” EX1003, ¶ 245. I disagree.

199. Dr. Fox argues that a skilled artisan would have used Bieganski’s method for selecting which other users’ preferences are considered in a recommendation because, he opines, Bieganski “improves upon” the technique used in Rose. EX1003, ¶ 236 & 247-248. I understand that the Board agreed that

Bieganski's method is an "improved technique." Decision, at 28 (citing Pet. 71 & EX1003, ¶ 236 & 247-248). I disagree that Bieganski's method is "improved," or better than, Rose's technique. As discussed above, Rose teaches that the feedback of all other users is relevant and is included in Rose's correlation-based algorithm. EX1006, at 6:21-34. For example, if the first user and User X consistently provide opposite feedback, Rose views information about User X's feedback (i.e., the feedback of the dissimilar user) on an item of information as just as valuable as information about another user that provides the same feedback as the first user. *Id.*

200. I also disagree with Dr. Fox's opinion (EX1003, ¶¶ 232-237) that it would be obvious to combine Rose and Bieganski to come up with the solutions in the '217 Patent.

201. One reason that it would not have been obvious to combine Rose and Bieganski to come up with the solutions in the '217 Patent is because Bieganski does not address "sent" content, whereas every claim of the '217 Patent addresses the relevancy of sent content. The Bieganski reference addresses the problem of recommending a particular type of content: non-textual multimedia content such as movies and videos. EX1007, 1:45-50. Although Bieganski also discusses "textual" information, all of the "textual" information that Bieganski discusses are non-sent items – i.e., books, magazines, publications, articles, and "Internet documents."

EX1007, 17:44-58. The Bieganski reference does not address “sent” electronic content, such as e-mails. *See generally* EX1007. In contrast, every claim of the ‘217 Patent addresses “*electronic content sent from a sender to a user.*” EX1001, at Claims. Because Bieganski is focused on a different type of content, a skilled artisan would not be motivated to look to Bieganski at all to solve the problems involving sent pieces of electronic content that the ‘217 Patent was trying to solve. EX1001, 1:10-45.

202. In addition, in my opinion, combining Rose and Bieganski would not be a simple change. The two threshold selections in Bieganski – i.e., minimum neighbor similarity and maximum neighborhood size – are not trivial. Furthermore, these thresholds may vary from one targeted user to another one.

203. In sum, the combination of Rose and Bieganski does not disclose the limitation of “*determining a first measure of relevance of the piece of electronic content based at least in part on one or more actions of the user on the piece of electronic content.*” In addition, it would not have been obvious to combine Rose and Bieganski to come up with the inventive solutions set forth in the ‘217 Patent.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 4th day of November 2025, in Plano, Texas.

Latifur Khan

Latifur Khan, Ph.D.