

**UNITED STATES PATENT AND TRADEMARK OFFICE**

---

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

---

META PLATFORMS, INC.,  
Petitioners

v.

STERLING COMPUTERS CORPORATION,  
Patent Owner.

---

IPR2025-00430

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

---

**DECLARATION OF EDWARD A. FOX  
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW  
OF U.S. PATENT NO. 7,716,217**

Mail Stop PATENT BOARD  
Patent Trial and Appeal Board  
U.S. Patent & Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

META-1003  
IPR2025-00430

## TABLE OF CONTENTS

|       |                                                          |    |
|-------|----------------------------------------------------------|----|
| I.    | INTRODUCTION .....                                       | 1  |
| II.   | BACKGROUND AND QUALIFICATIONS .....                      | 2  |
| III.  | LEVEL OF ORDINARY SKILL IN THE ART .....                 | 11 |
| IV.   | MATERIALS CONSIDERED .....                               | 12 |
| V.    | LEGAL STANDARDS .....                                    | 13 |
| A.    | Prior Art .....                                          | 13 |
| B.    | Priority Date .....                                      | 14 |
| C.    | Claim Construction .....                                 | 14 |
| D.    | Obviousness .....                                        | 15 |
| E.    | Markush Groups.....                                      | 20 |
| VI.   | SUMMARY OF OPINIONS.....                                 | 20 |
| VII.  | BRIEF DESCRIPTION OF THE TECHNOLOGY .....                | 21 |
| A.    | Information Retrieval.....                               | 21 |
| B.    | Digital Libraries .....                                  | 21 |
| C.    | User Profiles.....                                       | 23 |
| D.    | Recommending Based on Monitored User Actions .....       | 25 |
| E.    | Collaborative Filtering .....                            | 27 |
| F.    | Searching and Filtering .....                            | 32 |
| VIII. | OVERVIEW OF THE '217 PATENT .....                        | 35 |
| A.    | Specification.....                                       | 35 |
| B.    | Prosecution History.....                                 | 36 |
| IX.   | THE CHALLENGED CLAIMS .....                              | 41 |
| X.    | CLAIM CONSTRUCTION .....                                 | 44 |
| A.    | Limitations Implicating Means-Plus-Function (“MPF”)..... | 44 |
| 1.    | “Monitoring Module” .....                                | 45 |
| 2.    | “First Relevance Measurement Module” .....               | 47 |

**TABLE OF CONTENTS**  
**(continued)**

|                                                      | <b>Page</b> |
|------------------------------------------------------|-------------|
| 3. “Second Relevance Measurement Module” .....       | 50          |
| 4. “Relevance Analysis Module” .....                 | 54          |
| 5. “Content Presentation Module” .....               | 55          |
| 6. “Search Module” .....                             | 59          |
| XI. OVERVIEW OF THE CITED REFERENCES .....           | 61          |
| A. Dumais (EX-1005) .....                            | 61          |
| B. Rose (EX-1006) .....                              | 65          |
| C. Bieganski (EX-1007) .....                         | 71          |
| XII. DETAILED EXPLANATION OF GROUNDS .....           | 75          |
| A. Ground 1: Obviousness Over Dumais (EX-1005) ..... | 75          |
| 1. Claim 1 .....                                     | 75          |
| 2. Claim 2 .....                                     | 106         |
| 3. Claim 3 .....                                     | 110         |
| 4. Claim 5 .....                                     | 112         |
| 5. Claim 6 .....                                     | 113         |
| 6. Claim 7 .....                                     | 115         |
| 7. Claim 8 .....                                     | 117         |
| 8. Claim 9 .....                                     | 118         |
| 9. Claim 13 .....                                    | 123         |
| 10. Claim 14 .....                                   | 123         |
| 11. Claim 15 .....                                   | 123         |
| 12. Claim 18 .....                                   | 124         |
| 13. Claim 19 .....                                   | 124         |
| 14. Claim 22 .....                                   | 124         |
| B. Ground 2: Obviousness Over Rose (EX-1006) .....   | 124         |
| 1. Claim 1 .....                                     | 124         |

**TABLE OF CONTENTS**  
**(continued)**

|                                                                                     | <b>Page</b> |
|-------------------------------------------------------------------------------------|-------------|
| 2. Claim 2.....                                                                     | 143         |
| 3. Claim 3.....                                                                     | 146         |
| 4. Claim 5.....                                                                     | 148         |
| 5. Claim 6.....                                                                     | 148         |
| 6. Claim 7.....                                                                     | 151         |
| 7. Claim 8.....                                                                     | 153         |
| 8. Claim 9.....                                                                     | 154         |
| 9. Claim 13.....                                                                    | 156         |
| 10. Claim 14.....                                                                   | 156         |
| 11. Claim 15.....                                                                   | 156         |
| 12. Claim 18.....                                                                   | 156         |
| 13. Claim 19.....                                                                   | 157         |
| 14. Claim 22.....                                                                   | 157         |
| C. Ground 3: Obviousness Over Rose In Combination with<br>Bieganski (EX-1007) ..... | 157         |
| 1. Motivation to Combine.....                                                       | 157         |
| 2. Claim 1 .....                                                                    | 163         |
| 3. Claim 2.....                                                                     | 170         |
| 4. Claim 3.....                                                                     | 170         |
| 5. Claim 5.....                                                                     | 170         |
| 6. Claim 6.....                                                                     | 171         |
| 7. Claim 7.....                                                                     | 172         |
| 8. Claim 8.....                                                                     | 174         |
| 9. Claim 9.....                                                                     | 175         |
| 10. Claim 13.....                                                                   | 175         |
| 11. Claim 14.....                                                                   | 176         |
| 12. Claim 15.....                                                                   | 176         |

**TABLE OF CONTENTS**  
**(continued)**

|                       | <b>Page</b> |
|-----------------------|-------------|
| 13. Claim 18.....     | 176         |
| 14. Claim 19.....     | 176         |
| 15. Claim 22.....     | 177         |
| XIII. CONCLUSION..... | 177         |

## EXHIBIT LIST

| Ex No. | Shorthand                | Reference                                                                                                                                                  |
|--------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001   | '217 Patent or Marston   | U.S. Patent No. 7,716,217                                                                                                                                  |
| 1002   | '217 Patent File History | File History of the '217 Patent                                                                                                                            |
| 1003   | Fox Decl. or Fox         | Declaration of Dr. Edward A. Fox in Support of Petition                                                                                                    |
| 1004   | Fox CV                   | <i>Curriculum Vitae</i> of Dr. Edward A. Fox                                                                                                               |
| 1005   | Dumais                   | U.S. Pat. App. Pub. No. 2007/0016553 A1 to Dumais, et al.                                                                                                  |
| 1006   | Rose                     | U.S. Pat. No. 6,202,058 B1 to Rose, et al.                                                                                                                 |
| 1007   | Bieganski                | U.S. Pat. No. 6,334,127 to Bieganski, et al.                                                                                                               |
| 1008   | Lesk                     | Michael Lesk, <i>Understanding Digital Libraries</i> (Elsevier, 2nd ed. 2004)                                                                              |
| 1009   | Arms                     | William Y. Arms, <i>Digital Libraries</i> (MIT Press, 1st ed. 1999)                                                                                        |
| 1010   | Carroll                  | John M. Carroll, <i>Human-Computer Interaction in the New Millennium</i> (Pearson Education 2002)                                                          |
| 1011   | Kuniavsky                | Mike Kuniavsky, <i>Observing the User Experience: A Practitioner's Guide to User Research</i> (Elsevier 2003)                                              |
| 1012   | Shneiderman              | Ben Shneiderman, <i>Designing the User Interface: Strategies for Effective Human-Computer Interaction</i> (Addison Wesley 3rd ed. 1998)                    |
| 1013   | User Goals               | Daniel E. Rose and Danny Levinson, <i>Understanding user goals in web search</i> , 13–19 (In Proc. WWW '04, Association for Computing Machinery, May 2004) |
| 1014   | Teevan                   | Jaime Teevan, et al., <i>Personalizing Search via Automated Analysis of Interests and Activities</i> , 449-56 (In Proceedings of SIGIR '05)                |

| Ex No. | Shorthand     | Reference                                                                                                                                                                                                                                                                       |
|--------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1015   | Miller        | Miller, B. et al., <i>Experiences with GroupLens: Making Usenet Useful Again</i> , 219-33 (In Proceedings of the USENIX 1997 Annual Technical Conference)                                                                                                                       |
| 1016   | Claypool      | Mark Claypool, et al., <i>Combining Content-Based and Collaborative Filters in an Online Newspaper</i> , (ACM SIGIR Workshop on Recommender Systems, Aug. 1999)                                                                                                                 |
| 1017   | Goldberg      | David Goldberg, et al., <i>Using Collaborative Filtering to Weave an Information Tapestry</i> 35:12, 61-70 (Communications of the ACM, Dec. 1992)                                                                                                                               |
| 1018   | Melville      | Prem Melville, et al., <i>Content-Boosted Collaborative Filtering for Improved Recommendations</i> , 187-92 (In Proceedings of the Eighteenth National Conference on Artificial Intelligence, AAAI-2002)                                                                        |
| 1019   | Beyond Search | Daniel E. Rose, <i>Beyond Search: The Information Access Research Group at Apple</i> , 85–89 (SIGCHI Bull. 30, 2, April 1998)                                                                                                                                                   |
| 1020   | MessageWorld  | Daniel E. Rose et al., <i>MessageWorld: A New Approach to Facilitating Asynchronous Group Communication</i> , 266-73 (Association for Computing Machinery, In Proceedings of the Fourth International Conference on Information and Knowledge Management (CIKM), December 1995) |
| 1021   | Herz          | U.S. Patent No. 8,799,461 B2 to Herz, et al.                                                                                                                                                                                                                                    |
| 1022   | Kim           | S. Kim and E. Fox, <i>Interest-Based User Grouping Model For Collaborative Filtering In Digital Libraries</i> , In Proceedings of the 7th International Conference on Digital Libraries (ICADL, Dec. 2004)                                                                      |
| 1023   | Belkin        | Nicholas J. Belkin and W. Bruce Croft, <i>Information Filtering and Information Retrieval: Two Sides of the Same Coin?</i> 29-38, Communications of the ACM, 35:12, (Dec. 1992)                                                                                                 |
| 1024   | Wittenburg    | Kent Wittenburg and Eric Sigman, <i>Integration of Browsing, Searching, and Filtering in an Applet for</i>                                                                                                                                                                      |

| Ex No. | Shorthand | Reference                                                                                                                                                                                                                                                  |
|--------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |           | <i>Web Information Access</i> , 22-27 (In Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems, March 1997)                                                                                                                      |
| 1025   | Jung      | Seikyung Jung, et al., <i>Applying Collaborative Filtering for Efficient Document Search</i> , 20-24 (In Proceedings of the IEEE/WIC/ACM International Conference on Web Intelligence, September 2004)                                                     |
| 1026   | Ponte 1   | U.S. Patent No. 6,826,559 B1 to Ponte                                                                                                                                                                                                                      |
| 1027   | Ponte 2   | U.S. Patent No. 7,047,242 B1 to Ponte                                                                                                                                                                                                                      |
| 1028   | Melton    | U.S. Patent No. 9,864,813 B2 to Melton, et al.                                                                                                                                                                                                             |
| 1029   | Malik     | U.S. Pat. App. Pub. No. 2004/0078447 to Malik, et al.                                                                                                                                                                                                      |
| 1030   | McKeogh   | John McKeogh and Chris Exton, <i>Eclipse plug-in to monitor the Programmer Behaviour</i> , In Proceedings of the 2004 OOPSLA Workshop on Eclipse Technology eXchange (Eclipse '04), 93–97 (Association for Computing Machinery, New York, NY October 2004) |
| 1031   | Rich      | Charles Rich, et al, <i>A Plug-in Architecture for Generating Collaborative Agent Responses</i> , 782–89 (In Proceedings AAMAS'02, Association for Computing Machinery, New York, NY)                                                                      |
| 1032   | Domingue  | John Domingue, et al. <i>Magpie: Supporting Browsing and Navigation on the Semantic Web</i> , 191–97 (In Proceedings IUI'04, Association for Computing Machinery, New York, NY, 2004)                                                                      |
| 1033   | Cöster    | Rickard Cöster & Martin Svensson, <i>Inverted File Search Algorithms for Collaborative Filtering</i> , 246–52 (In Proceedings SIGIR '02, Association for Computing Machinery, New York, NY, 2002)                                                          |
| 1034   | Heath     | Lenwood S. Heath, et al. 1995. <i>Envision: a user-centered database of computer science literature</i> . Commun. ACM 38, 4 (April 1995)                                                                                                                   |

| <b>Ex No.</b> | <b>Shorthand</b> | <b>Reference</b>                                                                                                                                                                                    |
|---------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1035          | Nowell           | Lucy Terry Nowell, et al., <i>Visualizing search results: some alternatives to query-document similarity</i> , 67–75 (In Proc. SIGIR '96, Association for Computing Machinery, New York, NY) (1996) |
| 1036          | Saracevic        | Tefko Saracevic, <i>A Review of and a Framework for the Thinking on the Notion in Information Science</i> 321-43 (Journal of the Am. Society for Info. Sci., Dec. 1975)                             |
| 1037          | Meta Dkt.        | Docket for <i>Sterling Computs. Corp. v. Meta Platforms, Inc. f/k/a Facebook, Inc.</i> , Case No. 1:24-cv-00551 (W.D. Tex. May 22, 2024)                                                            |
| 1038          | X Dkt.           | Docket for <i>Sterling Computs. Corp. v. X Corp. f/k/a Twitter, Inc.</i> , 1:24-cv-00552 (W.D. Tex. May 22, 2024)                                                                                   |

## LISTING OF CLAIMS

| Reference      | Claim Limitations                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Claim 1</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1[pre]         | A computer-implemented system for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented system comprising:                                                                                                                                                                                                                                                             |
| 1[a]           | a computer processor; and                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1[b]           | a computer-readable storage medium storing computer program modules configured to execute on the computer processor, the computer program modules comprising:                                                                                                                                                                                                                                                                                                                                   |
| 1[c]           | a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;                                                                                                                                                                                                                                                                                                                                                         |
| 1[d]           | a first relevance measurement module 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;                                                                                                                                                                                                                                 |
| 1[e]           | a second relevance measurement module coupled to the monitoring module and configured to:                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1[f]           | 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                                                                                                                                                                                                                                                                                                                                               |
| 1[g]           | 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:<br><br>a local importance describing an importance of the sender to the user,<br><br>a global importance describing an importance of the sender within an organization with which the plurality of users are associated,<br><br>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; and                                                                                                                       |
| 1[h]           | a relevance analysis module 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.                     |
| <b>Claim 2</b> |                                                                                                                                                                                                                                                                                                                              |
| 2              | The system of claim 1, further comprising:<br><br>a content presentation module 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.                                            |
| <b>Claim 3</b> |                                                                                                                                                                                                                                                                                                                              |
| 3              | The system of claim 1, further comprising:<br><br>a search module configured to search the electronic content in accordance with the determined relevance score.                                                                                                                                                             |
| <b>Claim 5</b> |                                                                                                                                                                                                                                                                                                                              |
| 5              | The system of claim 1, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.                                                                                                                                                                                |
| <b>Claim 6</b> |                                                                                                                                                                                                                                                                                                                              |
| 6[pre]         | A computer program product for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-program product having a computer-readable storage medium having computer program instructions encoded thereon comprising: |
| 6[a]           | a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;                                                                                                                                                                                      |
| 6[b]           | a first relevance measurement module 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;                                                              |
| 6[c]           | a second relevance measurement module coupled to the monitoring module and configured to:                                                                                                                                                                                                                                    |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6[d]           | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 6[e]           | <p>determine a second measure of relevance of the piece of electronic content based at least in part on one or more measures derived from the group consisting of:</p> <p>a local importance describing an importance of the sender to the user,</p> <p>a global importance describing an importance of the sender within an organization with which the plurality of users are associated,</p> <p>a content relevance determined responsive to content of the piece of electronic content, and</p> <p>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; and</p> |
| 6[f]           | a relevance analysis module 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.                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Claim 7</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 7[pre]         | A computer-implemented method for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented method comprising:                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7[a]           | tracking actions by a plurality of users associated with an application for managing electronic content;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 7[b]           | identifying 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,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7[c]           | 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;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7[d]            | <p>determining a second measure of relevance of the piece of electronic content based at least in part on one or more measures derived from the group consisting of:</p> <p>a local importance describing an importance of the sender to the user,</p> <p>a global importance describing an importance of the sender within an organization with which the plurality of users are associated,</p> <p>a content relevance determined responsive to content of the piece of electronic content, and</p> <p>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; and</p> |
| 7[e]            | <p>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.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Claim 8</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 8               | <p>The system of claim 1, wherein identifying at least one other of the plurality of users that is cognate to the user comprises analyzing historical actions of the at least one other of the plurality of users with respect to historical actions of the user.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Claim 9</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 9               | <p>The system of claim 8, wherein the at least one other of the plurality of users is cognate to the user, and the user is not cognate to the at least one other of the plurality of users.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Claim 13</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 13              | <p>The computer program product of claim 6, further comprising:</p> <p>a content presentation module 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.</p>                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Claim 14</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                 |                                                                                                                                                                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14              | The computer program product of claim 6, further comprising:<br><br>a search module configured to search the electronic content in accordance with the determined relevance score.                                                                    |
| <b>Claim 15</b> |                                                                                                                                                                                                                                                       |
| 15              | The computer program product of claim 6, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.                                                                                       |
| <b>Claim 18</b> |                                                                                                                                                                                                                                                       |
| 18              | The method of claim 7, further comprising:<br><br>presenting the piece of electronic content to the user in accordance with the determined relevance score and presenting to the user a value describing the determined relevance score.              |
| <b>Claim 19</b> |                                                                                                                                                                                                                                                       |
| 19              | The method of claim 7, further comprising:<br><br>searching the electronic content in accordance with the determined relevance score.                                                                                                                 |
| <b>Claim 22</b> |                                                                                                                                                                                                                                                       |
| 22              | The method of claim 7, wherein identifying at least one other of the plurality of users that is cognate to the user comprises analyzing historical actions of the one other of the plurality of users with respect to historical actions of the user. |

I, Edward A. Fox, Ph.D., declare as follows:

**I. INTRODUCTION**

1. I have been retained as an expert witness on behalf of Meta Platforms Inc. (“Meta” or “Petitioner”) to offer technical opinions related to U.S. Patent No. 7,716,217 (“the ’217 patent”) (EX-1001). Specifically, I have been asked to consider the validity of claims 1-3, 5-9, 13-15, 18-19, and 22 (the “Challenged Claims”) of the ’217 patent in view of prior art and obviousness considerations from the perspective of a person of ordinary skill in the art at the time of the invention (“POSITA”) as it relates to the ’217 patent.

2. I am being compensated for my time at my standard consulting rate. I am also being reimbursed for expenses that I incur during the course of this work. My compensation is not contingent upon the results of my study, the substance of my opinions, or the outcome of any proceeding involving the Challenged Claims. I have no financial interest in the outcome of this matter or in the pending litigation between Petitioner and Patent Owner.

3. My analysis here is based on my years of education, research, and experience, as well as my investigation and study of relevant materials, including those cited herein.

4. I may rely upon these materials, my knowledge and experience, and/or additional materials to rebut arguments raised by the Patent Owner. Further, I may

also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

5. My analysis of the materials in this proceeding is ongoing and I will continue to review any new material as it is provided. This declaration represents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

## **II. BACKGROUND AND QUALIFICATIONS**

6. I am over the age of 18 and am competent to write this declaration. My education, training, and experience provides me with a deep knowledge pool about the technologies and topics set forth below.

7. My qualifications are set forth in my *curriculum vitae*, a copy of which is attached as Exhibit 1004 to this Declaration. The following is a brief summary of my relevant qualifications and professional experience.

8. Prior to my retirement on January 1, 2025, I served as a professor at Virginia Polytechnic Institute & State University (“Virginia Tech”) since September 1983, in the Department of Computer Science. Since February 2016, I also had a courtesy appointment as Professor in the Department of Electrical and Computer Engineering. Since January 1998, I was the Director of the Digital Library Research Laboratory at Virginia Tech. From June 1990 to June 2014, I was the Associate

Director for Research at Virginia Tech's Computing Center, a position that evolved to Faculty Advisor to Information Technology.

9. Before that, from August 1982 to April 1983, I was Manager of Information Systems at the International Institute of Tropical Agriculture, in Ibadan, Nigeria. Before that, from September 1978 to August 1982, I was an Instructor, Research Assistant, and Teaching Assistant at the Department of Computer Science at Cornell University. Before that, from September 1972 to August 1978, in Florence, SC, I was the Data Processing Manager in the Vulcraft Division of NUCOR Corporation. Before that, from September 1971 to June 1972, I was a Data Processing Instructor at Florence Darlington Technical College.

10. From December 2018 through November 2021, I was Chief Technology Officer of Mayfair Group LLC, as well as its product division, ClaimEdge, aiming to serve the insurance and law industries with collaboration and summarization software.

11. I earned a Bachelor of Science degree in Electrical Engineering (in the computer science option) from the Massachusetts Institute of Technology (MIT) in 1972, a Master of Science degree in Computer Science from Cornell University in 1981, and a Ph.D. in Computer Science from Cornell University in 1983. My undergraduate advisor was JCR Licklider, then Director of Project MAC, who in 1960 outlined the need for simpler interaction between computers and computer

users, in 1965 published a book calling for what later became digital libraries, and when working at DARPA, managed projects that led to the Internet. My graduate advisor was Gerard Salton, often called the father of information retrieval (IR). Some of my bachelor's work was in the area of information storage and retrieval, and that area has been the focus of my work since 1978. My doctoral dissertation related to all of the major IR approaches, including Boolean, extended Boolean, vector, and probabilistic handling of queries and documents. It involved studying logs of user sessions, clustering, TF-IDF and other term weighting, similarity measures, weighting different content types, ranking, relevance feedback, and unified vector representations including any number of content types (including words in different document sections, keywords or key phrases, categories or descriptors, in-links, out-links, co-citations, and bibliographic coupling).

12. By the mid-1980s my work in IR connected with the field of human-computer interaction (HCI), and by the late 1980s that broadened into work on multimedia information and systems, including interactive digital video. Since the early 1990s I have taught CS4624, "Multimedia, Hypertext, and Information Access," a capstone course in the Department of Computer Science, so am familiar with what computer science seniors know about these topics, including about systems for searching and recommending. Also, since the early 1990s, my work has included a concentration on digital libraries and related information repositories,

including web crawling and archiving. In recent decades especially, my work has connected with artificial intelligence, including with natural language processing (computational linguistics), knowledge bases, ontologies (and mappings), machine learning, and deep learning, especially involving classification, summarization, and clustering.

13. I am a member of the Association for Computing Machinery (ACM) and its Special Interest Group on Information Retrieval (SIGIR), for which I served from 1987-1991 as vice chairman and 1991-1995 as chairman. From 1988-1991, I served on the ACM Publications Board and again served on that Board as well as co-chair of its Digital Libraries Committee from 2018-2019.

14. ACM has awarded me seven recognition of service awards. I am a Fellow of ACM (cited for contributions in information retrieval and digital libraries) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) (cited for leadership in digital libraries and information retrieval), as well as a member of IEEE-CS. I am an inaugural inductee of the ACM SIGIR Academy, class of 2021, “to honor and recognize individuals who have made significant, cumulative contributions to the development of the field of information retrieval (IR). Inductees to the SIGIR Academy are the principal leaders in IR, whose efforts have shaped the discipline and/or industry through significant research, innovation, and/or service.” I served on the Executive Committee of the IEEE Technical Committee on Digital

Libraries from 2002-2017 and was its chairman 2004-2008. Since 2021 I have been a Fellow of the Asia-Pacific Artificial Intelligence Association (AAIA). Since January 2024, I have been a Fellow of the International Artificial Intelligence Industry Alliance (AIIA).

15. I have received a number of honors and awards relating to my work in information retrieval and other areas. One related honor, at Virginia Tech, is the XCaliber Award 2016 “for extraordinary contributions to technology-enriched learning activities” for the project “Enhanced problem-based learning connecting big data research with classes.” In 2024, I received the W.S. “Pete” White Award for Innovation in Engineering Education, one of the Virginia Tech College of Engineering Dean’s Awards of Excellence. I have taught classes on information retrieval since the early 1980s, and about multimedia since the early 1990s. In 2023 I received the Commercialization Champion award for “making knowledge accessible with improved computational searches and extensible digital libraries and information systems”. In October 2015, I received an award for Research Impact in Human-Computer Interaction, conferred by the Virginia Tech Center for Human-Computer Interaction (CHCI), and have served since 1995 as a Founding Member of CHCI.

16. I have held numerous board positions in various editorial, professional, and industry organizations and groups. For example, I served during 2010-2013 as

an elected member of the Computing Research Association Board, broadly representing the U.S. computing research community.

17. I have extensive experience in many of the key areas related to handling information with computers, including information retrieval, digital libraries (which relate to “specialized search engines” or “vertical search”), Web archiving, and human-computer interaction. This work involves theory, algorithms, systems, and interfaces/user studies. It also is described currently by buzz words such as search engines, big data, data science, data analytics, machine learning, and natural language processing.

18. In these areas, I have participated in, organized, or presented at hundreds of conferences and workshops, and I have over 965 related keynotes, tutorials, books, book chapters, articles, papers, posters, demonstrations, or reports, as well as 3 issued patents and over 365 other presentations.

19. I have been awarded several United States patents, and I have several patent publications and applications including the following examples (listed in order of recency):

- Co-inventor on U.S. Patent No. 11,983,210 B2; filed June 9, 2021, issued May 14, 2024, “Methods and systems for generating summaries given documents with questions and answers” (Edward A. Fox, Saurabh Chakravarty, Satvik Chekuri, Maanav

Mehrotra, and Aaroahi Sumant),

<https://patents.google.com/patent/US11983210B2>

- Co-inventor on U.S. Patent No. 11,914,954 B2; filed Dec. 8, 2019, issued Feb. 27, 2024, “Methods and systems for generating declarative statements given documents with questions and answers” (Edward A. Fox, Saurabh Chakravarty, Raja Venkata Satya Phanindra Chava, Maanav Mehrotra),  
<https://patents.google.com/patent/US11914954B2>
- Co-inventor on U.S. Patent App. No. 18/585,685; filed Feb. 23, 2024, published Aug. 29, 2024 as US 2024/0289356 A1, “Structured Documentation Access for Electronic Documents” (Edward A. Fox, William A. Ingram, Aman Ahuja, Satvik Chekuri, and Bipasha Banerjee),  
<https://patents.google.com/patent/US20240289356A1>
- Co-inventor on U.S. Provisional Patent App. No. 63/522,929; filed June 23, 2023
- Co-inventor on U.S. Provisional Patent App. No. 63/522,919; filed June 23, 2023
- Co-inventor on U.S. Provisional Patent App. No. 63/522,917; filed June 23, 2023

- Co-inventor on U.S. Provisional Patent App. No. 63/450,149; filed Mar. 3, 2023
- Co-inventor on U.S. Provisional Patent App. No. 63/448,702; filed Feb. 27, 2023
- Co-inventor on U.S. Provisional Patent App. No. 63/448,700; filed Feb. 27, 2023
- Co-inventor on U.S. Provisional Patent App. No. 63/448,159; filed Feb. 24, 2023
- Co-inventor on U.S. Patent App. No. 17/673,242; filed Feb. 16, 2022; published Aug. 18, 2022 as US 2022/0261662 A1, “Extensible Information Systems and Methods” (Prashant Chandrasekar and Edward A Fox), <https://patents.google.com/patent/US20220261662A1>
- Co-inventor on U.S. Patent App. No. 17/343,560; filed June 9, 2021; published Dec. 16, 2021 as US 2021/0390127 A1, “Methods and Systems for Generating Summaries Given Documents with Questions and Answers” (Edward A. Fox, Saurabh Chakravarty, Satvik Chekuri, Maanav Mehrotra, and Aarohi Sumant). <https://patents.google.com/patent/US20210390127A1>

- Co-inventor on U.S. Provisional Patent App. No. 63/149,764; filed Feb. 16, 2021
- Co-inventor on U.S. Patent App. No. 17/113,880; filed Dec. 7, 2020; published June 10, 2021 as US 2021/0174016 A1, “Methods and Systems for Generating Declarative Statements Given Documents with Questions and Answers” (Edward A. Fox, Saurabh Chakravarty, Raja Venkata Satya Phanindra Chava, and Maanav Mehrotra. <https://patents.google.com/patent/US20210174016A1>; issued as U.S. Patent No. 11,914,954 B2 (see above)
- Co-inventor on U.S. Provisional Patent App. No. 63/039,725; filed June 16, 2020
- Co-inventor on U.S. Provisional Patent App. No. 62/945,202; filed Dec. 8, 2019; issued as U.S. Patent No. 11,914,954 B2 (see above)
- Co-inventor on US patent no. 7346621, filed May 14, 2004, issued March 18, 2008, Method and System for Ranking Objects Based on Intra-type and Inter-type Relationships (Benyu Zhang, Hua-Jun-Zeng, Wei-Ying Ma, Wensi Xi, Zheng Chen, and

Edward

A.

Fox).

<https://patents.google.com/patent/US7346621B2>.

### **III. LEVEL OF ORDINARY SKILL IN THE ART**

20. In rendering the opinions set forth in this declaration, I was asked to consider the patent claims and the prior art through the eyes of a POSITA at the time of the alleged invention, which I understand is asserted to be January 13, 2006—the earliest possible priority date of the '217 Patent. I understand that the factors considered in determining the ordinary level of skill in a field of art include the level of education and experience of persons working in the field; the types of problems encountered in the field; the teachings of the prior art, and the sophistication of the technology at the time of the alleged invention. I understand that a POSITA is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above. I understand that a POSITA would also have knowledge from the teachings of the prior art, including the art cited below.

21. Taking these factors into consideration, in my opinion, at the relevant time, a POSITA relating to the technology of the '217 Patent would have had a Bachelor of Science degree in Electrical Engineering, Computer Engineering, Computer Science, or a similar field, plus two to three years of work experience in systems estimating relevance for various types of content. In my opinion, more education could substitute for work experience and vice versa.

22. Before January 13, 2006, my level of skill in the art was at least that of a POSITA. I am qualified to provide opinions concerning what a POSITA would have known and understood at that time, and my analysis and conclusions herein are from the perspective of a POSITA as of that date.

#### **IV. MATERIALS CONSIDERED**

23. In preparing this Declaration, I have reviewed the '217 patent (EX-1001) and its prosecution history (EX-1002), as well as the patents and other documents cited herein, and I have considered these documents in light of the general knowledge in the art.

24. I am familiar with the technology described in the '217 patent as of the earliest possible effective filing date of January 13, 2006. For the purposes of this *inter partes* review, as I discuss later, I have been instructed to assume that the effective filing date of the claims of the '217 Patent is January 13, 2006, the filing date of Provisional Application No. 60/758,828.

25. In formulating my opinions, I have relied upon my experience in the relevant art. I have also considered the viewpoint of a POSITA in the relevant field, as of January 13, 2006, who I describe above. For convenience, the materials I considered in arriving at my opinions are listed in the Exhibit List above. I have also considered any materials cited in this declaration even if not included in the list above.

## **V. LEGAL STANDARDS**

26. I am not a lawyer and do not provide any legal opinions, but I have been advised that certain legal standards are to be applied by technical experts in forming opinions regarding meaning and validity of patent claims. I have applied the legal standards described below.

27. It is my understanding that assessing the validity of a U.S. patent based on a prior art analysis involves two steps. First, one must assess what meaning a POSITA would have given the terms. Second, after assessing the meaning of the claim terms, one may then assess validity by comparing a patent claim to the “prior art.” I understand that the teaching of the prior art is viewed through the eyes of a POSITA at the time the invention was made. My analysis as to what constitutes a relevant POSITA is set forth above.

### **A. Prior Art**

28. I understand that a patent or other publication must first qualify as prior art before it can be used to invalidate a patent claim. For purposes of this declaration, counsel for Petitioner has instructed me to assume that each prior art reference cited in the combinations described below (Dumais, Rose, Bieganski) qualify as prior art to the '217 Patent.

**B. Priority Date**

29. I understand that the “priority date” (or “earliest effective filing date” or “Critical Date”) of a patent is the date on which it is filed, or the date on which an earlier application was filed if the patentee properly claims the benefit of the earlier application’s filing date. For purposes of my analysis in this declaration, I have assumed that the ’217 Patent is entitled to a priority date of January 13, 2006.

**C. Claim Construction**

30. I understand that the claims of a patent define the limits of the patentee’s exclusive rights. I understand that to determine the scope of the claimed invention, courts typically construe claim terms, the meaning of which the parties may dispute. I understand that claim terms should generally be given their ordinary and customary meaning as understood by a POSITA at the time of filing the patent application, after reading the patent and its prosecution history. I also understand that a basic tenet of claim construction presumes that different words in a claim have different meanings, unless there is evidence to the contrary. A claim term, for instance, will not receive its ordinary meaning if the patentee acted as his or her own lexicographer and clearly set forth a definition of the claim term in the specification. In that case, the claim term will receive the definition set forth in the patent.

31. I understand that claims must be construed in light of and consistent with intrinsic evidence. In this context, I understand that intrinsic evidence includes

the claims themselves, the written disclosure in the specification, and the patent's prosecution history, including prior art that was considered by the United States Patent and Trademark Office. I understand that the specification is always highly relevant to the claim construction analysis and often is the single best guide to the meaning of a disputed term. I understand that extrinsic evidence may also be considered when construing claims and may include, for example, technical dictionaries, technical publications and books, treatises, and expert testimony, though the intrinsic record will be more persuasive as to the meaning of a particular term.

32. I understand that a claim's preamble is considered to be limiting if it recites essential structure or steps or if it is necessary to give life, meaning, and vitality to the claim. On the other hand, I understand that a preamble is not limiting where the body of a claim defines a structurally complete invention, and the preamble only states a purpose of intended use for the invention.

**D. Obviousness**

33. My understanding is that a patent claim is invalid as obvious only if the subject matter of the claimed invention "as a whole" would have been obvious to a POSITA at the time the invention was made. To determine the differences between a prior art reference (or a proposed combination of prior art references) and the claims, the question of obviousness is not whether the differences themselves would

have been obvious, but whether the claimed invention as a whole would have been obvious. Also, obviousness grounds cannot be sustained by mere conclusory statements. Rather, it is necessary to provide some articulated reasoning with rational underpinning to support the legal conclusion of obviousness.

34. I understand that a patent claim that comprises several elements is not proved obvious by simply showing that each of its elements was independently known in the prior art. In my evaluation of whether any claim of the '217 Patent would have been obvious, I considered whether the Petition, or any evidence submitted in this proceeding, presented an articulated reason with a rational basis that would have motivated a POSITA to combine the elements or concepts from the prior art in the same way as in the claimed invention.

35. It is my understanding that there is no single way to define the line between true inventiveness on one hand—which is patentable—and the application of common sense and ordinary skill to solve a problem on the other hand—which is not patentable. For instance, factors such as market forces or other design incentives may be the source of what produced a change, rather than true inventiveness.

36. I understand that the decisionmaker may consider whether the change was merely the predictable result of using prior art elements according to their known functions, or whether it was the result of true inventiveness. The decisionmaker may also consider whether there is some teaching or suggestion in

the prior art to make the modification or combination of elements recited in the claim at issue. Further, the decisionmaker may consider whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way. The decisionmaker may also consider whether the claimed invention would have been obvious to try, meaning that the claimed innovation was one of a relatively small number of possible approaches to the problem with a reasonable expectation of success, by those skilled in the art.

37. I have been instructed by counsel that if any of these considerations are relied upon to reach a conclusion of obviousness, the law requires that the analysis of such a consideration must be made explicit. I understand that the decisionmaker must be careful not to determine obviousness using the benefit of hindsight and that many true inventions might seem obvious after the fact. I understand that the decisionmaker should consider obviousness from the perspective of a POSITA at the time the claimed invention was made, and that the decisionmaker should not consider what is known today or what is learned from the teaching of the patent.

38. I understand that in order to determine whether a patent claim is obvious, one must make certain factual findings regarding the claimed invention and the prior art. Specifically, I understand that the following factors must be evaluated to determine whether a claim is obvious: the scope and content of the prior art; the difference or differences, if any, between the claim of the patent and the prior art;

the level of ordinary skill in the art at the time the claimed invention was made; and, if available, the objective indicia of non-obviousness, also known as “secondary considerations.”

39. I understand that the secondary considerations include: commercial success of a product due to the merits of the claimed invention; a long felt need for the solution provided by the claimed invention; unsuccessful attempts by others to find the solution provided by the claimed invention; copying of the claimed invention by others; unexpected and superior results from the claimed invention; acceptance by others of the claimed invention as shown by praise from others in the field or from the licensing of the claimed invention; teaching away from the conventional wisdom in the art at the time of the invention; independent invention of the claimed invention by others before or at about the same time as the named inventor thought of it; and other evidence tending to show non-obviousness.

40. I understand that, to establish a secondary consideration, the evidence must demonstrate a nexus between that secondary consideration and the claimed invention.

41. I understand that a petition must identify, for any terms with means-plus-function limitations, the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function. I also understand a rebuttable presumption exists that without use of the term, “means,” a claim term

is not interpreted as means-plus-function, but that other nonce words like “component” or “module” have been found to satisfy the rebuttable presumption and invoke a means-plus-function claim construction of such a claim term.

42. I also understand that a petitioner seeking to demonstrate that the prior art discloses a means-plus-function limitation must prove that the corresponding structure—or an equivalent—was present in the prior art and performing the same claimed function.

43. I understand that the standard for determining whether the prior art discloses the corresponding structure or an equivalent is whether there are insubstantial differences, which means that if the assertedly equivalent structure performs the claimed function in substantially the same way to achieve substantially the same result as the corresponding structure described in the specification, it is equivalent.

44. I understand that proving structural equivalence does not require a component-by-component analysis, but rather that it is sufficient to show structure, materials, or acts that perform the claimed function in substantially the same way to achieve substantially the same result because the claim limitation is the overall structure corresponding to the claimed function and not individual components.

**E. Markush Groups**

45. I have been informed that a “*Markush*” group includes a disjunctive list of alternatives from which a selection can be made. I understand that a *Markush* claim uses the signal “group of” followed by a list of alternatives that fulfill the claim limitation. I have also been informed and understand that the Federal Circuit has held that the entire element of a *Markush* claim is disclosed by the prior art if one alternative in the *Markush* group is in the prior art.

**VI. SUMMARY OF OPINIONS**

46. For the reasons I discuss below, it is my opinion that the Challenged Claims of the '217 patent are disclosed in the prior art, and are rendered obvious by the following prior art.

- Ground 1: Claims 1-3, 5-9, 13-15, 18-19, and 22 are unpatentable as obvious over Dumais (EX-1005);
- Ground 2: Claims 1-3, 5-9, 13-15, 18-19, and 22 are unpatentable as obvious over Rose (EX-1006); and
- Ground 3: Claims 1-3, 5-9, 13-15, 18-19, and 22 are unpatentable as obvious over Rose in combination with Bieganski (EX-1007).

## VII. BRIEF DESCRIPTION OF THE TECHNOLOGY

### A. Information Retrieval

47. In 1963, the ACM founded the SIGIR, which promotes “research, development and education in the area of search and other information access technologies.” Special Interest Group on Information Retrieval, *General Information*, <https://sigir.org/general-information/about/>. According to the ACM Computing Classification System, the following are among the topics considered part of information retrieval, among others: document representation; document structure; document topic models, content analysis and feature selection; query representation; query intent; query log analysis; users and interactive retrieval; personalization; collaborative search; similarity measures; combination, fusion and federated search; document filtering; recommender systems; structured text search; desktop search; music retrieval; and web and social media search. *The 2012 ACM Computing Classification System*, ACM, <https://www.acm.org/publications/class-2012> (linking to visual display tool at <https://dl.acm.org/ccs>). Thus, the concept of information retrieval includes the technologies at issue in the ’217 patent.

### B. Digital Libraries

48. In the 1990s, at the same time as the WWW was growing, more focused systems managing collections of digitized, organized, and accessible information arose to serve particular communities with particular types of content. *See generally*

EX-1008 (Lesk) at 149 (noting “*community-rated* information [systems]. . . model the search you want to do by looking at what other people have done.”).

49. Work in this area, particularly by those in the communities of library and information science, information retrieval, and other computer science specialties, is referred to as “digital libraries.” For these libraries, “[i]nformation retrieval is a central topic.” EX-1009 (Arms) at 45 (noting that “[r]esearch in this field is at least 30 years old, but the basic approach has changed little.”), 192 (“Since 1995, an international group led by Stuart Weibel . . . has been working to devise a set of simple metadata elements that can be applied to a wide variety of digital library materials.”). Digital libraries build on (and add to) concepts from libraries, repositories and archives, hypertext, multimedia storage and retrieval, usability, and user needs/experiences. *Id.* at 4, 29, 144, 245; EX-1008 (Lesk) at 91, 186, 217-20.

As a leading textbook from 1999 stated:

Technology has dictated the pace at which digital libraries have been able to develop, but the manner in which the technology is used depends on people. Two important communities are the source of much of this innovation. One group, the information professionals, includes librarians, publishers, and a wide range of information providers, such as indexing and abstracting services. The other community contains computer science researchers and their offspring, the Internet developers. . . . Since the introduction of the web, however, there has been much more collaboration and understanding.

EX-1009 (Arms) at 2-3.

50. Broadly, digital libraries deal with digital objects of any type, along with descriptive and structural metadata associated with and among those objects. *Id.* at 2, 188-89, 225, and 239. “The unifying theme is that information is organized on computers and available over a network, with procedures to select the material in the collections, to organize it, to make it available to user, and to archive it.” *Id.* at 2. For example, Google is considered a spin-off from a Stanford University digital library project funded by the US National Science Foundation. EX-1008 (Lesk) at xxvii. Digital libraries (DLs) provide improved access, and human-computer interaction (HCI): “Traditional libraries offer rich resources, but digital libraries provide dramatic capabilities that support searching, browsing, and filtering.” EX-1010 (Carroll) at 244.

### **C. User Profiles**

51. To ensure a good user experience, practitioners are concerned with building user profiles, which can be used to customize the experience for users of a system. EX-1011 (Kuniavsky) at 130 (“In user profiling, you model your users based on your intuition, your judgment, and the information you have at hand. This quickly gives you insight into what makes a good user experience.”). A profile on each of the users can track the users’ important behaviors. Since a good user experience involves using a system to support their tasks, user profiles address usage trends (e.g., frequency) and tasks (e.g., duration, order, and method). *Id.* at 142-43. Since

the 1960s advent of computers used by more than one person, most computers have had an account for each user, typically recording (i) their name and/or identifier, (ii) information (*i.e.*, a password) to ensure privacy and security, and (ii) information to support their tasks. Thus, the term “user profile” broadly refers to the data and information present for a user.

52. Part of the data about a user can come from logging: “Section 4.6.2 Continuous user-performance data logging: The software architecture should make it easy for system managers to collect data about the patterns of system usage, speed of user performance, rate of errors, or frequency of requests for online assistance.” EX-1012 (Shneiderman) at 146. To help practitioners, Kuniavsky, in his book *Observing the User Experience: A Practitioner’s Guide to User Research* (2003), devotes an entire chapter to logging-related issues such as the following:

- “A log file is a raw record of everything that the programmers felt warranted being recorded.”
- “All common Web browsers have some sort of personal caching mechanism built in: they save the last days’ or weeks’ worth of browsing into a cache on the local disk.”

EX-1011 (Kuniavsky) at 403, 405.

53. Since Web server logs have information from various users of a website, cookies (*e.g.*, in Apache and Microsoft IIS Web servers) are commonly

used to generate user profiles from the raw data within the logs. For example, Yahoo! Inc. used query logs from the AltaVista search engine to deduce what “actual goals users have in mind when searching.” EX-1013 (User Goals) at 1, 14-16. Many practitioners who work on user interfaces and usability are interested in digital libraries. EX-1009 (Arms) at 143-61. User needs are addressed in digital libraries in part through user services—EX-1008 (Lesk) at 219-20 (discussing how digital libraries may involve “telephone, email and online chat alternatives” or “make arrangements with libraries around the world” for extended service hours)—which can generate related user log data. Further, a POSITA would appreciate that usage history is a common way to build a user profile and that more advanced techniques would also be available. EX-1010 (Carroll) at 492 (discussing social data mining systems that record “system usage history”), 505 (“PHOAKS users were able to rate the recommended URLs, and the system captured usage history (that is, how often each URL was browsed).”). For example, Teevan discusses techniques for personalized search employing user profiles, particularly by developing “rich models of user interests” based on “previously issued queries and previously visited Web pages” or “email the user has read and created.” EX-1014 (Teevan) at 449.

**D. Recommending Based on Monitored User Actions**

54. One area that relies on user profiles is recommendation or recommenders, which provide suggestions on content based on the user profile such

as what content the user has accessed previously. EX-1010 (Carroll) at 493 (“Content-based recommenders (Lieberman 1997; Maes 1994) build on the intuition ‘find me things like I have liked in the past.’ They learn preferences through user feedback. . . . Preferences are represented as a profile of user interests in particular types of content, often expressed as a set of weighted keywords.”). A POSITA would have known of the concept and use of recommenders. In the mid-1990s, techniques were developed to determine the relevance<sup>1</sup> of electronic content based on a user’s actions on that content. *See, e.g.*, EX-1015 (Miller)<sup>2</sup> at 1:5-15 (“the present invention

---

<sup>1</sup> In general, “determining” the relevance of electronic content is imprecise. This phrase, while convenient, and often used, should technically be more akin to “estimate the relevance.” For strict definition of “relevance,” *see generally* EX-1036 (Saracevic) (discussing a framework for considering relevance). For example, Saracevic specifies that it is the user—or judges/experts acting as surrogates for the user—who provide a value for relevance. *Id.* at 327-28, 333-34. Computer systems, using whatever method is involved, can only “estimate” or guess at what the user would specify, and so are making an estimate or prediction, not actually “determining.” My opinions throughout this declaration use “determining” as a shorthand, as discussed here.

<sup>2</sup> Miller, filed in 1996, is incorporated by reference in Bieganski at 1:8-17.

is directed to the use of implicit measures of user interest in items that are converted into implicit ratings for those users”); EX-1007 (Bieganski) at 2:31-39 (discussing “implicit” and “explicit” preference data).

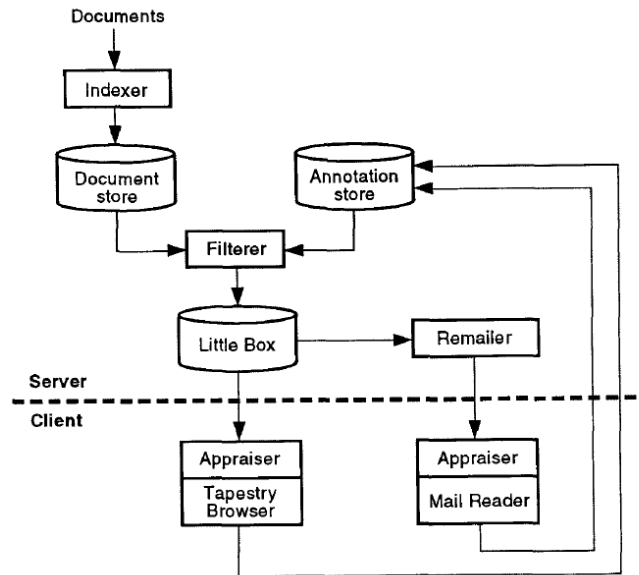
55. For example, the book *Human-Computer Interaction in the New Millennium* (2002) describes that “[c]ontent-based recommenders (Lieberman 1997; Maes 1994) build on the intuition” of things a user has liked in the past by monitoring. EX-1010 (Carroll) at 493. User feedback gained through such monitoring can be explicit or implicit. *Id.* Explicit feedback means a user’s indication that they like or dislike certain content, such as rating an item as “good” or “bad” or 5/10 stars. *Id.* Implicit feedback is derived from, for example, monitoring whether a user chooses to read a recommended document or how long the user spends reading the document. Learned user preferences are then “represented as a *profile* of user interests in particular types of content.” *Id.* (emphasis in original). User profiles allow a computer system to connect its model of the user’s understanding with the model of the user’s task.

#### **E. Collaborative Filtering**

56. Collaborative filtering, put simply, is “the technique of using peer opinions to predict the interest of others.” EX-1016 (Claypool) at 1-2. Users indicate their opinions by rating a piece of information and the collaborative filter correlates the ratings with those of other users to determine how to make future predictions for

the rater. *Id.* In 1992, more than a decade before the earliest possible priority date of the '217 patent, Xerox Palo Alto Research (PARC) designed a mail and document management system called Tapestry. EX-1017 (Goldberg) at 61. Tapestry disclosed, as its “basic tenet,” that email systems should combine both content-based and collaborative-filter-based to evaluate the relevance of electronic content. *Id.*; *see also* EX-1016 at 2; EX-1018 (Melville) at 1 (using “content-based predictor” in combination with “collaborative filtering” to overcome “first-rater problem,” where “[a]n item cannot be recommended unless a user has rated it before”); EX-1010 (Carroll) at 494 (“Because of the complementary aspects of content-based and social recommenders, an attractive research tactic is to create hybrid systems.”); 499-502 (discussing collaborative filtering techniques can be combined with content-based recommenders to address “first rater” and “sparsity” problems). Thus, collaborative filtering allowed people to “collaborate to help one another perform filtering by recording their reactions to documents they read” as “annotations.” EX-1017 at 61. Annotations for all users of the system are stored in a centralized annotation database called an “annotation store.” *Id.* at 63, 69.

**Figure 2.** The flow of documents through Tapestry



*Id.*, Fig. 2. The Tapestry system includes software agents called “appraisers” to use the annotations database to assign relevance weights to each document and filter out irrelevant documents. *Id.* at 64.

57. By 1993, before the industry coined the term “collaborative filtering,” Apple had already begun making movie recommendations to users “based on the correlation of their tastes.” EX-1019 (Beyond Search) at 87. In 1995, Apple created a prototype system called MessageWorld to address problems encountered with email and bulletin board tools. EX-1020 (MessageWorld) at 272 (“MessageWorld gave users a new interaction paradigm” and “incorporated two methods for learning from the community . . . . [T]he notion of using the ratings by individuals to predict what others in the community will like has gained popularity.”). MessageWorld

employed two prediction techniques, “traditional content analysis and the correlation of user preferences,” to match a user with potential “messages of interest.” *Id.* at 266, 272. Apple further disclosed using “[a]daptive algorithms” to incorporate knowledge about the community (plurality of users) into the assessment of each individual user’s interests. *Id.* at 266. Then in 1998, Apple developed a subsequent prototype called Information Rendezvous built on three principles, the third teaching that “knowledge and intelligence of the user community is an essential resource in identifying useful information.” EX-1019 (Beyond Search)<sup>3</sup> at 87. Information Rendezvous determined the most relevant items to each user based on criteria such as (1) content similarity of a current message to “messages which the user has found useful in the past,” and (2) “a correlation of user preferences” that recommends “items that one user found useful” to other users having “similar tastes.” *Id.* Apple likened this approach to “a global ‘soup’” of produced information, where system “consumers” (i.e., users) only need to “sample the portions of the soup of most interest to them.” *Id.*

58. By the early 2000s, Apple had secured patents on a robust information access system that ranked information by a “prediction of the likely degree of

---

<sup>3</sup> I note that Daniel E. Rose, the author of Beyond Search, is a co-inventor on Rose (EX-1006).

relevance to the user's interests" based at least in part on "data regarding correlations of interests between users." EX-1006, Abstract; *see generally* EX-1005. These systems leveraged correlations between users with similar interests to weight and assign relevance sources to a piece of content. For example, in Rose, when a user retrieves a document, the user "subsequently provides an indication of interest" for that document, which is used to create the matrix along with other user's indications. EX-1006 at 6:59-66, Title Page (citing EX-1017 (Goldberg)). Apple also secured U.S. Patent No. 8,799,461 B2, which disclosed electronic map displays where interest in "first-time contact" or a meeting with another user could be "brokered through autonomous agents capable [of] matching users having similar personal profiles." EX-1021 (Herz) at 8:5-13. Further, the personal schedules of both users can be combined with "current and predicted future locations...to notify users, reveal mutual geographic locations, and even suggest (and direct users to) appropriate venues." *Id.* Similarly, Dumais used collaborative filtering techniques which employed "[s]everal algorithms including techniques based on correlation coefficients, vector-based similarity calculations, and statistical Bayesian methods." EX-1005, ¶0055.

59. As another example, I, in collaboration with Seonho Kim, authored a conference paper titled "Interest-Based User Grouping Model for Collaborative Filtering in Digital Libraries." EX-1022 (Kim). As part of my discussion, I noted

that “many studies of collaborative filtering (CF) and adaptive techniques for recommender systems have been conducted for online shopping malls and personalized websites.” *Id.* at 533. There, I described the use of “implicit user rating[s],” as well as “interest-based user grouping” that relies on collaborative filtering to identify “users that have similar interests.” *Id.* at 533-34. I also discussed LINGO, a document clustering algorithm that can extract topics from documents, and other collaborative filtering systems of the time, such as GroupLens, PASS, and DEBORA. *Id.* at 534 (“The main idea of these studies is the sharing of user profile and preference information, which was entered explicitly by users, with other users within the system to provide them with more productive service.”); *see also* EX-1010 (Carroll) at 494 n.3 (describing Tapestry as “the first recommender system of any sort”), 499 (describing “GroupLens (Resnick et al. 1994), the Bellcore Video Recommender (Hill et al. 1995), and Firefly (Shardanand and Maes 1995)” as “[s]eminal collaborative filtering systems”).

#### **F. Searching and Filtering**

60. A POSITA would be familiar with systems that integrate searching and filtering. For example, in 1992, Belkin and Croft explained the traditional systems and methods for each, making clear that “information retrieval and information filtering are indeed two sides of the same coin” and “work together to help people get the information needed to perform their tasks.” EX-1023 (Belkin) at 37. This is

supported by Wittenburg and Sigman who in 1997 “present[ed] a Java applet called AMIT (Animated Multiscale Interactive TreeViewer) that integrates fisheye tree browsing with search and filtering techniques.” EX-1024 (Wittenburg) at 293. In 2004, as further support for the value of integrating searching and collaborative filtering, Jung disclosed a System for Electronic Recommendation Filtering (SERF) application which “applies collaborative filtering to create an efficient and effective document search engine.” EX-1025 (Jung) at 3-4 (“The data collected in our experiments shows that the subjects with SERF recommendations found their answers more efficiently and effectively.”), 4 (“Since the document recommendations are based on human evaluations . . . it enables search results to incorporate ranking based on hard-to-measure characteristics such as quality, readability, or usability as well as relevancy.”); *see also* EX-1014 (Teevan) at 449 (“[W]e use information about the searcher that we can glean in an automated manner to infer an implicit goal or intent”).

61. The Tapestry system (1992) also discussed using collaborative filtering for searching electronic content. For example, Tapestry used implicit feedback (*i.e.*, a user’s reply to a particular document) in its “filtering process.” EX-1017 at 62. If a user desired any “interesting” documents pertaining to a specific topic and did not “know how to write a search expression that characterizes them” but knew which senders had read those documents and replied to them, Tapestry allows the user to

filter their email based on documents replied to by the specified senders. *Id.* Further, Tapestry sets out a “typical scenario” where a user wants to initiate an “ad hoc query” to find documents in “an area of interest” but uses an overly broad keyword (“filtering”), which returns too many results. *Id.* at 63. Over time, the user discovers that the search feature “works much better” if, for example, the query is narrowed “either for documents containing both ‘information’ and ‘filtering,’ or for documents containing ‘filtering’ that received at least three endorsements.” *Id.* The search is then “installed as a query filter” where subsequently “all new documents satisfying this filter will be delivered to the user’s mailbox.” *Id.*

62. Apple also disclosed collaborative filtering for searching electronic content, particularly directed to weighted term ranking for an online query tool. EX-1026 (Ponte 1). Ponte discloses a “collaborative architecture” where “a simple weighting algorithm might take a single term query, such as a category of information, and rank each document in a term list 836 in numerical order according to the product of the term frequency (the number of times a term appears in the document) and the inverse document frequency (the inverse of the number of times the term appears in the entire document set).” *Id.* at 34:5-12; *see also* EX-1027 (Ponte 2) at 33:54-61 (same); EX-1028 (Melton) at 18:39-44 (disclosing a “graphical user interface with a history list” of data items ranked “based on the frequency of access”).

## VIII. OVERVIEW OF THE '217 PATENT

### A. Specification

63. The '217 patent relates generally to techniques for determining the relevance of electronic content. EX-1001, 3:35-37. “Given the heavy use of electronic mail, many email users receive hundreds of different emails a day,” much of which is “irrelevant (or more colloquially, is ‘junk’) and serves as a nuisance that the individual must navigate through.” *Id.*, 1:25-30. Sorting through emails to identify those “relevant to the recipient” takes time, and “typical email applications are resigned to providing unintelligent mechanisms (e.g., keyword, sender, recipient, and/or date range searches) for mining through email.” *Id.*, 1:30-44.

64. The '217 patent's embodiments “relate to a technique for determining the relative relevances of electronic mail messages” “based on, for example, *user actions* (e.g., what did the user do with that piece of electronic mail), *other user actions* (e.g., what did other users do with that piece of electronic mail), and/or *administrative settings*.” *Id.*, 3:34-42<sup>4</sup>. The '217 patent teaches “relevance” applies to “content” and “reflect[s] a user's likely interest in the content,” whereas “importance” refers to an “entity” and “reflect[s] a user's likely interest in content involving that entity.” *Id.*, 5:53-67.

---

<sup>4</sup> All emphasis is added, unless indicated otherwise.

65. Relevance and importance can “be determined based on monitoring users’ actions.” *Id.*, 6:1-3. For example, saving or forwarding a message suggests it is more relevant than deleting it, just as routinely reading a manager’s messages indicates the manager is important. *Id.*, 6:3-22. A system can “identify a cognate group of the n other users regarded as most similar,” which “may be defined by similar past user actions and assessments, and/or a direct input by a user.” *Id.*, 14:59-66. Relevance can involve both an “Individual Relevance Component” (“IRC”) for a given user and a “cognate relevance value” that is “based on a weighted average of the IRC’s of the n users considered to be the cognate group for that recipient.” *Id.*, 25:37-26:52.

## **B. Prosecution History**

66. The application leading to the ’217 patent was filed on January 16, 2007.<sup>5</sup> EX-1002 at 1. The Examiner issued an initial rejection on November 14, 2008, based on Malik (EX-1029). EX-1002 at 208 (November 14, 2008 Non-Final Rejection). In an Examiner Interview, Applicant argued Malik did not determine relevance based on user actions “on a piece of electronic content.” *Id.* at 225 (Dec.

---

<sup>5</sup> For purposes of this Petition, Petitioner assumes the ’217 patent is entitled to a priority date of January 13, 2006 based on Provisional Application No. 60/758,828, but reserves the right to challenge priority in other proceedings.

15, 2008 Examiner Interview Summary). After Applicant sought reconsideration, the Examiner issued a Final Rejection based on Malik. *Id.* at 250 (May 12, 2009 Final Rejection). The Patent Owner submitted a Request for Continued Examination and substantially amended the claims, as shown below:

1. (Currently Amended) A computer-implemented system for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented system comprising:

a computer processor; and

a computer-readable storage medium storing computer program modules configured

to execute on the computer processor, the computer program modules comprising:

a monitoring module configured to track actions by a plurality of users associated

with an application for managing electronic content;

~~a relevance analysis module coupled to the monitoring module and configured to~~

~~determine a relevance to a user of a piece of electronic content sent from a~~

~~sender to the user, the relevance being determined dependent on:~~

a first relevance measurement module coupled to the monitoring module and

configured to determine a first measure of [[a]] relevance of the piece

of electronic content based at least in part as determined dependent on

one or more actions of the user on the piece of electronic content;~~and~~

a second relevance measurement module 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 [[a]] relevance of the piece of

electronic

content as determined dependent based at least in part on 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; and  
a relevance analysis module 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.

*Id.* at 327 (January 15, 2010 Amendment).

67. The Examiner allowed the claims, but stated Malik “teaches the general state of the art in ‘relevance’ determinations,” including (i) a monitoring module to track actions of users; (ii) a relevance analysis module to determine relevance of

content to users; (iii) that relevance is determined based on measurements of user actions on that content; and (iv) that relevance is determined dependent on other users who received the same content. *Id.* at 524-25 (Feb. 12, 2010 Notice of Allowance). The Examiner explained Malik lacked the claimed following limitations:

*a first relevance measurement module coupled to the monitoring module and configured to determine a first measure of [[a]] relevance of the piece of electronic content as determined dependent on one or more actions of the user on the piece of electronic content; ~~and~~*  
*a second relevance measurement module 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 [[a]] relevance of the piece of electronic content as determined dependent at least in part on 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; and a relevance analysis module 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.*

As can be seen, this essentially just lists the *first relevance measurement module* and *second relevance measurement module*, whose values are then combined into a single relevance score. *Id.* at 526. But as I discuss below, the use of the claimed first/second relevance measurement modules were taught in the prior art, as was the combination of multiple relevance scores into another relevance score.

## **IX. THE CHALLENGED CLAIMS**

68. The '217 Patent includes a total of 22 claims, three of which (claims 1, 6, and 7) are independent claims. These independent claims overlap significantly. For example, as I have shown below, claim 6 is nearly identical to claim 1 except for three key differences: (1) it is a “*computer program product*” claim, (2) it removes the first limitation regarding the “*computer processor*,” and (3) it moves language regarding the second limitation’s “*computer-readable storage medium*” up into the preamble. With the exception of these changes, the remainder of claim 6 mirrors claim 1.

~~16.~~ A computer-~~implemented system~~ program product for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-~~implemented system~~program product having a computer-readable storage medium having computer program instructions encoded thereon comprising:

~~a computer processor; and~~

~~a computer-readable storage medium storing computer program modules configured to execute on the computer processor; the computer program modules comprising:~~

a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;

a first relevance measurement module 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;

a second relevance measurement module 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:

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; and

a relevance analysis module 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.

69. Further, I have provided a redline of claim 7 below. While it removed several more limitations than claim 6, claim 7 shows significant overlap with claim 1.

17. A computer-implemented ~~system~~method for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented ~~system~~method comprising:

~~a computer processor; and~~

~~a computer-readable storage medium storing computer program modules configured to execute on the computer processor, the computer program modules comprising:~~

~~a monitoring module configured to track~~tracking actions by a plurality of users associated with an application for managing electronic content;

~~a first relevance measurement module coupled to the monitoring module and configured to determine~~identifying 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,

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;

~~a second relevance measurement module 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~~determining 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:

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; and

~~a relevance analysis module configured to determine~~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.

70. Additionally, though the independent claims 1, 6, and 7 are similar, their dependent claims are presented out of order as compared to a typical patent. Claims 2-5 depend from claim 1. However, instead of depending from independent claim 7, dependent claims 8-12 also depend from claim 1. Similarly, claims 13-17 depend from claim 6 and claims 18-22 depend from claim 7.

## **X. CLAIM CONSTRUCTION**

71. I have given all the claim terms of the Challenged Claims their plain and ordinary meaning, as would have been understood by a POSITA, at the time of the alleged invention, unless otherwise discussed below.

### **A. Limitations Implicating Means-Plus-Function (“MPF”)**

72. I understand that no claim terms in the Challenged Claims use the term “means,” and there is a rebuttable presumption that the claim terms are not MPF. I further understand that presumption is overcome for limitations that use the term “module,” like the limitations in the Challenged Claims. *See, e.g.,* EX-1001, Cls. 1 (“*[The] computer program modules comprising: a monitoring module . . . first relevance measurement module . . . a second relevance measurement module . . . and a relevance analysis module*”), 2 (“*a content presentation module*”), 3 (“*a search module*”). The ’217 patent explains a “*module*” can be “any program, circuitry, logic, and/or functionality implemented in either software and/or hardware,” acknowledging that “any combination of the modules shown therein may run on any type of computer system.” *Id.*, 6:36-38, 6:66-67. It thus takes a broad view of what qualifies as a “module,” which can be any program, or even function, implemented in hardware or software.

73. I have noted that several claim limitations appear to be expressed in means-plus-function form by virtue of their use of the term “module.” Further, in my

opinion, “module” does not convey to a POSITA a specific structure for performing the functions of the Challenged Claims of the ’217 patent, including because the claims specify the specific functions that each module must perform. For example, a “*monitoring module*” could refer to many ways to monitor, but the claims specify the specific function of “*track[ing] actions by a plurality of users* associated with an application for managing electronic content[.]” *Id.*, Cl. 1. Similarly, the first/second “*relevance measurement modules*” have entirely different functions, confirming that “*relevance measurement module*” does not denote a specific structure. The same is true of the remaining “module” terms—“*relevance analysis module*,” “*Content Presentation Module*,” and “*Search Module*,” which are generic “modules” that do not convey to a POSITA a particular structure that performs the claimed function. Accordingly, I have identified means-plus-function constructions of several terms and have considered the function and corresponding disclosed structure in forming my opinions where applicable. The terms, function(s) achieved, and corresponding structure(s) of each function that I considered are as follows:

**1. “Monitoring Module”**

| <b>Limitation (Function Underlined)</b>                                                                                                                              | <b>Corresponding Structure</b>                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| a monitoring module configured to <u>track actions by a plurality of users</u> associated with an application for managing electronic content; ( <i>Id.</i> , cl. 1) | Software and/or algorithms at EX-1001, 1:48-52, 3:52-4:33, 6:39-45, 7:16-19, 15:51-58, 16:31-57, 27:11-60. |

|                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a monitoring module configured to <u>track actions by a plurality of users</u> associated with an application for managing electronic content; ( <i>Id.</i> , cl. 6) | In client-side integration, for example, <i>a plug-in to the email client</i> may be used to <i>monitor end users actions on the mail content</i> . In server-side integration, a <i>relational electronic mail server</i> (e.g., one developed by BLUESPACE SOFTWARE) <i>may be connected to the legacy email server and tag content with “flags”</i> so that it can track what happens to the content. ( <i>Id.</i> , 16:31-57.) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

74. The closest corresponding structure I can identify for carrying out the function of the “the monitoring module” in the ’217 patent is either: (a) “client-side integration” relying on a “plug-in” that “monitor[s] end users actions on the mail content,” or (b) a server-side implementation using a “relational electronic mail server” and/or “relational knowledge server” that can “tag content with ‘flags’” to track what happens to content during the life cycle of the content. *Id.*, 3:52-4:33, 16:31-57; *see also id.* at 15:51-58 (discussing relational electronic mail servers).

75. Plug-ins are common in Internet-based technology and simply add functionality to a program, without altering the larger program’s general functionality. Plug-ins were a common way that a system might track a user’s actions, prior to the priority date of the ’217 patent. *See, e.g.,* Britannica, *Plug-In* (software), <https://www.britannica.com/technology/plugin> (“Plug-ins first gained popularity in the 1990s as software and microprocessors became more powerful.”); EX-1030 (McKeogh (2004)) at 93-94 (discussing the “Eclipse” “plug-in [that] tracks

a number of significant behaviours such as mouse movement, key strokes (including paging), scrollbar movement and document changes that take place during the session”). A user might download a plug-in for their Internet web browser that blocks advertisements, or they might download a plug-in for their email that automatically checks grammar as they type messages. *See* EX-1031 (Rich (2002)) at Abstract, 785-87 (“Part of the plug-in metaphor is the idea that you don’t have to write them all yourself, but can obtain them from other sources.”). Multiple specific plug-ins were available to track user actions before the priority of the ’217 patent. EX-1030 (McKeogh (2004)) at 93-94; EX-1032 (Domingue (2004)) at 191-93 (discussing “Magpie” plug-in for Internet Explorer that uses ontology to “automatically track concepts found during a browsing session”); *see also* EX-1031 (Rich) at Abstract, 782, 784-85 (discussing plug-ins that monitor user’s actions broadly, including physical actions and language).

## 2. “First Relevance Measurement Module”

| Limitation (Function Underlined)                                                                                                                                                                                                                                                                                                                                     | Corresponding Structure                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a first relevance measurement module coupled to the monitoring module and configured to <u>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</u> ; (EX-1001, cl. 1) / a first relevance measurement module coupled to the monitoring module and | Software and/or algorithms at EX-1001, 6:39-48, 25:45-49, 27:12-19, 28:63-29:41.<br><br>Individual Relevance Component: an IRC value is a <i>relevance score for a piece of content respective to a given individual user</i> , and is <i>based on the actions of that user</i> . <i>Id.</i> , 27:12-15. |

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; (cl. 6)

Now turning to a description of factors used by a relevance analysis engine in accordance with one or more embodiments, a plurality of factors may make up the IRC. **The first are indicator functions,  ${}^x\text{IRCD}_{ri}$ , which are dichotomous (i.e., are simply “on” or “off”) depending on whether the action has happened or not.** This includes attributes such as factors that are available only for past-reading local relevance: “the user opens the electronic mail object” (if so, then  $D=1$ , if not, then  $D=0$ ); “the user clicks on a hyperlink in the electronic mail object” (if so, then  $D=1$ , if not, then  $D=0$ ); and “the user replies to the electronic mail object” (if so, then  $D=1$ , if not, then  $D=0$ ).

**A second set of variables  ${}^x\text{IRCC}_{rj}$  are values on cardinal scale (or ordinal scale transformed for the model to a cardinal scale):** “how many extra times the user opens the electronic mail object”; and “to how many people the user forwards the electronic mail object.” These may be placed into suitable functions  $f({}^xC_{rj})$  that are between 0 and 1. Some of these factors may also “decay” over time. While it may be difficult to determine this without some indication from the user, there clearly may be some electronic mail objects connected with projects that, once completed, leave the user unlikely to wish to consult the electronic mail objects again. Some feedback may be useful connected with a particular job

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>or project code. Further, there may be occasions when the relevance of an incoming electronic mail object is highly affected by the life cycle of a project. This means that it may be useful to include a time related factor of importance that has a discontinuity break when the project is completed. Moreover, this would mean that the relevance could be multiplied by a time-related factor <math>{}^xG_r(t)</math>. For example, <math>{}^xG_r(t)</math> may reflect relevance of a project up to a deadline time, <math>t_0</math>, beyond which the relevance begins to decay:</p> ${}^xG_r(t) = \begin{cases} 1 & t \leq t_0 \\ e^{-\lambda(t-t_0)} & t > t_0 \end{cases},$ <p>where <math>\lambda</math> is a decay constant (high for rapid decay, low for slow decay). In one or more embodiments, most stored electronic mail objects may have a time-decay-based element of relevance. (<i>Id.</i>, 29:63-29:41).</p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

76. The closest corresponding structures I can identify for carrying out the function of the “First Relevance Measurement Module” in the ’217 patent are the algorithms used to develop a user’s “Individual Relevance Component” based on a “plurality of factors,” including “dichotomous” (i.e., binary, yes/no) and “cardinal” (i.e., scaled) factors. *Id.*, 25:45-49, 27:12-19, 28:63-29:41.

77. “Dichotomous” factors are those that are simply “on” or “off,” to measure whether an action has or has not happened. *Id.*, 28:46-29:7. It distinguishes dichotomous factors from “cardinal scale” factors—distinguished from ordinal (1st,

2nd, 3rd, etc.)—to represent quantity, *e.g.*, “how many times” actions happen. *Id.*

An action can potentially fall under either or both categories—for example, the same action of opening an email could inform (a) *whether* a user opened an email (yes/no, dichotomous), as well as *how many times* a user opened that email (ten times, cardinal). *Id.*

### 3. “Second Relevance Measurement Module”

| Limitation (Functions Underlined)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Corresponding Structure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a second relevance measurement module coupled to the monitoring module and configured to:</p> <p><u>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</u></p> <p><u>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:</u></p> <p><u>a local importance describing an importance of the sender to the user,</u></p> <p><u>a global importance describing an importance of the sender within an organization with which the plurality of users are associated,</u></p> | <p><b>For identifying “cognate” users that are recipients of the electronic content,</b> the software and/or algorithms at EX-1001, 6:42-55, 14:45-15:11, 17:4-22, 25:65-26:10, 43:30-37</p> <p>In regard to how such similarity or identification of the cognate group is determined, one or more of the following approaches may be used: role or group based; collaborative filtering; fingerprinting; cluster models; search based methods; frequency analysis; and importance value correlation. Each of these different approaches, which may be used singly or in any combination, will now be described in turn. (EX-1001, 43:30-37).</p> <p><b>For determining a second measure of relevance,</b> the software and/or algorithms at <i>id.</i>, 6:42-55, 14:45-15:11, 25:50-58, 26:11-17, 26:24-30, 27:12-42, 29:50-31:13, 31:21-34:48, 32:42-57, 33:1-20, 33:29-33, 34:29-39, 41:7-25, 42:35-36.</p> <p>The “second measure of relevance” can be met by any of four options in a Markush Group.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><u>a content relevance determined responsive to content of the piece of electronic content, and</u><br/><u>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; (cl. 1)</u></p> <p>a second relevance measurement module coupled to the monitoring module and configured to:<br/><u>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</u><br/><u>determine a second measure of relevance of the piece of electronic content based at least in part on one or more measures derived from the group consisting of:</u><br/><u>a local importance describing an importance of the sender to the user,</u><br/><u>a global importance describing an importance of the sender within an organization with which the plurality of users are associated,</u><br/><u>a content relevance determined responsive to</u></p> | <p>In yet another example, in the case of searching through electronic mail, the electronic mail system may help rank search results and indicate to the user how likely each piece of content is to be of interest.</p> <p>2. Individual Relevance Component: an IRC value is a relevance score for a piece of content respective to a given individual user, and is based on the actions of that user. . . .</p> <p>4. Global Importance: a global importance value is an importance score for an entity respective to the entire system, and is a weighted average of all IIC values for that entity. [symbol: <math>I_{sg}</math> for sender-entity <math>s</math>] . . .</p> <p>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 <math>n</math> users considered to be the cognate group for that recipient. [symbol: <math>xRrc</math> for the relevance input from the cognate group <math>c</math> of recipient <math>r</math>, on electronic mail object <math>x</math> sent by senders <math>\{s\}</math> to recipient <math>r</math>]</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                   |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <u>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; (cl. 6)</u> |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

78. The closest corresponding structure I can identify for carrying out the function of the first “*cognate*” function for the “*second relevance measurement module*” involves evaluating similarity of users using “role or group based; collaborative filtering; fingerprinting; cluster models; search-based methods; frequency analysis; and importance value correlation” to evaluate “similar past user actions and assessments, and/or a direct input by a user.” *Id.* at 14:59-15:11, 43:30-37, 45:38-46:60 (using correlation to identify cognate users). Elsewhere, the ’217 patent identifies ways users might be identified as “*cognate*,” including identifying users “based on historical actions,” “direct input by a user,” according to tree structures/taxonomies, or being “inferred automatically.” *Id.*, 14:44-15:11, 17:10-21, 25:65-26:23, 33:58-34:25.

79. The closest corresponding structures I can identify for carrying out respective functions for determining the “measure of relevance” function for the “second relevance measurement module” is described below. The ’217 patent

describes how to calculate and use the various relevance factors at 25:37-26:52 and 29:50-34:63.

- **Local Importance:** Determined using (a) the sender's relative position to the recipient in an "organizational chart" or "inter-company project," or (b) calculating an "Individual Importance Component" ("IIC") for a sender based on the user's actions on messages from that sender. *Id.*, 25:45-49, 27:12-42, 30:4-9, 31:21-32:35. As discussed at 31:21-32:33, the IIC can be determined using a "weighted function" based on "the individual recipient's actions towards" the sender, as shown below.

$$IIC_{sr} = w_1 \frac{1}{n_s} \sum_{x=1}^{n_s} f^t(del; no) + w_2 \frac{1}{m_s} \sum_{x=1}^{m_s} f^t(l_{x1} / L_{x1}) + w_3 \sum_{x=1}^v f^t(R(T_x)) + w_4 f^t(I_{rs}^{assigned})$$

- **Global Importance:** Determined using (a) an organization chart (*id.*, 29:64-30:3), or (b) calculated based on: (1) a "weighted average of all IIC values" for a sender, (25:55-58, 30:63-31:3, 32:47-48), (2) the importance of electronic mail objects received, (30:25-33, 33:1-20), (3) an assigned value (33:21-28, 34:29-39, 42:35-36); or (4) "transferred post importance," (33:29-33), as depicted in the formula below.

$${}^k I_s^g = \alpha^{(k-1)} I_s^g + (1 - \alpha) \left[ w_1 f \left( \sum_{i=1}^n f \{ IIC_{sr}^{(k-1)}; I_r^g \} \right) + w_2 f \left( \sum_{j=1}^{m^{(k-1)}} I_s / N_j; \frac{1}{m} \sum_{j=1}^{m^{(k-1)}} I_s / N_j \right) + w_3 f({}^o HR_s^t) + w_3 f({}^o HR_s^p) \right]$$

- **Content:** Determined using “spiders” to “identify terms within the content” and “statistical techniques” to identify “[k]eywords of high relevance” with content relevance. *Id.*, 41:7-25, 45:13-37.
- **Actions by Cognate Users:** Determined based on a “weighted average of the IRC’s of the n users considered to be the cognate group for that recipient.” *Id.*, 26:11-17. The algorithm for the First Measure Module identifies how to calculate users’ IRC’s.

#### 4. “Relevance Analysis Module”

| Limitation (Function Underlined)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Corresponding Structure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a relevance analysis module configured to <u>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</u> ( <i>Id.</i> , cl. 1) / a relevance analysis module configured to <u>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</u> ( <i>Id.</i> , cl. 6) | <p>Software and/or algorithms at <i>id.</i>, 25:21-26:52, 27:12-19, 29:41-30:35, 35:62-36:6.</p> <p>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. (<i>Id.</i>, 25:21-26:52.)</p> <p>In regard to finding local relevance in accordance with one or more embodiments, a local relevance value for recipient r for an electronic mail object X is calculated using the following, for example, as inputs: mail data (as incorporated in the electronic mail object itself): combination</p> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | importance of senders{s} of electronic mail object X (as cached on arrival using periodically reviewed local importance values); global relevance of electronic mail object X (as stored on periodic review); recipient r's IRCs for electronic mail object X (i.e., any actions done on the mail which affect local relevance immediately); and cognate relevance for electronic mail object X (looking at the IRCs of the n in the cognate group). ( <i>Id.</i> , 35:62-36:6) |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

80. The closest corresponding structures I can identify for carrying out the function for the “relevance analysis module” in the ’217 patent are the algorithms used to determine the “local relevance value,” which is “a function of the user’s own IRC, the global and cognate relevance scores, and the combined importance relating to that mail.” Thus, the “relevance analysis module” considers the various factors that have been discussed and identified with respect to the earlier “modules.” *Id.*, 25:21-26:52, 35:62-36:6.

## 5. “Content Presentation Module”

| <b>Limitation (Function Underlined)</b>                                                                                                                                                                                                                                 | <b>Corresponding Structure</b>                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a content presentation module configured to <u>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</u> ( <i>Id.</i> , <b>cls. 2/13</b> ) | Software and/or algorithms at <i>id.</i> , 2:37-3:9, 6:55-60, 7:28-50, 24:30-34, 24:60-62, Figs. 5, 19-20.<br><br>In, for example, a searching mode, a user may actively look for a specific piece of information or for information of a given type based on given search |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>criteria (e.g., keywords, dates, specific senders). In this case, for example, a piece of content may be deemed to be more relevant to a search if two of the words in the subject are keyword search terms as opposed to if there was only one matched word. Moreover, <b>relevance scores may be displayed to the user in response to performing a particular electronic mail action.</b> (<i>Id.</i>, 7:28-34)</p> <p>For example, in the case of reading new electronic mail, when a user receives a new electronic mail object, the electronic mail system may indicate how useful to the user that content is likely to be. In another example, in the case of reading existing mail, the electronic mail system may indicate how important to the user each electronic mail object and submessage is likely to be. In yet another example, <b>in the case of searching through electronic mail, the electronic mail system may help rank search results</b> and indicate to the user how likely each piece of content is to be of interest. (<i>Id.</i>, 8:1-12)</p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

81. The closest corresponding structure I can identify for carrying out the function for the “content presentation module” of the ’217 patent is provided by the “mail presentation module.” *Id.*, 6:55-60, 7:28-34. The mail presentation module can be used to generate the various web page interfaces depicted in Figures 9-20. *Id.* For

example, Figures 19 and 20, replicated below, show the various ways content can be presented:

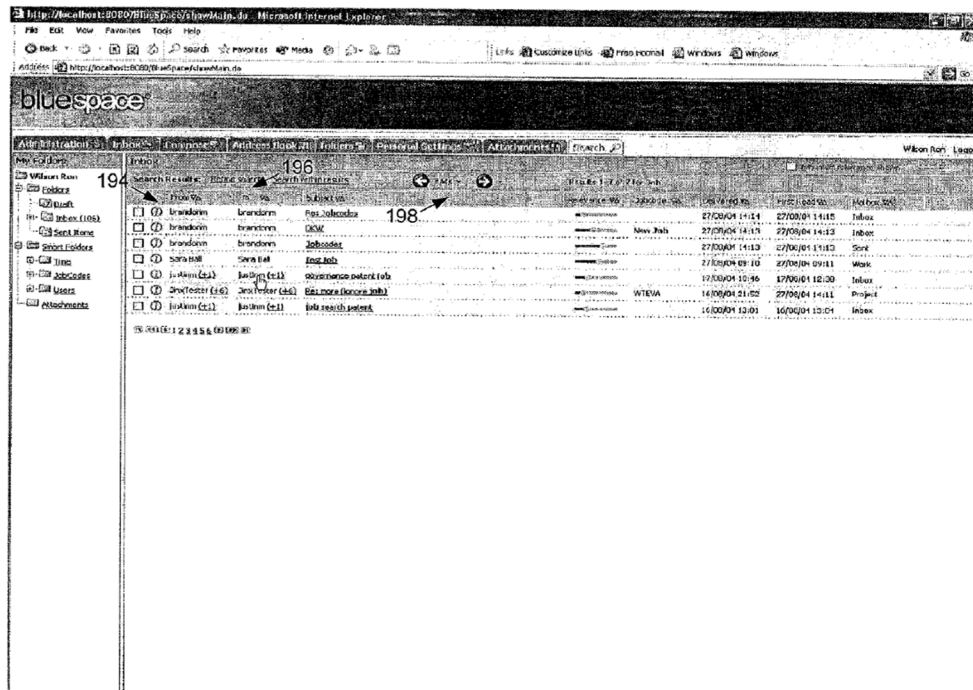


**FIGURE 19**

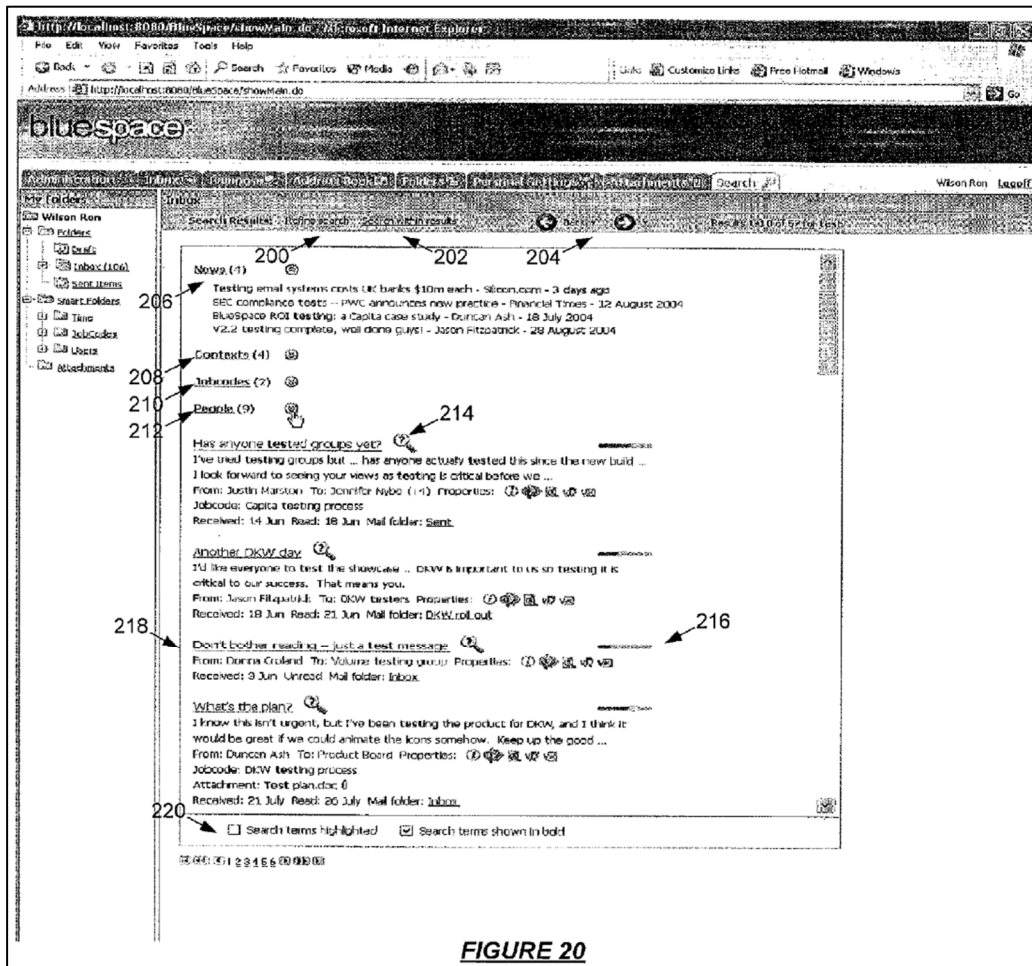
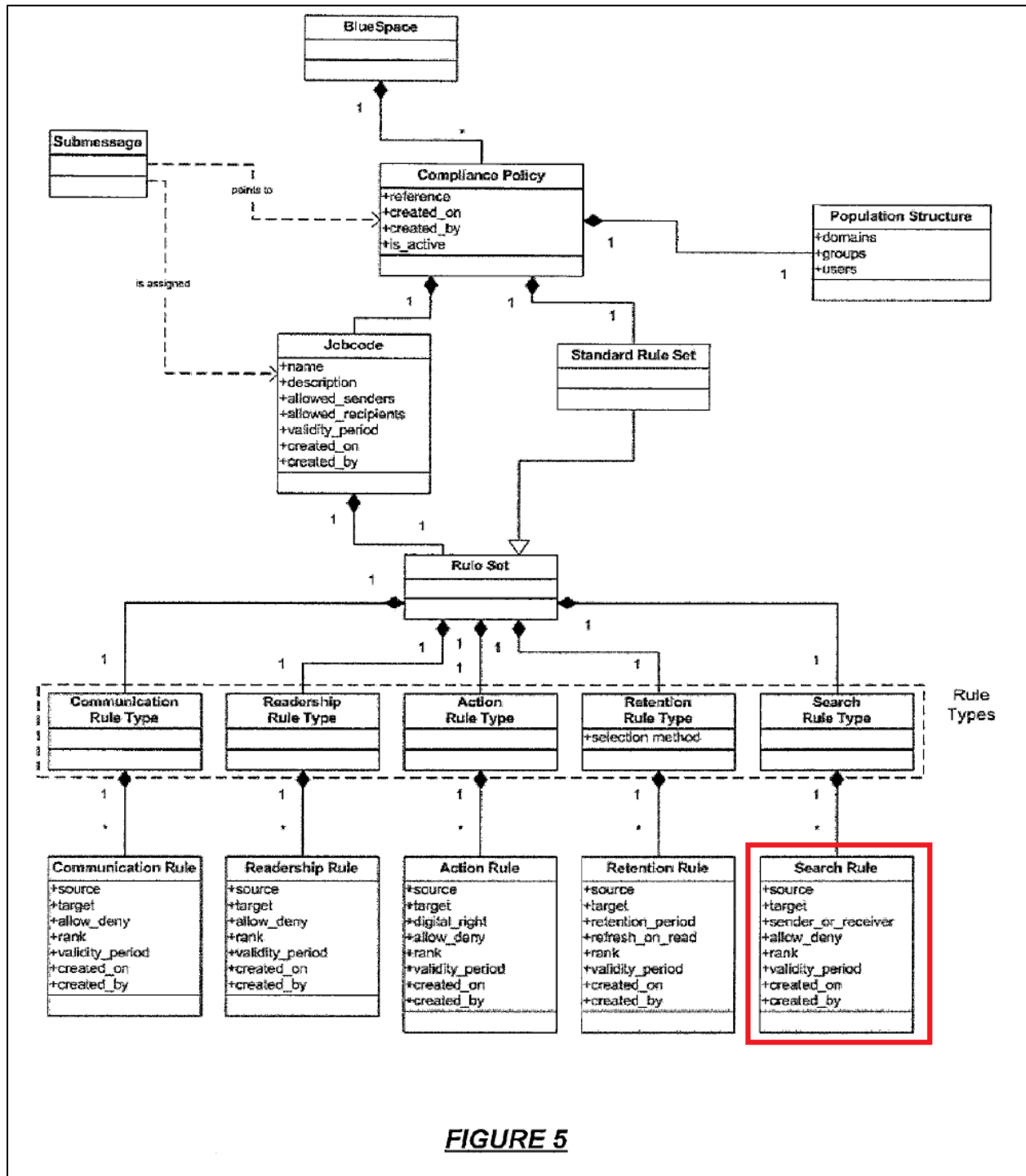


FIGURE 20

Moreover, Figure 5 shows that ranking is one of the ways in which search results can be displayed (red annotation added)<sup>6</sup>:

<sup>6</sup> All annotations added to tables unless otherwise noted.



## 6. "Search Module"

| Limitation (Function Underlined> | Corresponding Structure |
|----------------------------------|-------------------------|
|----------------------------------|-------------------------|

|                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a search module configured to <u>search the electronic content in accordance with the determined relevance score</u> (<i>Id.</i>, cls. 3/14)</p> | <p>Software and/or algorithms at <i>id.</i>, 6:60-64, 7:32-34, 7:42-48, 8:9-12.</p> <p>In, for example, a searching mode, a user may actively look for a specific piece of information or for information of a given type <b><i>based on given search criteria (e.g., keywords, dates, specific senders)</i></b>. In this case, for example, a piece of content may be deemed to be more relevant to a search if two of the words in the subject are keyword search terms as opposed to if there was only one matched word. (<i>Id.</i>, 7:42-48.)</p> <p>In yet another example, in the case of searching through electronic mail, the electronic mail system may <b><i>help rank search results and indicate to the user</i></b> how likely each piece of content is to be of interest. (<i>Id.</i>, 8:9-12.)</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

82. The closest corresponding structure I can identify for carrying out the function for the “search module” of the ’217 patent relates to the “search module 262,” which “provide[s] a user with search capabilities in accordance with the relevance and importance scores determined by the relevance analysis engine 252.” *Id.*, 6:60-64, 7:32-34, 7:42-48, 8:9-12. Search criteria can include “keywords, dates, specific senders.” *Id.*, 16:10-15. Because the claims specify searching electronic content “in accordance with the determined relevance score,” a POSITA would understand the ’217 patent’s discussion of “help[ing] rank search results and indicate

to the user how likely each piece of content is to be of interest” provides the corresponding structure for the “*search module*.”

## **XI. OVERVIEW OF THE CITED REFERENCES**

### **A. Dumais (EX-1005)**

83. Dumais<sup>7</sup> discloses a data manipulation system that assigns scores of relevance to electronic content, which can include both content-based scores and scores based on users’ interactions with that content. EX-1005, Abstract, ¶¶7-8, 23-25. As shown in Figure 1 (below), Dumais discloses a “monitor component” that observes user interaction or activity with data items—documents, files, email messages, calendar appointments, or web pages—which is coupled to a “tag component” that assigns weights or scores that are associated with “data items” in the database to indicate the “importance” of the item:

---

<sup>7</sup> I note that Dumais lists as inventors two of the authors listed on Teevan.

EX-1014.

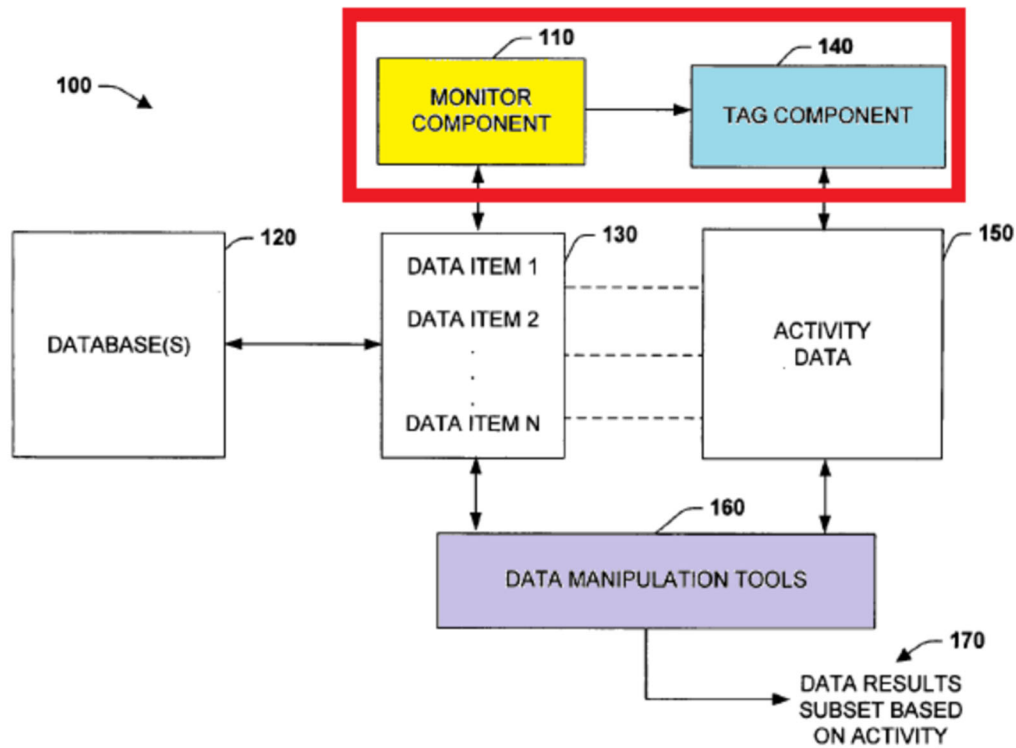


**FIG. 1**

*Id.*, ¶¶22-23, 31-33, Fig. 1. Monitored user interactions on a data item can include opening, closing, editing, adding to or deleting from, reading from or writing to, cutting, pasting, forwarding, or replying to a document, as well as the amount of time the document is viewed. *Id.*, ¶¶8, 22.

84. Dumais further teaches the use of a “personalization component” that builds “user models,”<sup>8</sup> depicted in Figure 5 (below), that reflect a user’s interests and can be used to personalize search results according to “determined activity data”:

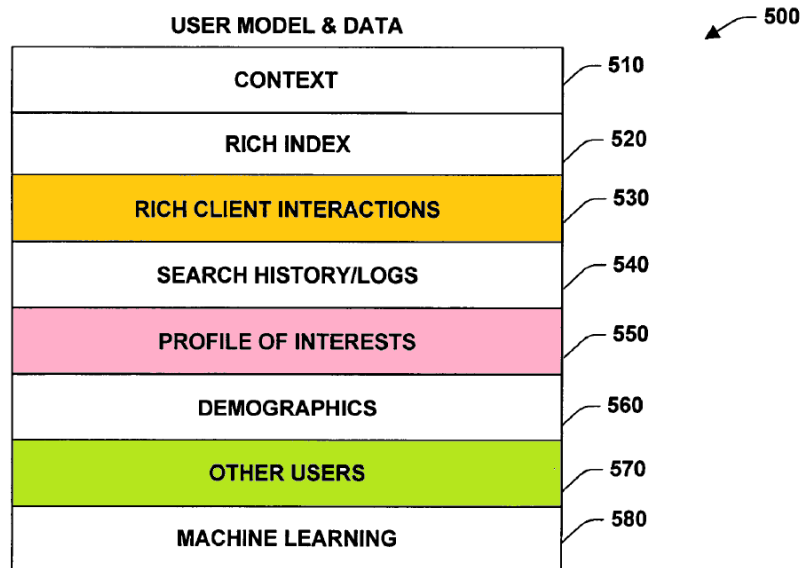


**FIG. 5**

*Id.*, ¶43, Fig. 5. The “user model” can be based on “many different sources of information” and created for individuals and groups via “collaborative filtering techniques that develop profiles by the analysis of similarities among individuals or

---

<sup>8</sup> Dumais paragraphs 40-55 describe Figures 4 and 5, which talk about user models. Dumais, ¶¶40-50, Figs. 4, 5. Figure 4 has user model 420. The entirety of Figure 5 is referred to as “user model 500,” but the table is labeled “User Model & Data.” For brevity, I refer to “user model.”

groups of individuals.” *Id.*, ¶¶43-50, 52. Dumais also teaches that by observing how one user interacts with a subset of other users in the network, the system can identify a subset of users that “belongs to a desired social network of interest for the one user.” *Id.*, ¶21.

85. The monitor component and tag component are further connected to Dumais’s “data manipulation tools,” which can be used, for example, to “refine” search results by “filtering or ranking” items. *Id.* ¶¶8, 24. Figure 4 (below) shows how a “user model” and a “global database 490 of user statistics” can modify both a search query and search results:

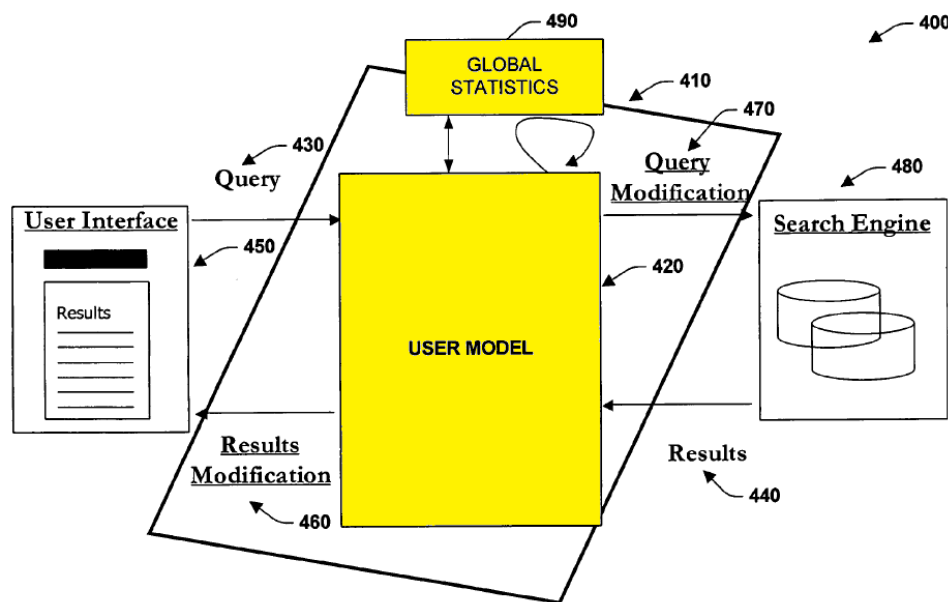


**FIG. 4**

*Id.*, ¶40, Fig. 4. The user model and global statistics can be “associated with user activity or interaction data...to facilitate data manipulation or processing.” *Id.*, ¶40.

Dumais's data manipulation system can also apply content-based scores to data items "based on the similarity of a user's query to the content of the document," using "activity data" to identify regions or terms of interest to a user. *Id.*, ¶25. Figure 2 (below) depicts an exemplary user interface that uses the tagged scores to identify subsets of relevant data files for users:

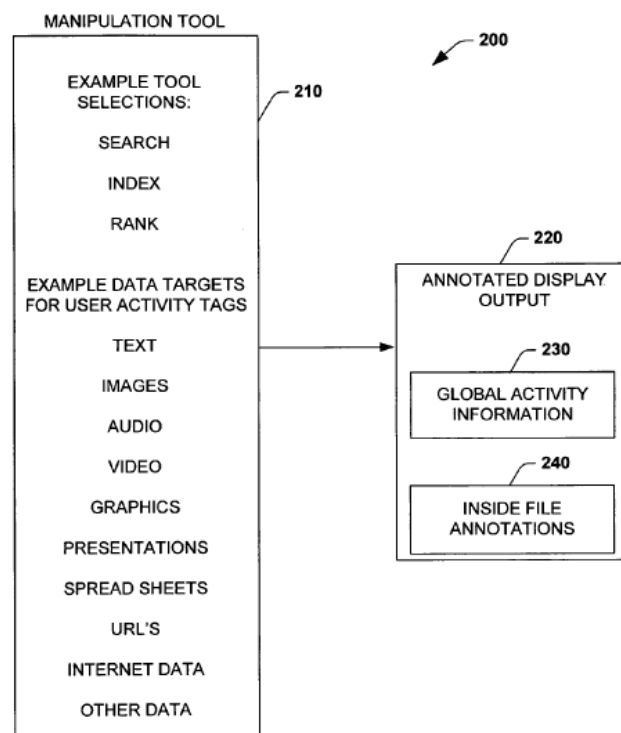


**FIG. 2**

**B. Rose (EX-1006)**

86. Rose teaches a "system for ranking the relevance of information that is accessed via a computer." EX-1006, 1:8-10. Ranking is predicted based on a "likely degree of relevance to [a] user's interests," and "data regarding correlations of

interests between users.” *Id.*, 2:26-27, 2:35-38. For example, a combined data relevance score may be based on “an attribute of the message...with other data relating to correlations of indications provided by users who have retrieved the message.” *Id.*, 6:5-11, 8:38-40 (“In the system of the present invention, however, the relevance score of a particular message takes into account not only on *the user’s own interests*, but also *feedback from the community*.”).

87. Rose teaches that “one factor” of relevance can be based on a user’s actions on electronic content “when they retrieve items of information.” *Id.*, Abstract, 6:51-59. The system monitors users providing explicit ratings on content, which are user actions on the electronic content itself. *Id.*, 5:32-34 (user may “provide an indication of degree of interest for each message which has been retrieved.”). For example, Figure 4 (below, annotations added) shows “thumbs-up” and “thumbs-down” icons that allow a user to rate content:

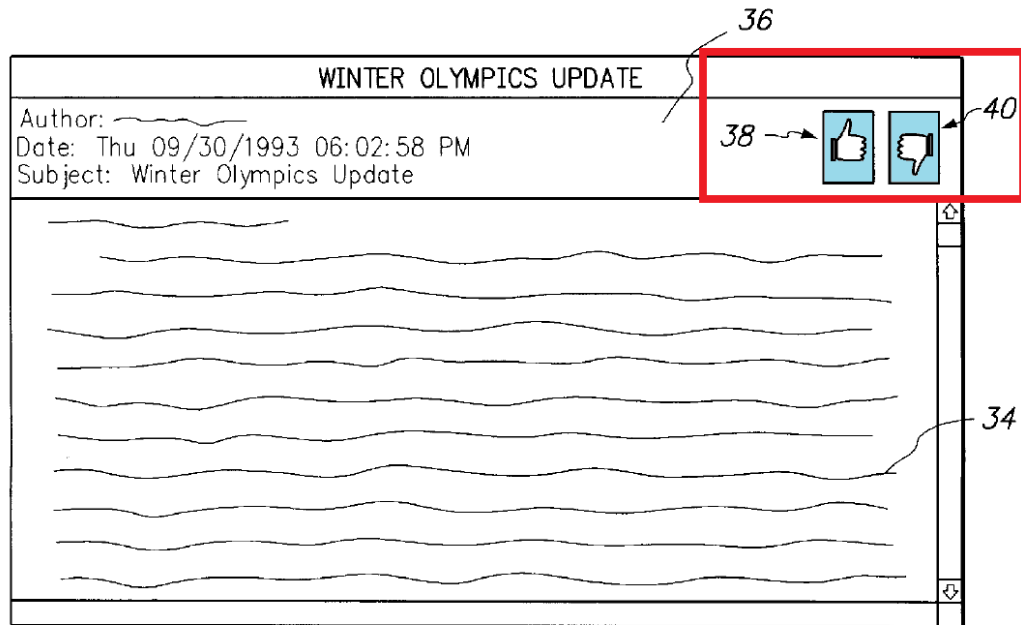


**FIG. 4**

88. Each user has a “profile of interests.” *Id.*, 2:28. User responses, such as clicking on “a ‘thumbs-up’ icon,” are “forwarded to the server 10, where it is used to update the user profile.” *Id.*, 5:18-23, Figs. 4, 6 (listing user responses for each user). Rose also states that “finer resolution can be obtained by providing additional options for the user...to indicate high interest, mediocre interest, or minimal interest.” *Id.*, 5:28-31. Using this “approach, each time a message is retrieved, feedback information regarding the user’s degree of interest [can be used to]...maintain an up-to-date profile for the user.” *Id.*, 5:45-47. Therefore, Rose teaches monitoring users for their explicit feedback on content.

89. When a user indicates their interest in a piece of electronic content, the system will update the user profile (and therefore, what is considered “relevant” to

the user) based on that feedback. *Id.*, 6:38-43 (“[I]f 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”), 6:51-59. When the significant terms in that document are given increased weight, a POSITA would understand the relevance or ranking of that document would automatically increase. A user’s profile “comprises a vector, based upon the user’s indications as to his or her relative interest in previously retrieved documents,” as shown in Figure 5B (below):

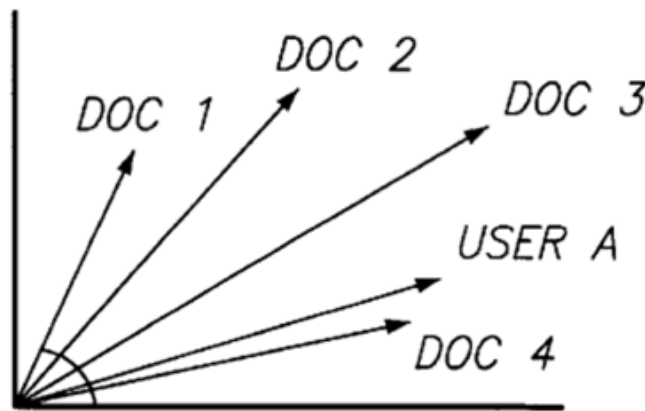


**FIG. 5B**

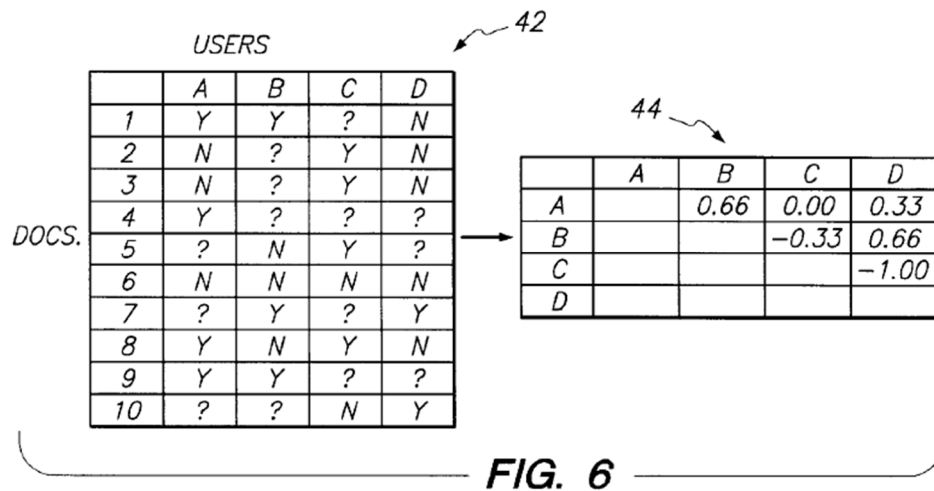
*Id.*, 6:36-38. Relevance for an individual user is determined “based on the similarity between the document’s vector and the user’s profile vector.” *Id.*, 6:51-53. The smaller the angle between document vector and user profile vector, the higher the item will be ranked. *Id.* This ranking system also applies to non-document information by using content data “based upon other attributes that are relevant to a user’s interest in that information,” such as “in [a] movie database, the content vector

might take into account the type of movie, such as action or drama, the actors, its viewer category ranking, and the like.” *Id.*, 6:21-26.<sup>9</sup> In another example, “event times can be used in the ranking equation, where older items might get lower scores.... [A] score might rise as the deadline approach[es], then fall when it [] passe[s].” *Id.*, 8:13-16.

90. Rose teaches a “second factor” of relevance can be based upon a correlation with the indications provided by other users. *Id.*, 6:59-7:3. Rose teaches the determination of a value representing “user correlation” based on “indications provided by users who have retrieved the message.” *Id.*, 6:5-11. For example, Figure 6 (below) shows a table listing all the documents that users A, B, C, D have rated, followed by a second “correlation matrix” table organizing that information to reflect the “degree of correlation between the various users’ interests in commonly retrieved messages” (*i.e.*, how often users rated “commonly retrieved” documents similarly).

---

<sup>9</sup> A POSITA would understand that Rose’s teaching of processing in relation to movies also discloses that similar processing would apply to other types of content, such as mail. EX-1006 (Rose), 3:26-28 (“The present invention can be employed in various kinds of information access systems, such as electronic mail, bulletin board, text search and others.”), 4:6-10, 8:41-48.



*Id.*, Fig. 6, 6:59-7:3. In this way, Rose identifies “cognate users” based on how similar or correlated the “user’s interests” are, and it determines a relevance score based on the inputs from such cognate users. *Id.*, 6:59-7:34.

91. Finally, Rose teaches that the ultimate “score” for electronic content can be combined from each of these “factors.” *Id.*, 2:38-41 (“[A] value indicative of the content of a document can be added to another value which defines user correlation, to produce a ranking score for a document.”), 6:50-53, 8:38-40.

92. As discussed, the “content” of the document is evaluated with respect to the user’s feedback on electronic content, and the second value indicating “user correlation” is evaluated with respect to feedback of other users for “commonly retrieved messages.” *Id.*, 2:39-40, 6:66. Rose also teaches that “multiple regression analysis can be utilized to combine the various factors.” *Id.*, 7:39-43, 2:41-45. In this way, Rose teaches obtaining a combined relevance score based on (1) feedback from a user and (2) feedback from “cognate” users on the same piece of electronic content.

**C. Bieganski (EX-1007)**

93. Bieganski teaches an electronic processing system that produces a “[s]erendipity-weighted recommendation output” specific to a user based on “user item preference data and community item popularity data.” EX-1007 at Abstract. Bieganski recommends content based on “user item preference data and community item popularity data” to produce a “filtered recommendation output set.” *Id.* at 3:30-44. “Preference data” can include both “explicit” (e.g., “values that a user has supplied directly”) and “implicit” values (e.g., “values that have been inferred by observing actions that the user has taken”). *Id.* at 2:31-42.

94. Bieganski Figure 2, replicated below, illustrates an embodiment that generates recommendations “based on user item preference data, population preference data..., and a serendipity control function:”

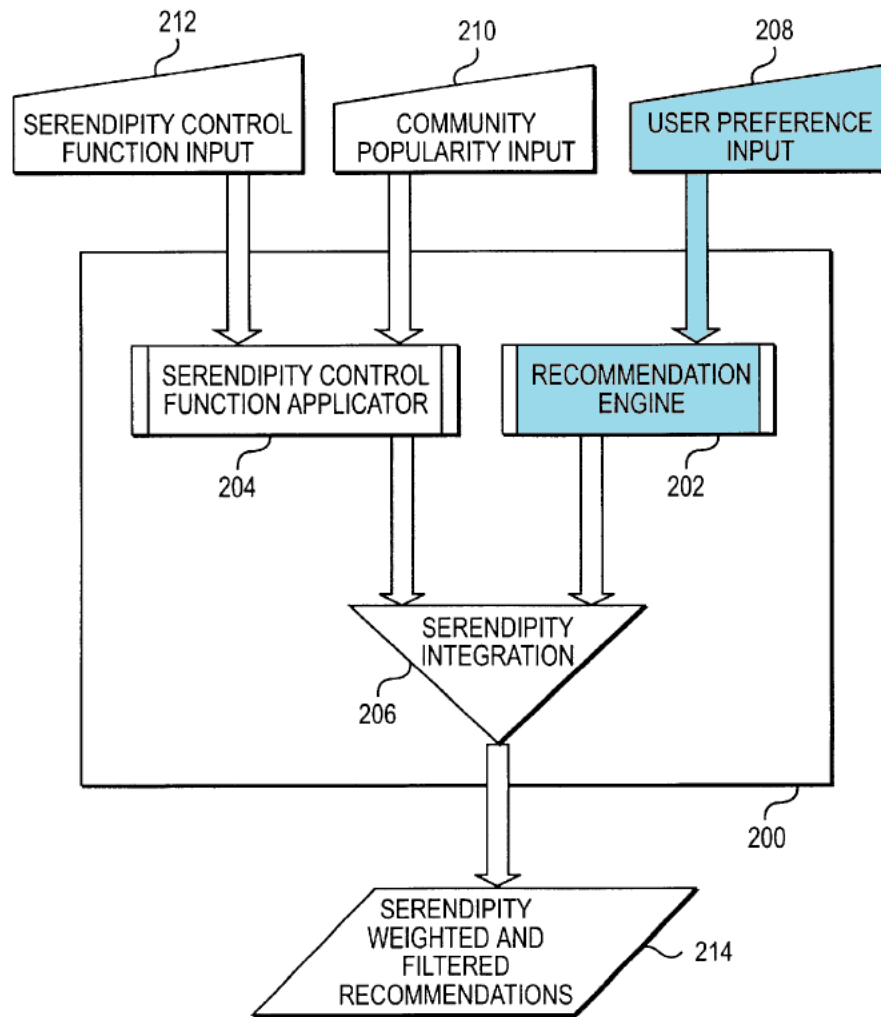


**FIG. 2**

*Id.* at 5:51-58, Fig. 2 (blue to indicate recommendation engine, based on user preference input). Bieganski teaches that the recommendation engine “predicts a user’s preference for each item in the dataset, without regard to serendipity.” *Id.* at 6:1-3. The recommendation engine “builds and maintains an interest profile for each user.” *Id.* at 6:3-4.

95. Bieganski teaches that the recommendation engine can use “many different techniques for generating personalized recommendations from user interest profiles.” *Id.* at 6:6-9. One of those techniques is “automated collaborative filtering,” where users are grouped into “affinity groups” or “neighborhoods” based on “shared interests.” *Id.* at 6:27-36. To form a neighborhood for a user, the recommendation engine “finds the set of people in the preference data who have the profiles most similar to the profile of a user.” *Id.* at 6:31-34, 6:37-39 (noting there are “many different methods to form affinity groups”), 6:44-52 (incorporating by reference “examples of neighborhood formation algorithms”); *see also* EX-1033 (Cöster) at 247, 249 (discussing “stop conditions” for when to stop processing users or factors for consideration). As an example, “[s]imilarity between two profiles may be measured by counting the items that are shared by the two profiles.” EX-1007 at 6:34-36.

96. Bieganski elaborates about one method of forming affinity groups of users “based on user preference data.” *Id.* at 6:39-7:65. “To form a neighborhood, the recommendation engine selects the set of users from the user population who have the profiles most similar to the customer's profile.” *Id.* at 7:9-11. The formation of neighborhoods can be controlled primarily by (i) minimum neighbor similarity, and (ii) maximum neighborhood size. *Id.* at 7:16-27, 7:57-65. A POSITA would understand that these neighborhoods would not necessarily be symmetrical, since a

maximum neighborhood size means that “only the best neighbors” will be included. *Id.* For example, Cöster and Svensson (EX-1033 (2002)) address efficient ways in collaborative filtering to construct a neighborhood for a user, where user B might be in the neighborhood for user A, but it is not necessarily true that user A is in the neighborhood for user B. *Id.* at 249. Cöster teaches the use of “heuristic stop conditions” that speed up execution by guiding when to skip evaluating users or other factors. *Id.* at 247, 249 (discussing “stop conditions on the number of users that are retrieved during the scanning of the inverted lists”). For example, a system could identify an initial group of users up until a “stop condition” is reached and then stop taking input; alternatively, the system could save processing power by only updating information for users already identified as similar, such that relationships will shift after being initially defined. *Id.* at 249 (“When the stop condition is reached, only those accumulators that are non-zero are considered. ... The other strategy is to continue processing lists but only to update those accumulators that are already non-zero.”). A POSITA would understand that such stop conditions result in asymmetric relationships, because only certain factors are considered for certain comparisons of users.

## XII. DETAILED EXPLANATION OF GROUNDS

### A. Ground 1: Obviousness Over Dumais (EX-1005)

#### 1. Claim 1

a) 1[pre] A computer-implemented system for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented system comprising:

97. If limiting, Dumais, in my opinion, teaches 1[pre]. Dumais discloses a “system 100” and, in Fig. 8, describes “computer 812” as an “exemplary environment 810” (“*a computer-implemented system*”). EX-1005, ¶¶17, 22, 70, Figs. 1, 4, 8. Specifically, Dumais explains that the terms “component,” “system,” “tag,” “monitor,” “model,” and “query,” as used in the patent, “refer to a computer-related entity, either hardware, a combination of hardware and software, software, or software in execution.” *Id.*, ¶20. A component can be “a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer.” *Id.* A component can also be “localized on one computer and/or distributed between two or more computers.” *Id.* Further, the “system 100” in Figure 1 “employs user activity or interaction data to perform various computer-related tasks.” *Id.* at ¶22. Therefore, a POSITA would have understood Dumais to be a “*computer-implemented system*.”

98. Dumais's "monitor component" observes a user's interactions with one or more databases, where data items are stored. *Id.*, ¶22. "Data items" ("*pieces of electronic content*") include "documents, files, email messages, calendar appointments, web pages." *Id.*, ¶31. Data items can be "forwarded," "replied to," or "sent" from one user ("*a sender*") to another. *Id.* ¶22. A tag component assigns weights or scores to reflect the user's interactions with a given data item. *Id.*, ¶¶22-23, 31. Dumais discloses a "weighting classification" that may generate a higher weight for "extensive editing of [a] file" as opposed to a lower weight for "minimal file usage." *Id.*, ¶23. After determining the weights or scores, the tag component 140 "associate[s] or tag[s]" each data item by "creating or modify[ing] values in a column or columns of the database 120 to indicate the weighting or importance of a particular item identified in a row of the database 120 for the metadata tag of interest." *Id.* The output of this association is referred to in Figure 1 as activity data 150. *Id.* The "functions of one or more tags" can be used downstream for further processing of data items such as retrieval, sorting, filtering, or presentation. *Id.*, ¶31 ("retrieve items based on functions of one or more tags."). Dumais also stores "user models" that reflect a users' interests, (*Id.*, ¶¶43-50), alongside "global statistics 490," both of which "can be associated with user activity or interaction data...to facilitate data manipulation." (*Id.*, ¶40).

99. As an example, Dumais discusses ways to influence a user's searching, including by personalizing the search *queries* or search *results*. *Id.*; *see also id.*, ¶¶41-42, Fig. 4. Modification of search results typically includes "re-ranking and/or selection from a larger set of alternatives," which can include "consideration or weighting from determined activity data." *Id.*, ¶41. In my opinion, a POSITA would have understood Dumais's ranking of content entails a "ranking score" ("*a relevance score*"). *See, e.g., id.*, cl. 17 ("providing a ranking score used for retrieval"). For example, Dumais discloses that "a ranking score can be utilized for data retrieval, to yield more weight to terms or objects that appear in sections of a data item that a user has attended to or has interacted with." *Id.*, ¶33. Attentional annotations, which "indicat[e] attention or interaction with data items" and their subcomponents, can be used for "indexing procedures" that "weight subcomponents of data items differently for retrieval." *Id.*, ¶¶32, 34. These "attentional annotations" can be used to alter access to or display of data items in search results based on past or present user interactions. Thus, Dumais's ranking of content ("data items") entails a "ranking score" based on relevance ("weight"). Dumais teaches that several inputs can affect rankings, including (1) "tags and data items," (*Id.* ¶¶24, 33, 41); (2) "content-based scores" that "give more weight" to terms with which the user has interacted (*Id.*, ¶25); and (3) a "user model" updated using a "global database 490 of user statistics"

(*Id.*, ¶40, Fig. 4). Rankings are “personalized” to a user (“*determined with respect to the user*”). *Id.*, ¶41.

100. Thus, Dumais teaches a data manipulation system (“*computer-implemented system*”) that determines a content-based score (“*relevance score*”) based on the user’s interactions (“*with respect to the user*”) for a data item sent to a user (“*a piece of electronic content sent from a sender to a user*”).

**b) 1[a] a computer processor; and**

101. In my opinion, Dumais discloses or renders obvious “a processor” (*a computer processor*). Dumais’s Figure 8 depicts an exemplary environment for the data manipulation system where the computer includes a processing unit 814, which “can be any of various available processors.” *Id.*, ¶70.

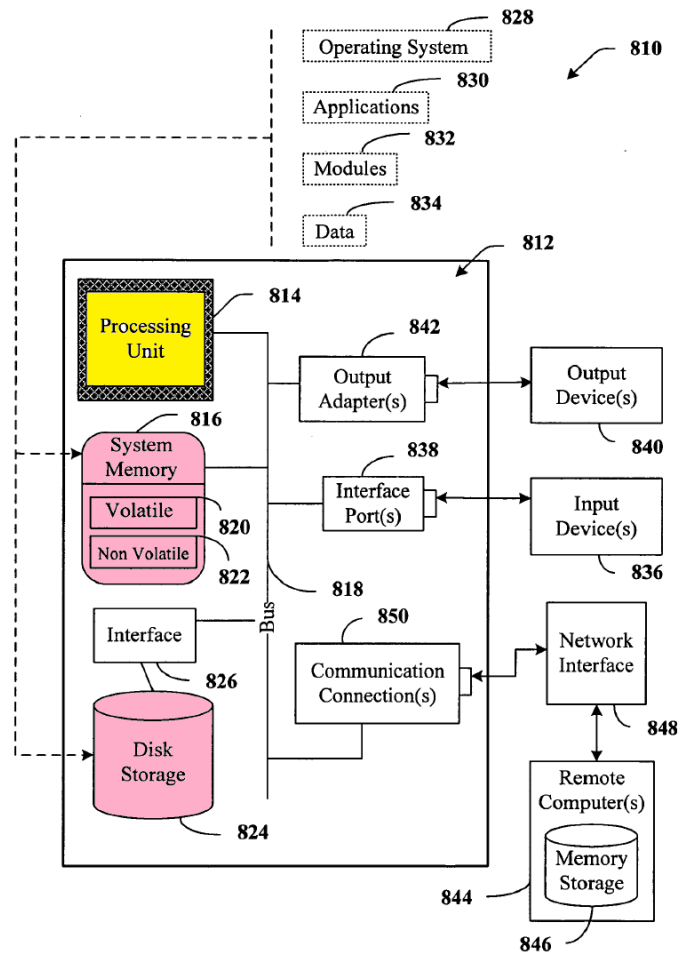


**FIG. 8**

102. Dumais discloses that a component of the data manipulation system can be “a process running on a processor, a *processor*, an object, an executable, a thread of execution, a program, and/or a computer.” *Id.*, ¶20. Further, the data manipulation system can also use “[d]ual *microprocessors* and other *multiprocessor* architectures” as the processing unit. *Id.*, ¶70. Thus, in my opinion, Dumais teaches *a computer processor*.

**c) 1[b] a computer-readable storage medium storing computer program modules configured to execute on the computer processor, the computer program modules comprising:**

103. In my opinion, Dumais teaches 1[b]. As discussed with 1[a], Dumais teaches its components run on a computer processor. The computer of 1[a] includes “a processing unit 814, a system memory 816, and a system bus 818,” where “system memory 816” further includes “volatile memory 820 and nonvolatile memory 822.” *Id.*, ¶¶70, 72. Dumais discloses that, for example, “system bus 818” couples “the system memory 816 to the processing unit 814.” *Id.*, ¶70. Additionally, Dumais stores its “basic input/output system (BIOS),” which transfers information between the computer elements, in nonvolatile memory 822. *Id.*, ¶72. In my opinion, a POSITA would have understood that Dumais’s system memory, volatile memory, and nonvolatile memory are *a computer-readable storage medium*.

104. Further, these components can “execute from various computer readable media having various data structures stored thereon” (*computer-readable storage medium*) and “may communicate via local and/or remote processes.” *Id.*, ¶20. Further, Figure 8 (above) depicts an exemplary environment for the data manipulation system where “applications,” “modules,” and “data” are stored in the system memory and disk storage. *Id.*, ¶¶70, 72-73. An “[o]perating system 828” allocates resources to system applications “through program modules 832 and

program data 834 stored either in system memory 816 or on disk storage 824” (*storing computer program modules configured to execute on the computer processor*). *Id.*, ¶¶20, 72, 74. A POSITA would have understood that Dumais’s components (i.e., “applications,” “modules,” and “data”) are “program modules configured to execute on the computer processor” that are stored in the “computer-readable storage medium.” Thus, Dumais teaches *a computer-readable storage medium storing computer program modules configured to execute on the computer processor*.

**d) 1[c] a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;**

105. In my opinion, Dumais teaches 1[c] under MPF or non-MPF. Dumais’s monitor component 110 (*monitoring module*) tracks “when the data items 130 are interacted with by users” with one or more databases that store data items (*track actions by a plurality of users*). *Id.*, ¶22, Fig. 1 (below).

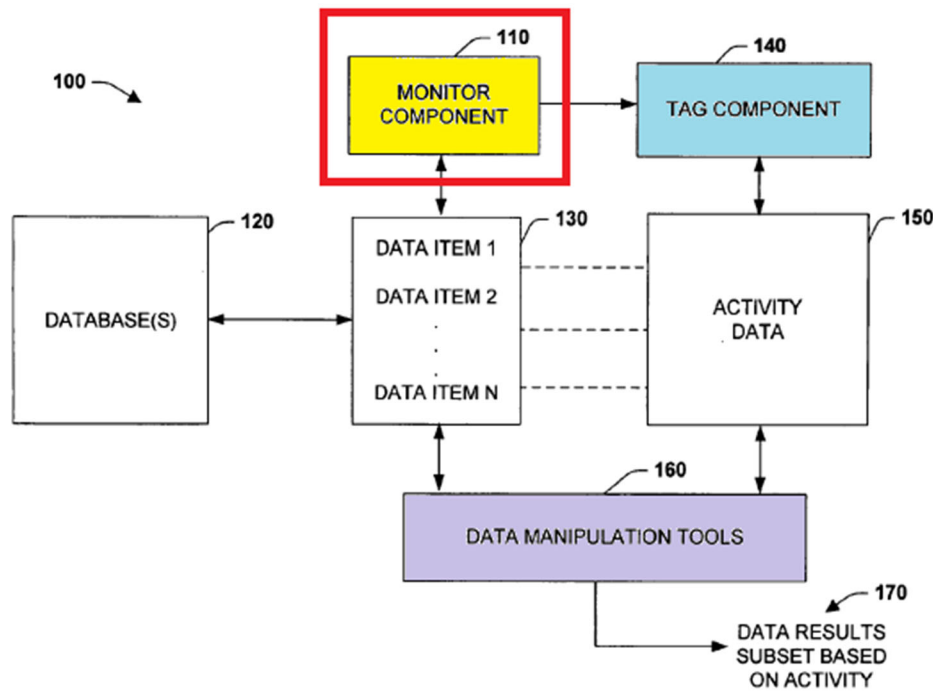


**FIG. 1**

106. As discussed above, Dumais teaches a “monitor component” that monitors many kinds of user actions on a data item (opening, closing, editing, forwarding, replying to, etc.). *Id.*, ¶¶19, 22 (“Monitoring can...determine when the data items 130 are interacted with by *users*”), 38. For further example, Dumais discloses a “global database 490 of user statistics.” *Id.*, ¶40. Dumais discloses “collaborative filtering techniques” (*Id.*, ¶¶43-50, 52), which evaluate similarities of multiple users, “based on the content and/or usage of items” by those users, confirming the system tracks usage data for multiple users. *Id.*, ¶52 (“Models can be derived for individuals or groups of individuals at 570” to develop profiles for “groups of individuals”). Specifically, collaborative filtering works with the user model 500 “to process previous user activities from a group of users that may

indicate preferences for a given user that predict likely or possible profiles for new users of a system.” *Id.*, ¶55. Thus, in my opinion, a POSITA would have understood that Dumais is *configured to track actions by a plurality of users*.

107. Dumais further teaches the use of “data acquisition components that record or log user event data (e.g., cell phone, acoustical activity recorded by microphone, Global Positioning System (GPS), electronic calendar, vision monitoring equipment, desktop activity, web site interaction and so forth).” *Id.*, ¶54. Monitored data activities further include how long a user interacts with a data item. *Id.*, ¶23. Dumais teaches that the activity or interaction is “subsequently tagged to a data item” so that the tags can be used to track user activity throughout the system. *Id.*, ¶¶19, 23. Specifically, “user activity information” is derived from “tags and data items 130” gained through monitoring, as depicted in Figure 1 above. *Id.*, ¶24. The “user activity information” is then used in combination with “data manipulation tools,” which can filter results to “a subset of data items based at least in part on the user's interaction with the data items.” *Id.*, ¶¶19, 24. Therefore, Dumais is configured to track user actions.

108. Dumais teaches that it is a “data processing” and “information retrieval” system that ranks content to identify “a smaller or more manageable set of items” (*an application for managing electronic content*). *Id.*, ¶¶10-13, 23 (discussing monitoring user actions “within an application”), 31. Dumais’s data manipulation

system can be implemented in “substantially any manner that supports personalized query and results processing,” such as “as a server, a server farm, *within client application(s)*, or more generalized to include a web service(s) or other *automated application(s)*” (*users associated with an application for managing electronic content*). *Id.*, ¶54.

109. As discussed above, the structure for the “monitoring module” can be met using “client-side integration” where a “plug-in” on the client’s computer (specifically, the email system) “monitor[s] end users actions on the mail content.” *Supra* ¶74. In my opinion, a POSITA would have understood Dumais’s “monitor component” teaches the structure of the “*monitoring module*,” because Dumais (1) contemplates that monitoring can be performed on a client, just like a client-side “plug-in” that monitors end users actions on mail content,<sup>10</sup> (*Id.*, ¶¶20, 46, 52, 54, 56, 78, Fig. 9), and (2) discloses a server that can “tag content with flags,” i.e., the “tags” discussed below in 1[d] that are subsequently applied to data items by the “tag component” based on monitored actions (*Id.*, ¶¶8, 20, 23, 56, 78). By the time of the ’217 patent, a POSITA would have known that plug-ins were a common way to track user actions. EX-1030 (McKeogh (2004)) at 93-94 (discussing the “Eclipse”

---

<sup>10</sup> For example, many users run their email application through a browser, and plug-ins are common in browsers.

plug-in for tracking “mouse movement, key strokes (including paging), scrollbar movement and document changes that take place during the session”); EX-1031 (Rich) at Abstract, 782, 784-85 (discussing plug-ins for monitoring user’s physical actions and language); EX-1032 (Domingue (2004)) at 191-93 (discussing “Magpie” plug-in for Internet Explorer that uses ontology to “automatically track concepts found during a browsing session”); see *also supra*, ¶ 75.

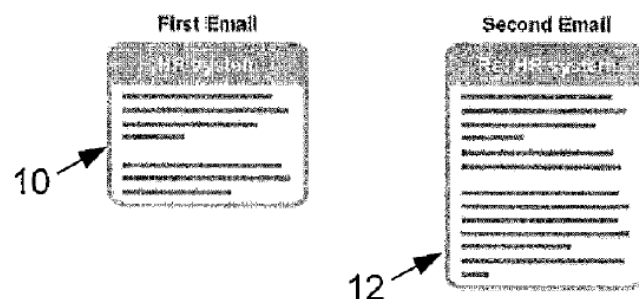
110. Dumais explicitly contemplates emails and discusses email applications with searching functionality.<sup>11</sup> Particularly, Dumais describes an e-mail inbox with keyword search functionality of previously received emails, where the keyword “links a search tool to respective e-mails that are associated with the term” and the search term “is linked to the actual contents of stored e-mails.” *Id.*, ¶01. A keyword search (*e.g.*, “John”) can return and present to the user all e-mails associated with John and the user could “subsequently sift through the retrieved list for the desired e-mail.” *Id.* Dumais’s data manipulation system includes processing of “email messages” where a “search component 650 extracts items from the index

---

<sup>11</sup> I note that Teevan, authored by the inventors of Dumais, discusses personalized search results in the context of “Web pages that the user viewed, email messages that were viewed or sent, calendar items, and documents stored on the client machine.” Teevan at 451.

640 such as emails ... relating to the context of the query 654.” *Id.*, ¶31. Dumais also discloses explicit queries and implicit queries. *Id.*, ¶65. For example, a user could integrate their desktop phone message system with their e-mail system such that any received phone calls from “selected individuals” would cause the e-mail system to “automatically retrieve e-mail relating to the individual via implicit query 714.” *Id.* Therefore, in my opinion, Dumais uses a conventional email system. *See id.*, ¶¶31, 36, 56, 65.

111. In my opinion, if Dumais does not teach a conventional email system explicitly, a POSITA would have been aware of conventional email systems by the time of the '217 patent, such that it would have been obvious to integrate with Dumais's searching and ranking system to personalize email and search results. The '217 Patent depicts a “traditional prior art email system” where “a second email 12” replies to “a first email 10,” (shown below), and a POSITA would have been familiar with such a traditional email system by the time of the '217 patent. EX-1001, 2:17, 3:52-4:4, Fig. 1A.



Thus, Dumais's "monitor component" teaches the structure of the '217 patent's "*monitoring module*."

**e) 1[d] a first relevance measurement module 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;**

112. In my opinion, Dumais teaches 1[d] under MPF or non-MPF. In Dumais, "activity or interaction[s] can be monitored and subsequently tagged to a data item." EX-1005, ¶19. Based on users' monitored actions, Dumais's "tag component 140" then assigns, or "tags," that data item with a score or weight (*first measure of relevance of the piece of electronic content*) "according to the type and intensity of the activity" (*based at least in part on one or more actions of the user on the piece of electronic content*). *Id.*, ¶¶7, 23. "Weights or scores" are variable and "can reflect the amount or pattern of the user's interaction with a given piece of data or application" (i.e., the "type and intensity of the activity")." *Id.*, ¶¶7-8, 23. "Tags and data items" can be used with "data manipulation tools" to "employ user activity information derived from the tags to augment...information access (e.g., searching, filtering or ranking of items)." *Id.*, ¶24.

113. As discussed above, the structure for the "*first relevance measurement module*" involves algorithms used to develop a user's "*Individual Relevance Component*" based on a "plurality of factors," including "dichotomous" (i.e., binary,

yes/no) and “cardinal” (i.e., scaled) factors. *Supra* ¶¶76-77. In my opinion, a POSITA would have understood Dumais’s “tag component” teaches the structure of the “*first relevance measurement module*” because the tag component assigns “weights or scores” based on monitored user activity (*Id.*, ¶¶7, 23), which mirror the ’217 patent’s discussion of “*individual relevance components*.” The ’217 Patent defines “*Individual Relevance Component (IRC)*” as “a relevance score for a piece of content respective to a given individual user, and is based on the actions of that user.” EX-1001, 25:45-49. For example, a recipient “r” can take “actions on electronic mail object X” that it received from senders “{s}.” *Id.*

114. Dumais teaches that tags can be based on both dichotomous (whether or not an email is opened, replied to, etc. (EX-1005, ¶38)) and scaled factors (tracking how often or for how long a user interacts with a data item, (*id.*, ¶¶7-8, 23, 31)). The ’217 Patent similarly teaches dichotomous “indicator functions” such as factors that turn “on” or “off” depending on whether the action has occurred and “values on cardinal scale” reflecting “how many extra times” the user opens or

forwards the electronic mail object.<sup>12</sup> EX-1001, 28:63-29:40. Thus, Dumais teaches the structure of a “*first relevance measurement module*.”

115. In one example, the system assigns a low weight to “minimal file usage” (e.g., “opened one time within a year,” “very light perusal of a document”), indicating “lower importance of the file to the user” whereas “extensive editing of the file” may be assigned a higher weight. EX-1005, ¶¶8, 23, 39. The “determined weight information” is illustrated as “Activity Data 150” in Figure 1 below.

---

<sup>12</sup> This is a common way to track usage of information, by tracking (a) whether something happened and (b) how often or how many times it happened. *See, e.g.*, EX-1007 (Bieganski) at 2:1-30 (“The preference data can be unary or numerically valued. Unary preference data is a set of customer-item pairs: a customer-item pair indicates that an event linking the customer to the item has occurred.”).

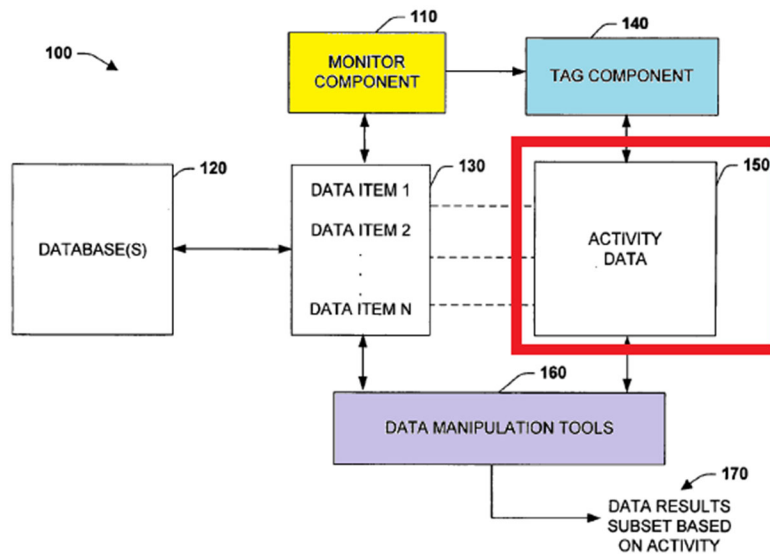
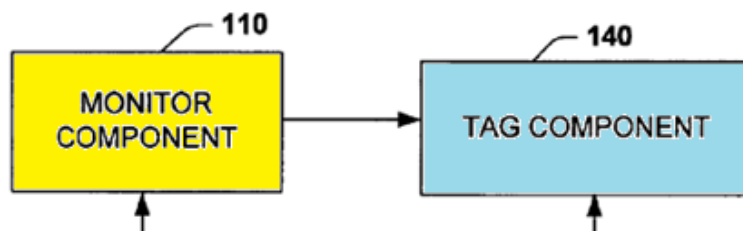


FIG. 1

The score or weight is associated with the respective data item and indicates the user's "past usage or interactions" with it. *Id.*, ¶¶8, 23, 35, 39, Fig. 2.

116. Further, Figure 1 (excerpted below) shows that the "tag component" ("first relevance measurement module") is connected to and communicates with (coupled to)<sup>13</sup> the monitoring component ("monitoring module"):



<sup>13</sup> The '217 patent never restricts how modules are "coupled." *See generally* EX-1001.

*Id.*, Fig. 1, ¶20 (“The components may communicate via local and/or remote processes...(e.g., data from one component interacting with another component in a local system, distributed system, and/or across a network such as the Internet with other systems via the signal”). In my opinion, a POSITA would have understood that the tag component 140 and monitor component 110 are “coupled” because they physically execute from the same memory on the same processor and work together to calculate the “weight and score.” See 1[pre], 1[a], 1[b]; *Id.*, ¶¶8, 23. The ’217 patent contemplates that a “*module*” is “any program, circuitry, logic, and/or functionality implemented in either software and/or hardware.” EX-1001, 6:35-38. A POSITA would have understood that Dumais’s “modules” could be “coupled” in almost any variety of ways, since there are countless ways that functions, programs, logic, and circuitry can be “coupled” to one another. Thus, Dumais teaches *a first relevance measurement module coupled to the monitoring module that determines a first measure of relevance of electronic content based on user actions on that content.*

**f) 1[e] a second relevance measurement module coupled to the monitoring module and configured to:**

117. In my opinion, Dumais teaches 1[e] under non-MPF or MPF, as discussed below in 1[f] and 1[g]. Dumais teaches a “personalization component 410” (*second relevance measurement module*) that includes a “user model” that is “based

on user activity,” as well as processing components for “using the model to influence search results.” EX-1005, ¶¶40-41, Fig. 4; *see also* 1[f], 1[g] (below). Personalization component 410 also uses a “global database” of “user statistics” to update user models. *Id.*, ¶40.

118. In my opinion, a POSITA would have been motivated to use “personalization component 410” in combination with (*coupled to*) the tag component 140 and monitor component 110, because Dumais discusses that the user model can be used with “determined activity data” to personalize search results. *Id.*, ¶43; *see also id.*, ¶¶40 (“[T]he user model 420 and/or global statistics 490 can be associated with user activity or interaction data...to facilitate data manipulation or processing.”), 43, 53, 79, Fig. 5. Indeed, Dumais teaches that the user model can be used for “data manipulation,” (*id.*, ¶40), such that the “personalization component” is located within the “Data Manipulation Tools,” depicted in Figure 1 (below) as being connected to the monitor component and tag component:

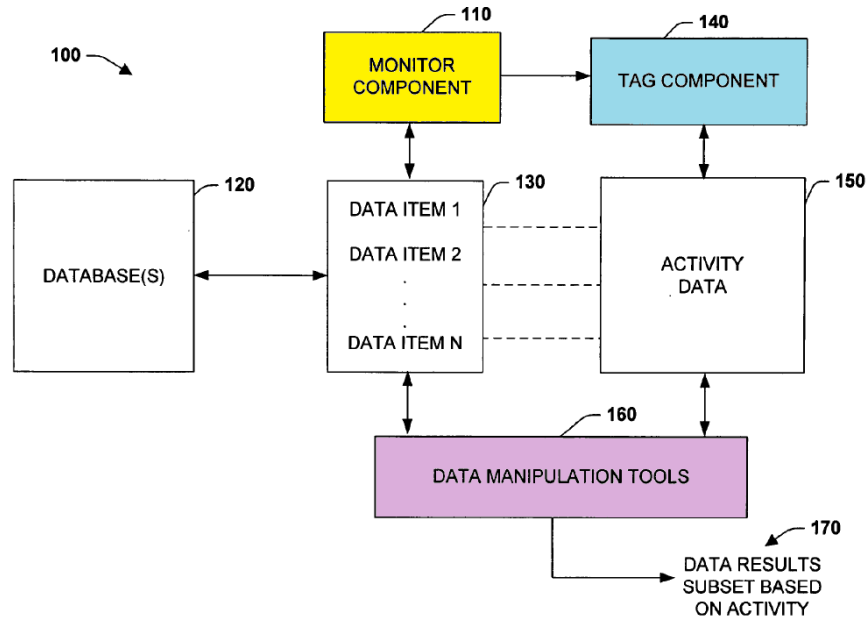


**FIG. 1**

*Id.*, Fig. 1. In my opinion, a POSITA would have understood that combining the “personalization component 410” with the user model would accomplish “successful personalization” of search results that “accurately reflects” a user’s interests. *Id.*, ¶43. Further, it would have been obvious to combine the “personalization component 410” and the user model because both components are “based on user activity.”

119. For these reasons, the personalization component is “coupled to” the tag component 140 and monitor component 110. *Id.*, ¶¶22, 40, 43.

**g) 1[f] 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**

120. In my opinion, Dumais teaches 1[f], under MPF or non-MPF. Dumais explicitly discloses identifying other recipients of electronic content that are “cognate” to the user 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.*” *Id.*, ¶52 (emphasis added); *see also id.*, ¶22 (“Monitoring can...determine when the data items 130 are interacted with *by users.*”) (emphasis added), Fig. 5 (depicting data from “Other Users” in a “User Model”). Particularly, Dumais discloses that collaborative filtering techniques can derive these user models “for individuals or groups of individuals at 570” by “develop[ing] profiles by the analysis of similarities among individuals or groups of individuals.” *Id.*, ¶52. Further, the system can “process previous user activities from a group of users that may indicate preferences for a given user that predict likely or possible profiles for new users of a system.” *Id.* at 55. Dumais also discusses “observing that one user interacts with a subset of other users over a network” to “determine[] or infer[] that this subset of users belongs to a *desired social network of interest.*” *Id.*, ¶21 (emphasis added). In my opinion, a POSITA would have understood these disclosures (i.e., “similarities among individuals”, “previous user activities from a group of users”) teach identifying a “*cognate*” group of users for a user, as that term is used in the ’217 patent. EX-1001, 14:59-15:11 (“[E]mbodiments may identify a ‘cognate group’ for a user, based on historical actions....[T]he 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.”).

121. Dumais teaches that “data items” can include emails (and other documents sent to a recipient), and Dumais contains robust disclosures discussing emails and integrating with a user’s “e-mail system.” EX-1005, ¶¶31, 36, 56, 65. For example, as I discussed above in 1[c], 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. *Id.*, ¶65. Thus, in my opinion, 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, including identifying all of those receiving an email message based on inclusion in the TO or CC fields. For example, 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. It 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.

122. As discussed above, the structure for the “*cognate*” function of the “*second relevance measurement module*” can be met using “role or group based; collaborative filtering; fingerprinting; cluster models; search-based methods;

frequency analysis; and importance value correlation” to evaluate “similar past user actions and assessments, and/or a direct input by a user.” *Supra* ¶78. Dumais teaches the structure for this function of the second relevance measurement module. Indeed, “collaborative filtering” and “group based” analyses—both taught by Dumais to build the “other user” information within user models—are two of the ways the ’217 patent teaches to evaluate “similar past user actions and assessments” of users. For example, the ’217 Patent discloses that the approaches for determining the cognate group can be “role or group based; collaborative filtering; fingerprinting; cluster models; search-based methods; frequency analysis; and importance value correlation.” EX-1001, 43:30-37; *see also* 14:59-15:11 (“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”).

**h) 1[g] 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:**

**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; and**

123. In my opinion, Dumais teaches 1[g], under MPF or non-MPF. Dumais's personalization engine builds "user models" from a "variety of sources" (containing a *second measure of relevance of the piece of electronic content*) which generally map to the limitations of 1[g] (*based at least in part on one or more measures derived from the group*). EX-1005, ¶43. As discussed below in 1[h], Dumais relies on the relevance values stored in the user model to personalize and rank content.

124. Dumais teaches "*local importance describing an importance of the sender to the user*" because "Rich Client Interactions" data in the user model include monitoring "client interactions" like a user's "recent or frequent contacts." *Id.*, ¶¶43-

46; *cf.* EX-1001, 13:53-67 (discussing evaluating importance of user's contacts), 19:25-33; *see also supra* ¶79 (identifying structure for local importance as algorithms calculating a relevance score for a sender based on the user's actions on messages from that sender). Dumais discusses that "data items" can include email and monitors when items are "forwarded, replied to, [or] sent to" others. Dumais, ¶¶22, 31. Dumais also contemplates that the system might evaluate the "rate and frequency of emails...from the author of a message *at a user's focus of attention*," which is determined based on that user's activity. *Id.*, ¶64 (emphasis added). For MPF, in my opinion, a POSITA would have understood Dumais teaches the structure of the "*second relevance measurement module*" for "*local importance*" because evaluating the user's "recent or frequent contacts" is based on a user's actions on that sender's messages (which inform the user's "focus of attention"). *Id.*, ¶23. As I discussed above in 1[pre], Dumais discloses assigning weights or scores to monitored data activities based on the extent of user interaction with a data item (i.e., "minimal file usage," "extensive editing of the file"). The data items are then tagged accordingly, where the association can "indicate the weighting or importance of a particular item identified." *Id.*

125. Dumais teaches "*a global importance describing an importance of the sender within an organization with which the plurality of users are associated*" describing a sender's importance within an organization because "client

interactions” can include the user’s “relationships in an organizational chart.” *Id.*, ¶46; *see also supra* ¶79 (identifying structure for global importance can be met by “an organization chart”). For MPF, in my opinion, a POSITA would have understood Dumais teaches the structure of the “second relevance measurement module” for “global importance” because the ’217 patent contemplates that an “organizational chart” is one way to determine “*global importance*.” In fact, the ’217 patent discloses that an email’s global importance can depend “in particular” on the sender’s position within “the organization chart of an organization.” EX-1001, 29:64-30:3.

126. Dumais teaches “*a content relevance determined responsive to content of the piece of electronic content*” because the data manipulation system assigns “content-based scores” to documents “based on the similarity of a user’s query to the content of the document.” EX-1005, ¶25; *see also supra* ¶79 (identifying structure for content relevance can be met by “statistical techniques” to identify “[k]eywords of high relevance”). Dumais teaches that the personalization component can modify search results using statistical similarity matching or category matching, both of which personalize search results by evaluating a user’s interests and content. Dumais, ¶42. Moreover, a “user model” can also include an “index of content previously encountered.” *Id.*, ¶45. For MPF, in my opinion, a POSITA would have understood Dumais teaches the structure of the “*second*

*relevance measurement module*” for “*content relevance*” because Dumais teaches the use of “statistical techniques” to evaluate content, which is precisely what the ’217 patent relies on to identify relevant content. *Id.*, ¶42; EX-1001, 41:7-25. For example, Dumais explains that the “personalization component 410” can include both “statistical similarity match (in which users interests and content are represented as vectors and matched to items), and category matching (in which the users’ interests and content are represented and matched to items using a smaller set of descriptors).” *Id.*, ¶42. A POSITA would have understood that a “statistical similarity match” is a “statistical technique” used to correlate the “content and/or usage of items.” *Id.*, ¶¶42, 52. Similarly, the 217 patent teaches a “*relevance analysis engine*” to identify the terms with email content that “statistically increase the likelihood that it is relevant to the recipient or person performing discovery.” EX-1001, 41:7-25, 45:13-37 (discussing using “frequency analysis” for “reducing data size by communal filtering determining cognate groups,” including the “most content in common with the user in question”).

127. Finally, Dumais teaches “*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.*” As discussed for 1[f], Dumais employs collaborative filtering techniques that update the relevance of messages based on the actions of other users on that same message. EX-

1005, ¶¶52, 55; *see also supra* ¶79 (identifying structure for actions by cognate users can be met by algorithms implementing a weighted average of relevance scores for cognate users). In my opinion, a POSITA would have understood that Dumais monitors the actions of other users, just as it does when discussed in 1[c]. Dumais, ¶19 (monitored user interaction data is “employed for searching, indexing, cataloging, ranking, or viewing of various data items (or item subsets) residing in a database”), 22 (“[a] monitor component 110 observes data interactions overtime”), 38 (monitoring is used to “determine when data or files are interacted with by users”). This information can be stored as “Other Users” data within the user model. *Id.*, ¶48, Fig. 5. Dumais teaches that “several algorithms” can be used to implement collaborative filtering, including “techniques based on correlation coefficients, vector-based similarity calculations, and statistical Bayesian methods.” *Id.*, ¶55; *see also id.*, ¶¶53 (system can use “statistical/mathematical models and processes for modeling users and determining preferences”), 41 (“modification of results...can include a consideration or weighting from determined activity data”). For MPF, in my opinion, a POSITA would have understood that Dumais renders the structure of the “*second relevance measurement module*” for actions of cognate users obvious, including because (1) “correlation coefficients” can be used to perform a “weighted average” of data from cognate users, and (2) a weighted average is a simple and well known “statistical/mathematical” technique. Accordingly, it would have been

obvious to use a weighted average to assign a level of importance to a user's interaction with a data item.

128. I understand that this claim limitation is a *Markush* group and lists specified alternative “measures” that can be used to calculate the “*second measure of relevance of the piece of electronic content*.” I also understand that if one alternative in the *Markush* group is in the prior art then the entire *Markush* group is considered disclosed by the prior art. Thus, although only a single “second relevance score” from this *Markush* group is needed, Dumais renders each obvious. *See supra* ¶45.

**i) 1[h] a relevance analysis module 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.**

129. In my opinion, Dumais teaches 1[h] under non-MPF or MPF. Although “other forms of data manipulation can be performed,” Dumais uses personalized searching to explain how it recommends content. EX-1005, ¶40. Dumais’s “personalization component 410” contains “processing components” (*relevance analysis module*) that use “user models” to personalize searches by modifying either the search *queries* or the search *results* themselves, as shown in Figure 4 (below):

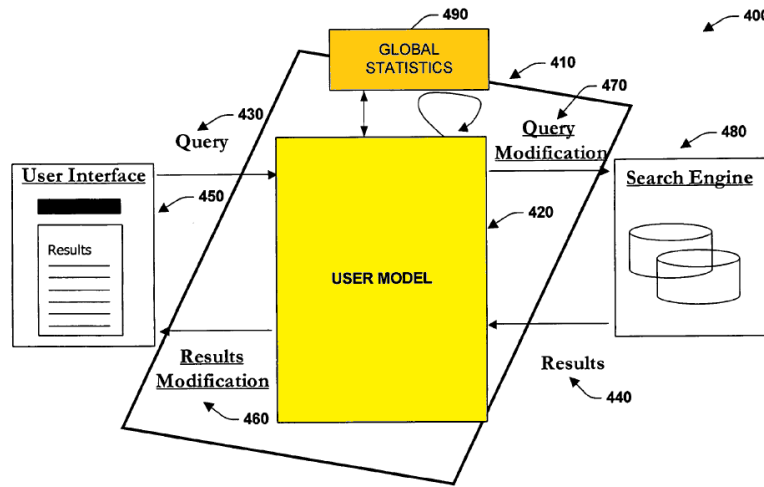


**FIG. 4**

*Id.*, ¶¶40 (“processing components (e.g., retrieval algorithms modified in accordance with the user model) for using the model to influence search results by modifying a query 430 and/or modifying results 440 returned from a search.”); *see also id.*, ¶¶41-42, 50, Fig. 4. Dumais teaches that modification of search results typically includes “re-ranking and/or selection from a larger set of alternatives,” which can include “consideration or weighting from determined activity data.” *Id.*, ¶41. In my opinion, a POSITA would have understood that this ranking of content requires a “ranking score” (*a relevance score*). *See, e.g., Id.*, cl. 17 (“providing a ranking score used for retrieval”). As I discussed above in 1[pre], Dumais discloses that “a ranking score can be utilized for data retrieval, to yield more weight to terms or objects that appear in sections of a data item that a user has attended to or has interacted with.” *Id.*, ¶33.

130. User models “can be based on many different sources of information” to personalize results for a user. *Id.*, ¶50. “In addition to the user model, a “global

database” of user statistics can be maintained, where “the user model 420 and/or global statistics 490 can be associated with *user activity or interaction data ...* to facilitate data manipulation.” *Id.*, ¶40. As discussed for 1[d], this activity/interest data is stored in “tags” on data items (*the first determined measure of relevance*) that “indicate at least one user’s interaction with the data items.” *Id.*, ¶19. Thus, Dumais teaches combining information from user models (informed by a global database of user statistics) (containing the *second determined measure(s) of relevance*, see 1[f]-[g]), and determined activity data (*i.e.*, “tags” on data items based on monitored interactions, see 1[d]) (*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*). The ultimate ranking is determined by (1) considering or weighting from “determined activity data” (within or derived from “tags” on data items), on one hand, and (2) data from the User Model (“rich client interactions,” “other users,” etc.), on the other.

131. Rankings of search results can be accomplished using “statistical similarity match[ing]” or “category matching,” which compare “users interests and content” to identify relevant results. *Id.*, ¶42. For example, Dumais teaches that several inputs can affect rankings, including (1) “tags and data items,” (*Id.*, ¶¶24, 41 (“determined activity data”)); (2) “content-based scores” that “give more weight” to terms with which the user has interacted (*Id.*, ¶¶25, 33); and (3) a “user model”

updated using a “global database 490 of user statistics,” which contains information specific to a user relating to “recent and frequent contacts,” an “organizational chart,” and “other users.” *Id.*, ¶¶36 (“Searches can be crafted in a plurality of ways and can include combinations of content searching, activity-based searching, and or combinations thereof”), 40, 46, Figs. 4-5. Further, “activity data 150” (*first measure of relevance*) can be used with “content-based scores” (*second measure of relevance*) to determine an overall ranking. *Id.*, ¶25.

132. As an example, Dumais teaches that a “content-based score” can be assigned to documents based on a user’s query (which can be modified based on the user model). *Id.*, ¶¶25, 41. When ranking documents in response to the user’s search, the results will use tags (derived from monitored user actions) to “give more weight to terms that appear in documents or sections of a document that have been edited or the user has spent lots of time reading.” *Id.*, ¶¶24-25. Thus, this “content-based score” is based on both (a) information from a user’s “user model” and (b) determined or “tagged” activity data based on monitoring users’ interactions with content. *Id.*, ¶¶25, 41.

133. As discussed above, the structure for the “*relevance analysis module*” can be met, essentially, by considering the various factors that have been discussed and identified with respect to the earlier “modules.” *Supra* ¶80. In my opinion, a POSITA would have understood that the personalization component’s processing

components disclose the structure of the “relevance analysis module.” *Cf.*, EX-1001, 26:46-52. “Tags and data items” and “determined activity data,” identified by the monitoring module and first relevance measurement module as discussed in 1[c]-[d] above, reflect the relevance of an item to the user, mirroring the “*individual relevance components*” discussed in the ’217 patent. EX-1005, ¶ 31 (“[A] viewer allows a user to retrieve items based on functions of one or more tags.”). Similarly, Dumais discloses developing local/global and cognate relevance scores for data items, including email, as discussed in 1[e]-[g] above. In my opinion, a POSITA would have understood Dumais’s discussion of “statistical similarity match[ing]” or “category matching” to refer to functions of the various relevance measures discussed for claim 1. *Id.*, ¶42.

## **2. Claim 2.**

**a) The system of claim 1, further comprising:  
a content presentation module 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.**

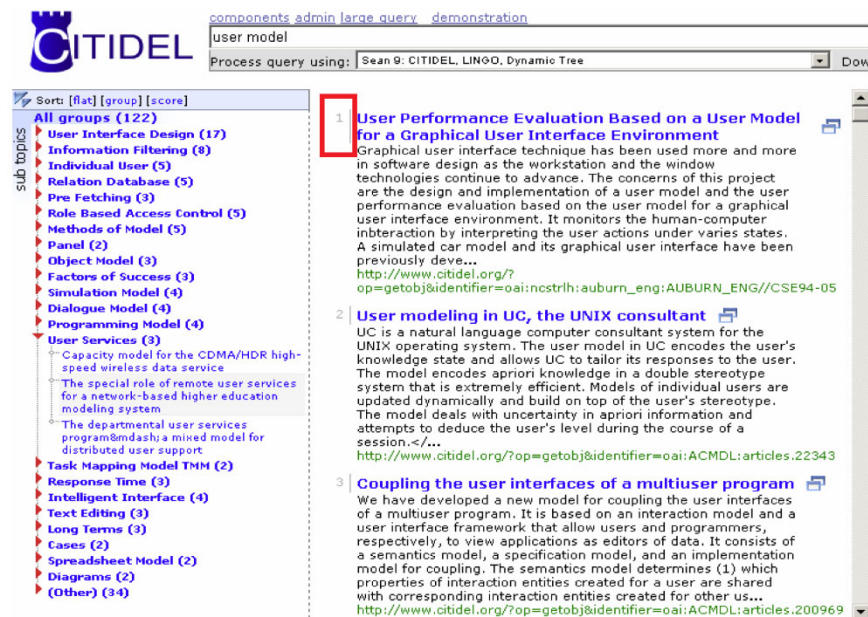
134. In my opinion, Dumais teaches claim 2’s additional limitation under MPF or non-MPF. Dumais teaches that search results can be displayed on a “user interface display” or “user interface” (*content presentation module*) that can display “highlighting,” “graphics,” and annotations on items indicating user activity. *Id.*, ¶¶35-36, 40, 58, Fig. 4. Dumais personalizes search results, which can include

ranking content for display (*present the piece of electronic content to the user in accordance with the determined relevance score*). *Id.*, ¶¶40-43.

135. As discussed above for 1[d], activity data can “identify regions or terms of interest” where content-based scores are used to “[d]ifferentially present (via highlighting or other techniques) items or regions of items of interest.” *Id.*, ¶¶25-30, Fig. 2. For example, Dumais discusses presenting emails that have been highlighted “in one color” to indicate items having “a higher activity score” (*a value describing the determined relevance score*). *Id.*, ¶36. It would have been obvious to display a *determined relevance score* because Dumais discloses displaying a list of documents ranked according to the *determined relevance score*. *See supra*, Section X.A.5 (“content presentation module”).

136. To the extent Dumais does not explicitly disclose presenting a value describing the relevance score to the user, in my opinion, a POSITA would have understood that an obvious “technique” to differentially present content-based scores for items would be to display a score or rank next to the electronic content. EX-1005, ¶¶25-30; *see also* EX-1034 (Heath) at 52-53 (displaying search results ordered by “Icon#” and Query Number (“Q#”); EX-1035 (Nowell) at 67-75 (discussing that “[m]any visualization interfaces for information retrieval systems visualize ranked query-document similarity and clustering” and that “many users are *aware that estimated relevance values exist, and want to see those values*, even

though they may not understand the numbers' significance").<sup>14</sup> As a simple example, I co-authored a paper in 2004, and the image below shows that search results included display of the rank of the content:



EX-1022 at 557 (red annotation added to indicate ranking). Numbering content is one of the simplest ways to organize information. Dumais already calculates a ranking score to “re-rank” content, so displaying the score would be simple and logical. See EX-1005, ¶41. Further, Dumais discloses that search results are “modified (via user model) to generate personalized results” and such modification can include “various types of agglomeration and summarization of all or a subset of results.” It would have been obvious to a POSITA that such “agglomeration” could

<sup>14</sup> I note that I also co-authored EX-1034 (Heath) and EX-1035 (Nowell).

include coloring or ordering a subset of search results in a way that indicates ranking according to relevance. Indeed, search engines commonly provided search results alongside a ranking (*a value describing the determined relevance score*). See EX-1034 (Heath), 52-53; EX-1035 (Nowell), 67-75 (“[M]any users are aware that estimated relevance values exist, and want to see those values, even though they may not understand the numbers’ significance.”).

137. As discussed above, the structure for the “content presentation module” can be met by a mail presentation module that displays content in a web interface, including according to a ranking. *Supra* ¶81. In my opinion, a POSITA would have understood Dumais teaches the structure of the “content presentation module.” Dumais repeatedly teaches that it can be used with e-mail and discusses integrating its data manipulation tools with a user’s “e-mail system.” EX-1005, ¶¶1, 36, 65. Dumais discusses changing how emails are displayed on a “user interface display,” (*Id.*, ¶36), mirroring the ’217 patent’s discussion of a “mail presentation module” generating interfaces for e-mail. EX-1001, 6:55-60, 7:28-34. For example, as I discussed above, Dumais discloses that a “tool 210” can apply highlighting or graphics to a returned file or data set to indicate increased activity (“a higher activity score”) with the user and differentiate one subset of results from another. EX-1005, ¶36. The ’217 patent similarly teaches a “*mail presentation module 260*” that

displays electronic mail to a user according to “*relevance and importance scores determined by the relevance analysis engine 252.*” EX-1001, 6:55-60.

**3. Claim 3.**

**a) The system of claim 1, further comprising:  
a search module configured to search the electronic content  
in accordance with the determined relevance score.**

138. In my opinion, Dumais teaches claim 3’s additional limitation under MPF or non-MPF. Dumais discloses an exemplary system for personalizing search results. EX-1005, ¶40. As discussed in connection with 1[e]-[g], the “personalization component” includes “processing components (e.g., retrieval algorithms modified in accordance with the user model)” for search engines to modify a search query or search results. *Id.*, ¶40. As depicted in Fig. 4 (below), Dumais contemplates searches can be conducted by “search engines 480” (*a search module configured to search the electronic content*). A POSITA would understand that search engines, for efficiency purposes and/or to ensure rapid responses to users, often employ stopping rules and other algorithms that consider, as part of the search process, relevance scores that have already been determined.

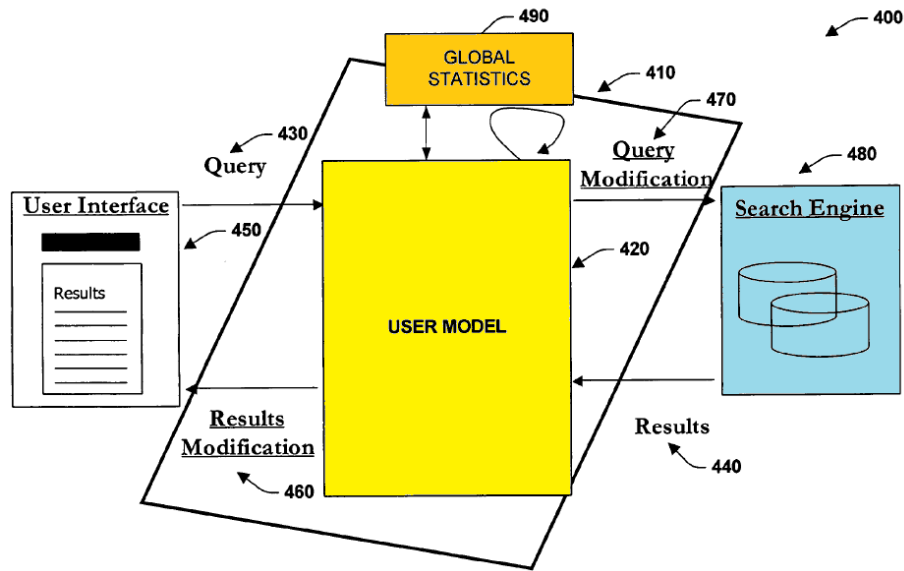


**FIG. 4**

Dumais teaches that search results can be modified, which “usually includes some form of re-ranking and/or selection from a larger set of alternatives” (*search...in accordance with the determined relevance score*). *Id.*, ¶41. I note that use of the term “re-ranking” suggests the search results may iterate on the results, ranking results through multiple ranking steps; Figure 4 arguably shows a similar process, where results can be personalized before additional searching, etc. Dumais further contemplates that the search queries themselves can be modified to further personalize searching. *Id.*, ¶¶40-41.

139. As discussed above, the structure for the “search module” can be met by a searching system that can “rank search results and indicate to the user how likely each piece of content is to be of interest.” *Supra* ¶82. A POSITA would have understood Dumais teaches the structure of the “search module.” Like the ’217

patent, which helps “rank search results and indicate to the user how likely each piece of content is to be of interest,” Dumais re-ranks search results to personalize search results to a user. EX-1001, 8:9-12; EX-1005, ¶41. As was discussed with claim 2, Dumais can indicate which items or areas of interest within an item will be of interest to a user based on their history. EX-1005, ¶¶35-36, 40, 58.

140. Thus, Dumais explicitly teaches claim 3.

#### 4. Claim 5.

a) **The system of claim 1, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.**

141. In my opinion, Dumais teaches claim 5’s additional limitations. Dumais discloses that “[t]he systems and methods described herein support a plurality of data processing applications,” including “processing data items such as *documents*, files, *email messages*, calendar appointments, web pages,” among other data files (*the electronic content comprises at least one of an email, a document, an instant message, and an SMS message*). *Id.*, ¶31. For example, Dumais discloses that the user model can be obtained “[f]rom a rich index of content previously encountered at 520 (e.g., *documents*, web pages, *email*, *Instant Messages*, notes, calendar appointments, and so forth).” *Id.*, ¶¶43-45, Fig. 5. Thus, Dumais teaches that the electronic content can be at least *an email, document, or an instant message*.

**5. Claim 6**

**a) 6[pre] A computer program product for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-program product having a computer-readable storage medium having computer program instructions encoded thereon comprising:**

142. In my opinion, Dumais teaches 6[pre]. As discussed in 1[pre], Dumais discloses “*determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user.*” For the same reasons discussed for 1[a] and 1[b], Dumais further discloses “*a computer-program product having a computer-readable storage medium having computer program instructions encoded thereon.*” *Id.*, ¶¶20, 22 (describing a “system 100...to perform various computer-related tasks”), Fig. 8. In my opinion, a POSITA would understand a “*computer implemented system*” (1[pre]) also teaches a “*computer-program product*” (6[pre])—both rely on a computer, and computers typically have programs.

**b) 6[a] a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;**

143. See 1[c].

**c) 6[b] a first relevance measurement module 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;**

144. *See* 1[d].

**d) 6[c] a second relevance measurement module coupled to the monitoring module and configured to:**

145. *See* 1[e].

**e) 6[d] 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**

146. *See* 1[f].

**f) 6[e] determine a second measure of relevance of the piece of electronic content based at least in part on 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,**

**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; and**

147. *See* 1[g].

**g) 6[f] a relevance analysis module 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.**

148. *See* 1[h].

**6. Claim 7**

**a) 7[pre] A computer-implemented method for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented method comprising:**

149. *See* 1[pre] and 6[pre].<sup>15</sup>

**b) 7[a] tracking actions by a plurality of users associated with an application for managing electronic content;**

150. *See* 1[c].

**c) 7[b] identifying 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,**

151. *See* 1[f].

---

<sup>15</sup> Notably, Claim 7 is a method claim that does not recite “*modules*,” meaning it does not implicate or require any means-plus-function analysis.

**d) 7[c] 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;**

152. *See* 1[d].

**e) 7[d] determining a second measure of relevance of the piece of electronic content based at least in part on 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; and**

153. *See* 1[g].

**f) 7[e] 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.**

154. *See* 1[h].

7. **Claim 8.**

a) **The system of claim 1, wherein identifying at least one other of the plurality of users that is cognate to the user comprises analyzing historical actions of the at least one other of the plurality of users with respect to historical actions of the user.**

155. In my opinion, Dumais teaches claim 8's additional limitations. As discussed above for 1[f], Dumais teaches identifying "*cognate*" users. Dumais teaches that "collaborative filtering techniques" can be used to develop profiles based on "the analysis of similarities among individuals or groups of individuals," where "[s]imilarity computations can be based on the content and/or *usage of items*" (*analyzing historical actions of the at least one other of the plurality of users with respect to historical actions of the user*). EX-1005, ¶52. Dumais further discloses that identifying a cognate user comprises analyzing the historical actions of those other users because "[c]ollaborative filtering is applied with the user model 500 to process *previous user activities* from a group of users that may indicate preferences for a given user that predict likely or possible profiles for new users of a system." *Id.*, ¶55; *see also id.*, Abstract, Fig. 5 (storing "other users" data).

156. Dumais also teaches that the “location history” of users can be tracked when they act on<sup>16</sup> items, confirming the system stores historical actions of users. *Id.*, ¶¶31 (tags represent user’s “location history” when accessing items), 44 (history of interactions), 47 (history of search queries), 50 (“model 500 can be sourced from a history or log of locations”), cl. 3 (referring to “history of times” user has accessed item). Thus, Dumais teaches identifying cognate users by analyzing historical actions of other users with respect to the historical actions of this user.

**8. Claim 9.**

**a) The system of claim 8, wherein the at least one other of the plurality of users is cognate to the user, and the user is not cognate to the at least one other of the plurality of users.**

157. In my opinion, Dumais renders claim 9 obvious. Dumais teaches that user models can be derived for “individuals or groups of individuals” using “collaborative filtering,” which analyzes “similarities among individuals or groups of individuals...based on the content and/or usage of items.” *Id.*, ¶52.

---

<sup>16</sup> While the phrase “act on” is generally understood, it bears mentioning that “on” might be more precisely expressed with words like “related to,” “dealing with,” “addressing,” etc., since the actions may not change the item itself, instead making or recording data associated with the item.

158. As a simple example, Dumais contemplates that email can be analyzed using different time frames of reference (emails in the past month, web accesses in last three days, etc.). *Id.*, ¶ 51 (“[U]sers can vary one or more of these parameters via a user interface, wherein such settings can be a function of the nature of the query, the time of day, day of week, or other contextual or activity-based observations.”). A POSITA would understand that based on *when* other users interact with one another, they may get different results by searching for different time frames of reference. If two users’ interactions took place thirty days ago, they will get different users identified as “similar” if one searches over the past thirty days and another searches only the past three days. It would be expected that users in the first set may not be cognate to one another.

159. A POSITA would have been familiar with collaborative filtering techniques and would have understood that many collaborative filtering systems did not require groups of users to be symmetrical (*wherein the at least one other of the plurality of users is cognate to the user, and the user is not cognate to the at least one other of the plurality of users*). For example, Cöster discusses implementation details and scalability recommendations regarding forming neighborhoods in collaborative filtering, starting with user profiles. The formation is for a given user, and a POSITA would understand that the process is not symmetrical in that while user B might be in the neighborhood for user A, it is not necessary that user A is in

the neighborhood for user B. EX-1033 at 246-47, 250-51; *see also supra* ¶96 (discussing EX-1033 (Cöster) shows that techniques for scalability often result in asymmetric groupings).

160. Further, the '217 patent, in discussing “*cognate*” entities, recognizes that “it may not be inherent that the population of recipients falls into separate and mutually exclusive cognate groups.” EX-1001 at 14:59-15:11. This merely reflects that when evaluating similarities between users, it is fairly common for relationships *not* to be symmetrical, unless you compare every user and every factor of comparison. Consider the hypothetical chart of ratings information below:

|       | Horror | Romantic | Comedy | Tragedy | Action |
|-------|--------|----------|--------|---------|--------|
| UserA | 8      | 2        | 5      | 4       | 8      |
| UserB | 6      | 8        | 5      | 4       | 7      |
| UserC | 3      | 3        | 8      | 5       | 3      |
| UserD | 4      | 9        | 6      | 7       | 5      |

I have used these genres and range of numbers (1-10) for illustration purposes, but a system could develop a user-specific ranking to a genre of content in a number of different ways.

161. A chart comparing every user and every variable would be symmetric. But in practice, many systems would need to compare *numerous* users and factors

for evaluating their interactions with content—thus, there can quickly be hundreds of users evaluated across thousands of factors, which can quickly become very processing-intensive if the system must evaluate every factor for every user against every other user’s responses. This problem can be exacerbated further depending on how often the system re-processes comparisons—re-comparing users once a day will be much less intense than re-comparing users after every interaction, but it would use outdated information until a re-comparison is performed.

162. One example approach that a POSITA would have been familiar with is to evaluate only the “most-important” factors for a particular user. Using the chart above as an example, identifying users that are similar to UserA might save processing time by comparing only those genres that are most-important to UserA, i.e., “Horror” and “Action.” The chart below lists differences in the ratings for UserB, UserC, and UserD when using only those factors:

|                    | UserB | UserC | UserD |
|--------------------|-------|-------|-------|
| UserA (Horror)     | 2     | 5     | 4     |
| UserA (Action)     | 1     | 5     | 3     |
| UserA Correlation: | 1.5   | 5     | 3.5   |

As shown, the third row averages the differences between UserA and the others across the “best” genres for UserA will provide a rough approximation of how close

UserA's ratings are to others, where the smaller a number is, the more correlated those users' interests are. Based on the above, UserB would be the “top” user correlated with UserA, with UserD being the second-closest.

163. By comparison, the most important genres for UserD are “Romantic” and “Tragedy”—performing comparisons along those genres will produce a different “similarity” score for UserA and UserD, as shown below:

|                    | UserA | UserB | UserC |
|--------------------|-------|-------|-------|
| UserD (Romantic)   | 7     | 1     | 6     |
| UserD (Tragedy)    | 3     | 3     | 2     |
| UserD Correlation: | 5     | 2     | 4     |

Comparing users along the categories most relevant to UserD reflects different correlation scores. For example, the prior chart reflects that UserA has a “3.5” correlation score with UserD, but along these metrics, UserA has a “5” correlation score with UserD. Moreover, UserB would be the “top” correlated user for UserD, with UserC being the second-closest—thus, while UserD might be in the “top 2” users for UserA, the same UserA would not necessarily be in the “top 2” users for UserD. This is a simple example meant to illustrate the concept that it is quite common that evaluating comparisons among users would not necessarily be

symmetric—a POSITA would be familiar with how these systems typically evaluate users and the fact they users are rarely grouped symmetrically.

164. Thus, a POSITA would have understood that Dumais’s discussion of collaborative filtering contemplated cognate relationships that were not symmetrical or mutual. *Id.*

**9. Claim 13.**

- a) The computer program product of claim 6, further comprising:  
a content presentation module 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.**

165. *See* claim 2.

**10. Claim 14.**

- a) The computer program product of claim 6, further comprising:  
a search module configured to search the electronic content in accordance with the determined relevance score.**

166. *See* claim 3.

**11. Claim 15.**

- a) The computer program product of claim 6, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.**

167. *See* claim 5.

**12. Claim 18.**

**a) The method of claim 7, further comprising:  
presenting the piece of electronic content to the user in  
accordance with the determined relevance score and  
presenting to the user a value describing the determined  
relevance score.**

168. *See* claim 2.

**13. Claim 19.**

**a) The method of claim 7, further comprising:  
searching the electronic content in accordance with the  
determined relevance score.**

169. *See* claim 3.

**14. Claim 22.**

**a) The method of claim 7, wherein identifying at least  
one other of the plurality of users that is cognate to the user  
comprises analyzing historical actions of the one other of  
the plurality of users with respect to historical actions of the  
user.**

170. *See* claim 8.

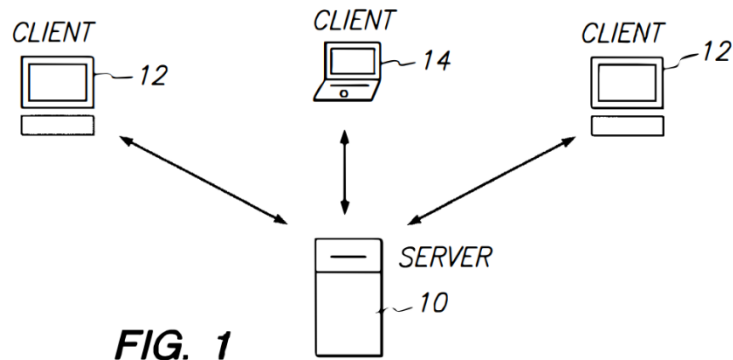
**B. Ground 2: Obviousness Over Rose (EX-1006)**

**1. Claim 1**

**a) 1[pre] A computer-implemented system for  
determining a relevance score of a piece of electronic  
content sent from a sender to a user, the relevance score  
determined with respect to the user, the computer-  
implemented system comprising:**

171. Rose discloses 1[pre]. The system in Rose is implemented using  
“multiple personal computers that are connected via a network.” Rose, 3:17-21, Fig.

1 (below). Therefore, it would have been obvious to a POSITA that the system in Rose is *computer-implemented* akin to the system in the '217 patent.



172. Rose discloses *a piece of electronic content sent from a sender to a user*. The system in Rose depicts a “client-server arrangement,” where a database of information is stored at a server computer and interacts with various client computers. *Id.*, 3:45-62. For example, Rose describes its system implemented as an “electronic mail system” wherein a “message” can be “a memorandum or note that is addressed from one user of an electronic mail system to another” (*a piece of electronic content sent from a sender to a user*). *Id.*, 3:36-42, cl. 12.

173. Rose’s information ranking is by relevance (*determining a relevance score of a piece of electronic content*). *Id.*, 1:6-10. Rose provides that each user has a “profile of interests” that can be used to rank “messages in an electronic mail network... according to their likely degree of relevance” (*relevance score determined with respect to the user*). *Id.*, 2:25-34. Rose’s server evaluates the relevance of messages based on: (1) the user’s “likely interest in a particular piece of

information,” and (2) “a correlation with the indications provided by other users.” *Id.*, 6:51-7:6. For example, Rose discloses “a separately accessible database of movie descriptions . . . [providing] movie recommendations to users,” where user responses “update [a] user’s profile” but are also provided “to rank [a] movie for viewing by other users whose interests in movies are similar or opposed.” *Id.*, 5:53-55, 5:58-60. Therefore, a POSITA would have understood that Rose discloses 1[pre].

**b) 1[a] a computer processor; and**

174. In my opinion, Rose teaches 1[a]. The system in Rose utilizes “multiple personal computers that are connected via a network” (*computer processor*). Rose, 3:14-18, 3:20-21 (“[T]he invention can find utility in any situation which provides for computer access to information.”). *Id.*, 3:20-21. Since Rose teaches connecting said system to a network and other computers, and running the modules described below, it would have been obvious to a POSITA that at least one computer processor was included.

**c) 1[b] a computer-readable storage medium storing computer program modules configured to execute on the computer processor, the computer program modules comprising:**

175. Rose discloses 1[b]. Considering 1[a], in my opinion, a POSITA would understand that Rose’s multi-computer system included storage mediums containing programs that execute on a computer processor (*computer-readable storage*

*medium*). *Id.*, 3:45-57 (discussing that “a database of information is stored at a server computer,” where the server “can be any suitable...computer having sufficient storage capacity to accommodate all of the items of information to be presented to users.”). Further, “[a] profile of interests is stored for each user having access to the [multi-user computer] system.” *Id.*, 2:28-29. These profiles are monitored and updated with different weights based on a “user provid[ing] an indication of degree of interest.” *Id.*, 5:32-33. A POSITA would have found that such information from each user would necessitate storage on a computer-readable storage medium to build the distinct user profiles mentioned in Rose.

176. Rose also discloses that this storage medium would contain the various computer program modules, including a monitoring module, first and second relevance measurement modules, and a relevance analysis module, as discussed in the claims below (*storing computer program modules configured to execute on the computer processor*).

177. Further, Rose describes “a message server [that] carries out communications . . . over a network, and retrieves information from two databases.” *Id.*, 4:13-16; Fig. 2 (below). A POSITA would have understood that to send and retrieve this information (as well as assigning weight to adjust rankings), the *computer program modules* handling the information would have to be *configured to execute on a computer processor*.

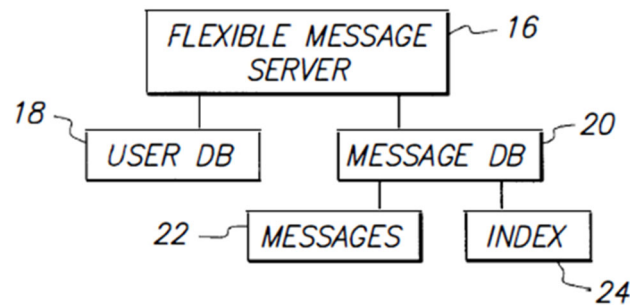


**FIG. 2**

**d) 1[c] a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;**

178. Rose discloses 1[c] under MPF and non-MPF. Rose teaches that client computers in a client-server architecture can use any “suitable communication program that enables the user to access messages stored at the server machine,” including a client-side “electronic mail system” (monitoring module). *Id.*, 3:63-66. The system in Rose stores user inputs, and tracks said inputs to adjust relevance scores in a user’s profile. *Id.*, 7:35-47. For example, in an “electronic mail system,” the interface shows “two icons which permit the user to indicate his or her interest in [a] particular message . . . [and] [w]hen either of the[] two icons is selected, the indication provided [] is forwarded to the server 10, where it is used to update the [user’s] profile.” *Id.*, 5:8-23; Fig. 4.

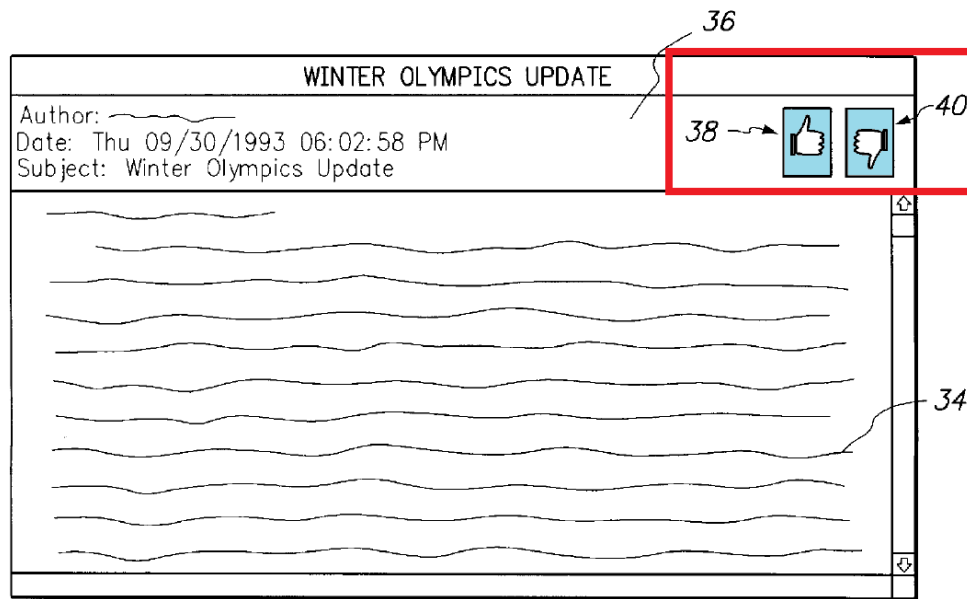


**FIG. 4**

Figure 7 shows another example interface where movie recommendations are ranked according to a “recommendation score.” For example, “each time a user sees a movie, he or she can record his or her reaction to it, e.g., like or dislike. This information is used to update the user’s profile for the movie database, as well as provide information to rank that movie for viewing *by other users* whose interests in movies are similar or opposed.” *Id.*, 5:56-60. EX-1006, 5:50-64, Fig. 7.

| Your Messages from "Movie Recommendation"                    |                         |
|--------------------------------------------------------------|-------------------------|
| Score                                                        | Title                   |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Jagged Edge             |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Sea of Love             |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | D.O.A.                  |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | The Eye of the Needle   |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Dave                    |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Sleepless in Seattle    |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Lost in America         |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Mephisto                |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Melvin and Howard       |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Heat and Dust           |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | One Against the Wind    |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Flashdance              |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Duel                    |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | In the Line of Fire     |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Boxing Helena           |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Indecent Proposal       |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | A River Runs Through It |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Cliffhanger             |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Joe Versus the Volcano  |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Not Without My Daughter |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Fat Man and Little Boy  |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Runaway Train           |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Ordeal by Innocence     |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Cujo                    |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | THX 1138                |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | The River               |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Black Rain              |

**FIG. 7**

These interfaces track a plurality of user actions as they incorporate “not only [] the user’s own interests, but also feedback from the community.” *Id.*, 8:38-40.

179. Rose also discloses that each user has a “user profile” stored in a database on the server, which they can only access by authorizing themselves using a “suitable communication program” at a client computer (*users associated with an application for managing electronic content*). *Id.*, 3:63, 4:5, 4:13-20.

180. As discussed above, the structure for the “monitoring module” can be met using “client-side integration” where a “plug-in” on the client’s computer

(specifically, the email system) “monitor[s] end users actions on the mail content.” *Supra* ¶74. A POSITA would understand that Rose renders obvious the structure of a “*monitoring module*.” For example, Rose contemplates the use of an “electronic mail system” and generally operates on “messages in an electronic mail network,” confirming it uses email. *See, e.g., id.*, 2:25-35, cl. 12. Given that Rose teaches that a user can use any “suitable communication program that enables the user to access messages stored at the server machines,” a POSITA would have considered it obvious to use plug-ins for that client-side electronic mail system (*e.g.*, running in a browser, etc.) to monitor a user’s interactions with mail. *Id.*, 1:13-49, 2:25-33, 2:50-57, 3:63-66, 4:38-44, cl. 12; EX-1001, 16:31-39; *supra* ¶ 75; EX-1030 (McKeogh (2004)) at 93-94 (discussing the “Eclipse” plug-in for tracking “mouse movement, key strokes (including paging), scrollbar movement and document changes that take place during the session”); EX-1031 (Rich) at Abstract, 782, 784-85 (discussing plug-ins for monitoring user’s physical actions and language); EX-1032 (Domingue (2004)) at 191-93 (discussing “Magpie” plug-in for Internet Explorer that uses ontology to “automatically track concepts found during a browsing session”).

**e) 1[d] a first relevance measurement module 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;**

181. Rose discloses 1[d] under MPF or non-MPF. As Rose discusses, users can use their client-side electronic mail systems (*monitoring module*) to leave explicit ratings on electronic content (*based at least in part on one or more actions of the user on the piece of electronic content*). Rose, 2:48-50, 5:15-37. When they do, Rose teaches that ratings from the user's client device are sent to a server (*a first relevance measurement module*) and "used to update the user profile" (containing a *first measure of relevance of the piece of electronic content*), which, in turn, is "used to rank the messages stored within the system." *Id.*, 4:33-35, 5:21-23, 5:43-46 ("[E]ach time a message is retrieved, feedback information regarding the user's degree of interest is obtained, to thereby maintain an up-to-date profile for the user"). Rose details how the server (*first relevance measurement module*) uses a network to both send messages to and receive feedback from (*coupled to*) the client-side electronic mail system (*monitoring module*). *Id.*, 3:51-62, 4:11-20, 5:1-23.

182. When the 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. *Id.*, 6:36-43; *see also id.* For example, in a word document, each word "can be assigned a weight, based on its

statistical importance. ... words which frequently occur in a particular language are given a low weight value, while those which are rarely used have a high weight value. The weight value for each term [being] multiplied by the number of times that term occurs in the document.” *Id.*, 6:12-16. Similarly, Figure 5B shows that “***a score of a document’s relevance***” (another *first measure of relevance*) “can be indicated by the cosine of the angle between the document’s vector and the user’s profile vector.” *Id.*, 6:54-57 (emphasis added).

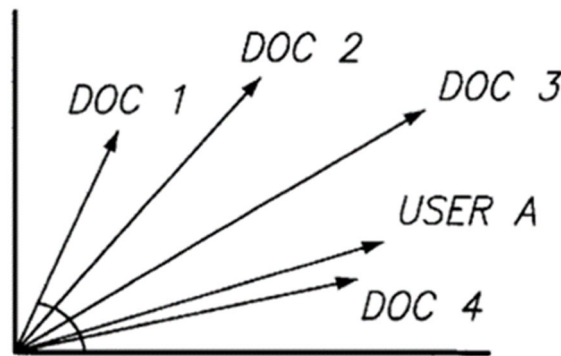


**FIG. 5B**

183. Rose’s server further renders obvious the structure of a “*first relevance measurement module*.” For example, the “score of a document’s relevance,” indicated by the cosine of the angle between a document’s vector and a user’s vector, is based on numerous factors, as in the ’217 patent. EX-1006, 6:54-57. Therefore, “[a] document having a vector which is close to that of the user’s profile will be highly ranked, whereas those which are significantly different will have a lower ranking.” Rose, 6:57-59.

184. As discussed above, the structure for the “first relevance measurement module” involves algorithms used to develop a user’s “Individual Relevance Component” based on a “plurality of factors,” including “dichotomous” (i.e., binary, yes/no) and “cardinal” (i.e., scaled) factors. *Supra* ¶¶76-77. While Rose describes relatively simple examples, it explains that a document’s vector “would likely have hundreds or thousands of dimensions, depending upon the number of terms that are monitored.” *Id.*, 6:26-35. Rose provides examples of “dichotomous” factors (“thumbs up,” “thumbs down,”), but it also teaches that “cardinal” factors can be considered, such as “the number of times” a term appears in a document or allowing users “finer resolution...by providing additional options for the user.” *Id.*, 5:24-28, 6:16-18. Because Rose teaches that its server can determine *a first measure of relevance* based on numerous factors, a POSITA would understand Rose to teach the structure of a “*first relevance measurement module*.”

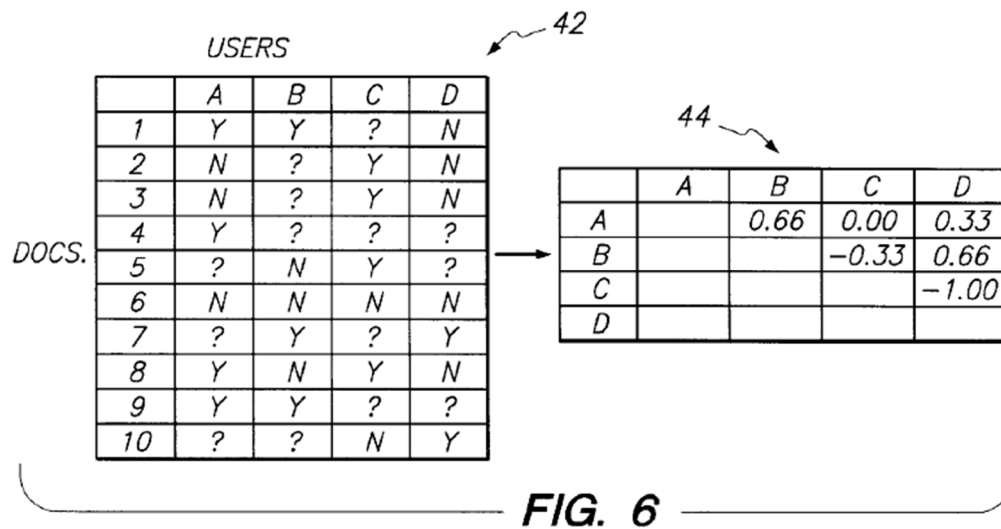
**f) 1[e] a second relevance measurement module coupled to the monitoring module and configured to:**

185. Rose discloses 1[e] under MPF or non-MPF. In addition to considering relevance based on a user’s actions, as discussed in 1[d], Rose’s server teaches the development of a “feedback table 42” that is used to develop a “correlation matrix R” (*second relevance measurement module*) that identifies “[a] second factor in the prediction of a user’s interest in information [that] is based upon a correlation with

indications provided by other users.” Rose, 6:59-7:6. As discussed for 1[c], the server—where the correlation matrix would be stored—can communicate with (*i.e.*, is *coupled to*) client-side electronic mail systems (*monitoring modules*), which track “not only on the user’s own interests, but also feedback from the community.” *Id.*, 8:38-40. Therefore, this is differentiated as *a second measurement module* since the first measurement module is only a matter of the user-in-question’s perspective. Each time a user retrieves a document and provides an indication of interest, that result can be stored and used in the correlation matrix. *Id.*, 6:59-7:6. A POSITA would understand Rose’s correlation matrix provides the structures for the “*second relevance measurement module*,” as discussed in 1[f]-[g] below.

**g) 1[f] 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**

186. Rose discloses 1[f]. According to Figure 6 (below), each time a user retrieves a document and provides an indication of interest, the result can be stored in a table, *i.e.*, in Rose’s feedback table 42.



From this table, the server generates a “correlation matrix,” “whose entries indicate the *degree of correlation* between the various users’ interests in *commonly retrieved messages*.” *Id.*, 6:64-66. Table 44 demonstrates that the inputs in 42 are coalesced and generate a value which represents the degree of correlation. Given Rose contemplates being used in the context of email, a POSITA would understand that users of “commonly retrieved messages” includes users that are recipients of the same email message (*the plurality of users that is a recipient of the piece of electronic content*).

187. Rose relies on this correlation to identify “users whose interests in movies are similar or opposed” or “users having similar feedback responses” (*identify at least one other of the plurality of users...that is cognate to the user*). Rose, 5:57-60; 7:39-51. More precisely, Rose teaches that element “ $R_{ij}$ ” within the correlation matrix “contains a measure of correlation between the  $i$ -th user and the

j-th user.” *Id.*, 6:61-7:1, Fig. 6. Further, Rose employs “regression methods...to *identify* the most important attributes that are used as predictors, e.g., salient terms in a document and *users having similar feedback responses.*” Rose, 7:39-51. Notably, the ’217 patent, like Rose, also uses a correlation matrix to identify *cognate* users:

| <u>Correlations</u> |          |          |          |          |          |
|---------------------|----------|----------|----------|----------|----------|
|                     | User A   | User B   | User C   | User D   | User E   |
| User A              | 1        | 0.042675 | -0.35891 | 0.754378 | -0.28248 |
| User B              | 0.042675 | 1        | 0.301382 | 0.154122 | 0.122467 |
| User C              | -0.35891 | 0.301382 | 1        | -0.0957  | -0.31789 |
| User D              | 0.754378 | 0.154122 | -0.0957  | 1        | -0.43545 |
| User E              | -0.28248 | 0.122467 | -0.31789 | -0.43545 | 1        |

EX-1001, 46:7-15; *see also id.* at 14:45-47, 35:36-38 (“[A] cognate group of *n* users is identified, whose IICs *correlate most closely* with that user.”); 46:35-44 (“Another way to determine cognate users relates to *correlating* importance values.”).

188. To 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. Rose, 6:26-30 (explaining that electronic content “would likely have hundreds or thousands of dimensions, depending upon the number of terms that are monitored”). To track and tailor each user profile across a large

number of responses without grouping users into more-manageable sub-groups would present scalability issues. *See supra* ¶¶159-163; *see also* Rose, 2:25-3:24, 3:36-44, cl. 12; EX-1022 (Kim) (noting importance of scalability in context of collaborative filtering); EX-1033 (Cöster) at 247 (noting need for scalability), 249 (discussing “stop conditions” for when to stop processing users or factors for consideration). A POSITA would be familiar with simple techniques that identify the top factors or users that are relevant to a particular user, which improves the predictive value from their collective input. Further, based on the user inputs in the system, a POSITA should recognize that those datapoints would naturally organize users in relative proximity to others in response, based on the description of vectors above.

189. As discussed above, the structure for the “cognate” function of the “second relevance measurement module” can be met using “role or group based; collaborative filtering; fingerprinting; cluster models; search-based methods; frequency analysis; and ***importance value correlation***” to evaluate “similar past user actions and assessments, and/or a direct input by a user.” *Supra* ¶78. Rose’s correlation matrix renders obvious the structure of this limitation for 1[f]. Rose discusses updating profiles of “users whose interests in movies are similar or opposed” and identifying “users having similar feedback responses,” which are identified by values stored in the correlation matrix. A POSITA would understand

Rose thus mirrors the '217 patent's identification of cognate users using "importance value correlation" to evaluate "similar past user actions and assessments, and/or a direct input by a user." Rose, 5:57-60; 7:39-51; *cf.* EX-1001, 26:11-17, 43:30-37, 46:7-15 (discussing using correlations to identify "cognate" users).

190. Nevertheless, to the extent that Rose's description is limiting, it would have been obvious to combine the invention disclosed in Rose with the invention by Bieganski detailed below in Ground 3.

**h) 1[g] 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:**

**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; and**

191. Rose discloses 1[g]. Because this claim discusses a Markush Group, Rose need only disclose one of the four kinds of second measures of relevance.

192. As discussed in 1[f], Rose's correlation matrix stores a "degree of correlation" (*second measure of relevance*) based on "indications" (*one or more actions on the piece of electronic content*) provided by other users on "commonly retrieved messages" (*at least one other of the plurality of users that is a recipient of the piece of electronic content*). Rose, 6:59-66; *see also* Fig. 6. The other users generally provide feedback on the content in the same way discussed in 1[c] and 1[d], where their feedback on the content is stored in a table within the server of Rose, which, in turn, informs the values in the correlation matrix (*see* 1[f]). Rose uses the correlation matrix to identify "users whose interests in movies are similar or opposed" and "users having similar feedback responses" (*cognate to the user*).*Id.*, 5:57-60; 7:39-51.

193. A POSITA would understand that Rose's correlation matrix renders obvious the structure of the second relevance measurement module for 1[g]; *see also supra* ¶79 (identifying structure for actions by cognate users can be met by algorithms implementing a weighted average of relevance scores for cognate users). The user "indications" used to calculate degrees of correlation are monitored and tracked for all users in the same way as discussed in 1[c]. *See, e.g.*, Rose, 2:46-50 ("The user correlation data is obtained through feedback information provided by users when they retrieve items of information."); 5:8-23, 5:56-60 (user ratings inform "other users whose interests in movies are similar or opposed."). Moreover,

Rose, like the '217 patent, contemplates calculating a weighted average of user indications from correlated users. *Id.*, 7:35-50; EX-1001, 26:11-17.

**i) 1[h] a relevance analysis module 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.**

194. Rose discloses 1[h] under MPF or non-MPF. As discussed in 1[pre], Rose involves messages (e.g., emails) (*piece of electronic content*) that are sent between users (*sent from the sender to the user*). As discussed above in 1[d], Rose's server stores users' "user profiles," which contains the *first measure of relevance*—when a user "indicates interest in a document, all of the significant terms in that document can be given increased weight in the user's profile." *Id.*, 6:36-43. These user profiles are compared to document profiles to determine a "score of a document's relevance" (another *first measure of relevance*) *id.*, 6:54-57. Similarly, as discussed in 1[f]-1[g], Rose's correlation matrix calculates a *second measure of relevance*, namely a "degree of correlation," that is based on the actions of correlated users who have received the same messages. *Id.*, 6:64-66.

195. Rose teaches that "a combination of attribute-based and correlation-based prediction is employed to rank the relevance of each item of information. 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” (*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*). *Id.*, 7:35-40. Similarly, Rose contemplates the use of “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.” *Id.*, 7:44-47. Rose further teaches that “Evolutionary programming techniques” can be used to analyze “data regarding content of messages and user correlations” to combine/evaluate “various types of data” until it identifies “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.*, 7:51-62.

196. A POSITA would understand that Rose’s server renders obvious the structure of the “relevance analysis module.” The user “indications” used to calculate degrees of correlation are monitored and tracked for all users in the same way as discussed in 1[c] and 1[f]. Rose, like the ’217 patent, discloses calculating a final relevance score based on a relevance score for that user and cognate relevance scores. *Id.*, 7:35-40, 7:44-47.

**2. Claim 2.**

**a) The system of claim 1, further comprising:  
a content presentation module 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.**

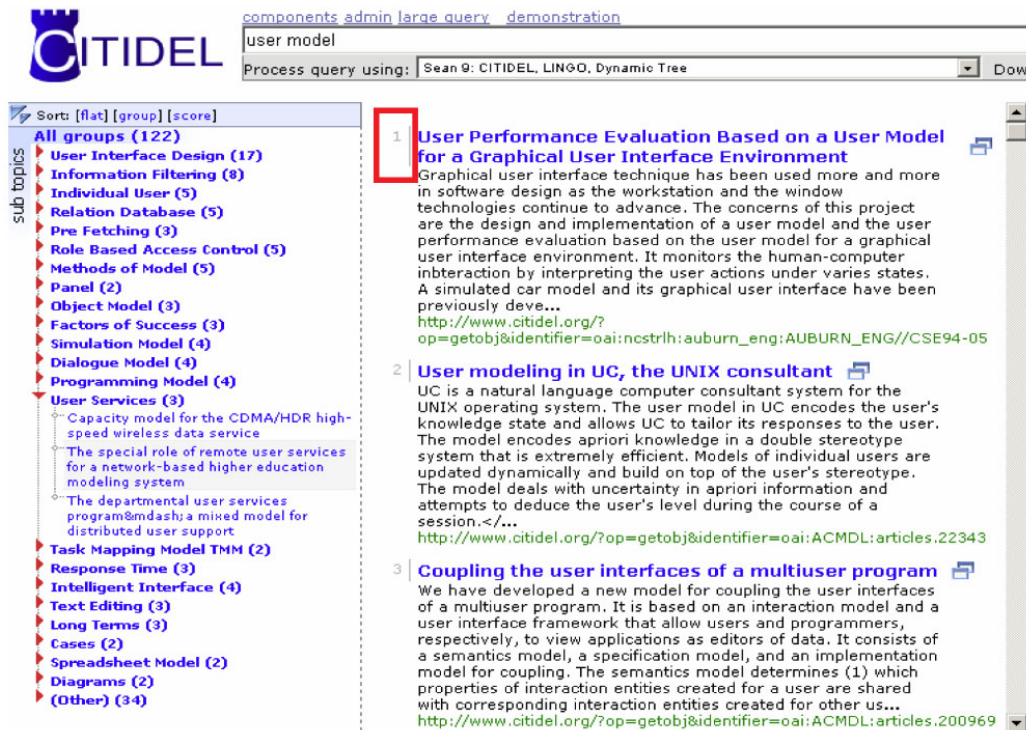
197. Rose discloses Claim 2’s additional limitations, under MPF or non-MPF. Rose teaches an example of an “interface” (*content presentation module*) that presents ranked messages to a user (*present the piece of electronic content to the user in accordance with the determined relevance score*). *Id.*, Fig. 3. Rose’s interface “comprises a window 26 containing a number of columns of information. The lefthand column 28 indicat[ing] the relative ranking score of each message” (*present to the user a value describing the determined relevance score*). Rose, 4:51-53, Fig. 3 (annotated below), Fig. 7, Claim 8.

| Your Messages |              |        |
|---------------|--------------|--------|
| Score         | Date         | Author |
| 30            | Fri 06/25... | ~~~~~  |
|               | Thu 09/30... | ~~~~~  |
|               | Thu 08/05... | ~~~~~  |
|               | Thu 06/24... | ~~~~~  |
|               | Thu 07/22... | ~~~~~  |

**FIG. 3**

198. To the extent Rose does not describe a literal number representing the value of the relevance score, in my view, it would have been obvious to use a literal

number instead of representing the “relative ranking score” pictorially. *See supra* ¶¶ 135-137 (explaining that a POSITA would know it would be possible to display a literal value); EX-1034 (Heath), 52-53 (displaying search results ordered by “Icon#” and Query Number (“Q#”); EX-1035 (Nowell), 67-75 (discussing that “[m]any visualization interfaces for information retrieval systems visualize ranked query-document similarity and clustering” and “many users are aware that estimated relevance values exist, and want to see those values”). As a simple example, I co-authored a paper in 2004, and the image below shows that the search results included the rank of the content:



EX-1022 at 537 (red annotation added to indicate ranking); EX-1034 (Heath) at 52-53 (discussing ranking through both numerical values (“Est. Rel.”) and icons); and

EX-1035 (Nowell) at 70-72 (showing “ranks or identifiers” of documents).  
Numbering content is one of the simplest ways to organize information.

199. Not only was the display of a numbered rank of sorted items common at the time of the '217 patent, but also, Rose already discusses calculating a “final ranking score,” (Rose, 7:35-40), such that it would be obvious to a POSITA to *use* that score by displaying it to the user. As an example, this final score can be calculated from “a weighted sum of scores that are obtained from each of the content and correlation predictors.” *Id.*, 7:38-40. Using a formula where “each parenthetical product pertains to [a user] . . . the first value represents the degree of correlation between the other user and the current user in question . . . The second value indicates whether the other user voted favorably (+1) or negatively (-1) after reading the document. ... The values of +1 and -1 are merely exemplary. Any suitable range of values can be employed to indicate various users’ interests in retrieved items of information.” 7:25-34.

200. Based on this description, a POSITA would understand that Rose’s interface renders obvious the structure of the *content presentation module* for claim 2. As discussed above, the structure for the “content presentation module” can be met by a mail presentation module that displays content in a web interface, including according to a ranking. *Supra* ¶81. Rose contemplates being used with “electronic mail systems” (*see* 1[pre]), mirroring the '217 patent’s discussion of a “mail

presentation module.” Just as the ’217 patent discusses various web page interfaces, so, too, does Rose. Rose, Figs. 3, 4, 7.

**3. Claim 3.**

**a) The system of claim 1, further comprising:  
a search module configured to search the electronic content  
in accordance with the determined relevance score.**

201. Rose discloses Claim 3’s additional limitations, under MPF or non-MPF. Rose states that “[t]he present invention can be employed in various kinds of information access systems, such as electronic mail, bulletin board, *text search* and others.” Rose, 3:26-28, cl. 26. Rose teaches that “[t]he relevance predicting technique of the present invention... can be employed to filter messages provided to a user in an electronic mail system and search results obtained through an on-line text retrieval service” (*search module configured to search the electronic content in accordance with the determined relevance score*). *Id.*, 2:51-55.

202. As discussed above, the structure for the “search module” can be met by a searching system that can “rank search results and indicate to the user how likely each piece of content is to be of interest.” *Supra* ¶82. A POSITA would have understood that these “search” functions in Rose render obvious the structure of claim 3’s “*search module*.” For example, Rose teaches that documents can be “displayed in order of rank.” Rose, 2:33-34, Fig. 3.

| Score | Date         | Author | Title                  |
|-------|--------------|--------|------------------------|
| [X]   | Fri 06/25... |        |                        |
| [X]   | Thu 09/30... |        | Winter Olympics Update |
| [X]   | Thu 08/05... |        |                        |
| [X]   | Thu 06/24... |        |                        |
| [X]   | Thu 07/22... |        |                        |
| [X]   | Thu 10/07... |        |                        |
| [X]   | Tue 08/03... |        |                        |
| [X]   | Wen 06/23... |        |                        |
| [X]   | Thu 09/30... |        |                        |
| [X]   | Mon 07/19... |        |                        |
| [X]   | Tue 07/27... |        |                        |
| [X]   | Fri 09/24... |        |                        |
| [X]   | Thu 07/08... |        |                        |
| [X]   | Fri 06/19... |        |                        |

**FIG. 3**

Further, a POSITA would have been motivated to use Rose’s “relevance predicting technique of the present invention” in the context of search results, (*id.*, 2:51-55), such that search results are displayed according to their order of rank. For example, a user who is interested in a particular hobby may search for events related to said hobby. In one example, Rose states that “event times can be used in the ranking equation, where older items might get lower scores.” Rose, 8:13-15. In another example, “[a] user who has written about a particular topic is more likely to have other messages relating to that same topic presented to him or her.” *Id.*, 8:27-29.

203. Therefore, a POSITA would have recognized that Rose discloses *a search module configured to search the electronic content in accordance with the determined relevance score.*

**4. Claim 5.**

**a) The system of claim 1, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.**

204. Rose discloses the additional limitations of claim 5. For example, Rose discusses that electronic content includes “messages in an electronic mail network or documents within a particular bulletin board category” (*wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message*). *Id.*, 2:28-34, 3:38-43 (discussing that “message” is used generically to “refer to each item of information that is provided by and accessible to users”); 3:26-33; Claims 12 & 24.

205. From this description, a POSITA would have understood these items as equivalent to the electronic content types described in claim 5.

**5. Claim 6**

**a) 6[pre] A computer program product for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-program product having a computer-readable storage medium having computer program instructions encoded thereon comprising:**

206. Rose discloses 1[pre]. As with 1[pre], the system described in Rose renders obvious 6[pre]. Rose gives an example of an algorithm to produce a prediction score:

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

*Id.*, 7:15.

The resulting “prediction score for [a] User C regarding Document 1 [in Figure 6] is as follows: (0.00\*1)+(0.33\*1)+(-1.00\*-1)=0.67. In this formula, each parenthetical product pertains to one of the other users, i.e., A, B, and D, respectively. Within each product, the first value represents the degree of correlation *between the other user and the current user in question*, as indicated by the matrix **44**. The second value indicates whether the other user voted favorably (+1) or negatively (-1) after reading the document, as indicated in the table **42**” (*a computer program product for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user*) *Id.*, 7:20-31.

207. As discussed for 1[a] and 1[b], Rose teaches that “multiple personal computers that are connected via a network” (*computer program product*) and contemplates the use of a server and client computers with storage (*having a computer-readable storage medium having computer program instructions encoded thereon*). *Id.*, 3:14-18, 3:20-21, 3:45-57 (discussing that “a database of information is stored at a server computer,” where the server “can be any suitable...computer

having sufficient storage capacity to accommodate all of the items of information to be presented to users.”).

208. A POSITA would understand a “*computer implemented system*” (1[pre]) also teaches a “*computer-program product*” (6[pre])—both involve a computer, which typically involves a program.

**b) 6[a] a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;**

209. *See* 1[c].

**c) 6[b] a first relevance measurement module 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;**

210. *See* 1[d].

**d) 6[c] a second relevance measurement module coupled to the monitoring module and configured to:**

211. *See* 1[e].

**e) 6[d] 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**

212. *See* 1[f].

**f) 6[e] determine a second measure of relevance of the piece of electronic content based at least in part on 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,**

**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; and**

213. *See* 1[g].

**g) 6[f] a relevance analysis module 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.**

214. *See* 1[h].

**6. Claim 7**

**a) 7[pre] A computer-implemented method for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented method comprising:**

215. *See* 1[pre].

**b) 7[a] tracking actions by a plurality of users associated with an application for managing electronic content;**

216. *See* 1[c].

**c) 7[b] identifying 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,**

217. *See* 1[f].

**d) 7[c] 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;**

218. *See* 1[d].

**e) 7[d] determining a second measure of relevance of the piece of electronic content based at least in part on 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; and**

219. *See* 1[g].

**f) 7[e] 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.**

220. *See* 1[h].

**7. Claim 8.**

**a) The system of claim 1, wherein identifying at least one other of the plurality of users that is cognate to the user comprises analyzing historical actions of the at least one other of the plurality of users with respect to historical actions of the user.**

221. Claim 8 depends from claim 1 (*see* 1[pre]). As discussed above, Rose develops “user profiles” based on “feedback” or “indications” provided by users on electronic content (*analyzing historical actions of the at least one other of the plurality of users with respect to historical actions of the user*), which can be used to identify correlated users via Rose’s correlation matrix (*identifying at least one other of the plurality of users that is cognate to the user* comprises). *See* Rose, Cl. 1[c]-[d]; 2:28-34; 5:21-23, 5:43-46, 5:55-61, Claim 3. Therefore, from my understanding, when Rose identifies cognate users, it does so based on their “indication of interest” or “feedback,” which are historical actions. *See also id.*, Cl. 1[f].

**8. Claim 9.**

**a) The system of claim 8, wherein the at least one other of the plurality of users is cognate to the user, and the user is not cognate to the at least one other of the plurality of users.**

222. Rose discloses the additional limitations of Claim 9. As discussed above for 1[f], the invention in Rose can generate a correlation matrix displaying the “degree of correlation” between users based on prior indications of interest. *Id.*, 6:61-66. In the ’217 patent, non-mutuality is described by showing that “in a certain case, [a] user A may be in [a] user B’s cognate group because user A is part of a group of n users most similar to B, but at the same time user B may not be in A’s cognate group because there are n other users more similar to user A than is user B.” EX-1001, 15:3-8.

223. Although Rose, when discussing Figure 6, gives an “example” of the correlation matrix that is “symmetric,” (Rose, 7:1-6), in my opinion, a POSITA would understand that a correlation matrix need not be symmetric (*wherein the at least one other of the plurality of users is cognate to the user, and the user is not cognate to the at least one other of the plurality of users*). Indeed, Rose discusses that although it illustrates its concepts simply, “[i]n practice, of course, the vectors for information content would likely have hundreds or thousands of dimensions.” *Id.*, 6:26-30. In my opinion, a POSITA would understand that when computing a correlation matrix using thousands of dimensions for each user/document, shortcuts

or post-processing often lead to a non-symmetric matrix. *See, e.g.*, EX-1033 (Cöster) at 247, 249 (discussing “stop conditions” for when to stop processing users or factors for consideration); *supra* ¶¶95-96 (discussing Cöster). For example, for a given user A, the top N similar users might be all that have a non-zero value, and might include user B. On the other hand, the top N similar users to user B might not include user A. For similar reasons discussed above in Ground 1 with Dumais, a POSITA would be familiar with issues of scale, like that described in Rose, that would generally require users to have asymmetric *cognate* relationships because the system would prioritize users or factors to evaluate. *Supra*, ¶¶157-164. Therefore, a POSITA would consider Rose’s “example” to be just one way to organize the correlation matrix for descriptive purposes and would have found it obvious to use a non-symmetric correlation matrix.

224. The ’217 patent also describes asymmetry by showing that “in a certain case, [a] user A may be in [a] user B’s cognate group because user A is part of a group of n users most similar to B, but at the same time user B may not be in A’s cognate group because there are n other users more similar to user A than is user B.” EX-1001, 15:3-8. A POSITA would have recognized that this is simply a logical outcome of how a computer system processes factors/users, as discussed above. Thus, like the ’217 patent, Rose teaches it is possible that said user may be cognate to some but not all of the other users. *Id.*

**9. Claim 13.**

- a) **The computer program product of claim 6, further comprising:  
a content presentation module 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.**

225. *See claim 2.*

**10. Claim 14.**

- a) **The computer program product of claim 6, further comprising:  
a search module configured to search the electronic content in accordance with the determined relevance score.**

226. *See claim 3.*

**11. Claim 15.**

- a) **The computer program product of claim 6, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.**

227. *See claim 5.*

**12. Claim 18.**

- a) **The method of claim 7, further comprising:  
presenting the piece of electronic content to the user in accordance with the determined relevance score and  
presenting to the user a value describing the determined relevance score.**

228. *See claim 2.*

**13. Claim 19.**

**a) The method of claim 7, further comprising:  
searching the electronic content in accordance with the  
determined relevance score.**

229. *See* claim 3.

**14. Claim 22.**

**a) The method of claim 7, wherein identifying at least  
one other of the plurality of users that is cognate to the user  
comprises analyzing historical actions of the one other of  
the plurality of users with respect to historical actions of the  
user.**

230. *See* 1[c].

**C. Ground 3: Obviousness Over Rose In Combination with Bieganski  
(EX-1007)**

231. Rose is summarized under Ground 2. Bieganski is also briefly summarized in the paragraphs above. *Supra* ¶¶87-90. To the extent Rose, alone, does not render the teachings of the '217 patent obvious, in my opinion, the teachings of Rose in combination with Bieganski do.

**1. Motivation to Combine**

232. To the extent Rose does not teach identifying “*cognate*” users, in my opinion, a POSITA would have been motivated to combine Rose with the teachings of Bieganski that explain how to organize users into “sets” (*i.e.*, “neighborhoods”) based on their shared interests. As discussed below, it is my opinion that a POSITA

would understand Bieganski to teach how to identify “*cognate*” users whose actions inform a second measure of relevance of a piece of electronic content.

233. Both Rose and Bieganski are contemporaneous prior art, with Rose filed on April 25, 1994 and issuing on March 13, 2001, and Bieganski filed on July 17, 1998 and issuing December 25, 2001. Rose, Cover Page; Bieganski, Cover Page. Both Rose and Bieganski arise in the same technology space and are directed to similar teachings related to ranking the relevance of information on a computer. Rose, 1:6-10 (“The present invention is directed to information access in multiuser computer systems...for ranking the relevance of information.”), Title Page (citing EX-1017 (Goldberg)); Bieganski, 1:35-44 (“The present invention relates generally to...collaborative filtering and recommender systems.”). Both Rose and Bieganski contemplate being used with search engines. Rose, 1:36-40, 2:51-57 (“The relevance predicting technique of the present invention . . . can be employed to filter messages provided to a user in an electronic mail system.”), 3:26-28, cl. 26; Bieganski, 16:29-46, 17:59-18:6 (“[A] standard search engine may be coupled with the invention.”). Both discuss examples of how to use weights to combine different values to estimate a score. *See, e.g.*, Rose, 7:37-47; Bieganski, 4:2-8.

234. Both Rose and Bieganski contemplate basing recommendations, in part, on users’ actions. Rose, 2:48-50 (“Preferably, the user provides an indication of interest in each document which he or she retrieves.”), 6:51-7:6; Bieganski, 2:31-

42 (discussing user “preference data” based on “preference values that a user has supplied directly” or “inferred by observing actions that the user has taken”); Indeed, both Rose and Bieganski provide examples of users providing ratings on movies (although a POSITA would understand their teachings are likewise applicable to other types of content, like email messages). Rose, 5:53-64 (“each time a user sees a movie, he or she can record his or her reaction to it”); Bieganski, 1:38-44 (“For example, a recommender system may predict that a user will like the movie ‘Titanic’ because he previously indicated a liking for such other epic movies”). Further, both Rose and Bieganski discuss storing “user profiles” based upon a user’s actions on documents that are received. Rose, 5:21-23 (“the indication provided . . . is used to update the user profile”); 6:36-46; Bieganski, 6:1-6 (“The engine builds and maintains an interest profile for each user that occurs in the user preference data.”); *see also supra* ¶¶50-52. Rose also contemplates that it can be used in combination with “[o]ther approaches which take into account both the attribute-based information and user correlation information.” Rose, 7:35-8:19; *see also* Bieganski at 6:1-54 (explaining that Bieganski’s teachings can be used with “many different methods” for forming affinity groups).

235. Both Rose and Bieganski seek to take advantage of the “community” of users to inform the relevance of electronic content. Rose, 8:23-40 (“the relevance score of a particular message takes into account not only the user’s own interests, but

also feedback from the community.”); Bieganski, 1:57-60 (“By pooling together the preferences evinced by a community of users, collaborative filtering allows that user community to share the preferences anonymously in a large scale manner.”); *see also supra* ¶¶54-55. For example, both Rose and Bieganski teach methods that consider, in addition to a user’s actions on content, feedback from “similar” users who have interacted with that same content. Rose, 5:58-60 (rankings consider “other users whose interests in movies are similar”), 6:6-11 (“data relating to correlations of indications provided by users who have retrieved the message”); Bieganski, 1:60-63 (“other people are chosen based on how similar their interests and expectations are to the user’s.”), 6:27-36 (“Similarity” measured by “the items that are shared by the two profiles.”). As I discussed above, Collaborative Filtering was well known by the time of the ’217 patent, and a POSITA would have found it obvious to apply when seeking to improve recommendations. *Supra* ¶¶ 56-59.

236. Rose considers the actions of other users by first considering how “correlated” other users are with the user for whom the system is recommending content and then weighting inputs from those users accordingly. Rose, 6:59-7:50. As taught in Rose, the more correlated a user, the greater the weight their opinions will have (and vice-versa if the user is not strongly correlated). *Id.*, 7:26-34. In my opinion, a POSITA would have been motivated to improve upon Rose’s “correlation” of users by sorting them into neighborhoods, as discussed in Bieganski,

which addresses real-time challenges too. Bieganski, 5:26-29. While Rose weights users based on how correlated they are—minimizing the value of inputs from non-correlated users and increasing the value of inputs from correlated users—this still could be problematic in that the system relies on input from other users who are not well suited to a particular user. Even though Rose weights opinions of low-correlated users to be less relevant, a large number of non-correlated users providing input could still skew recommendations for a user. For example, Bieganski explains that:

It is important to limit membership in the neighborhood to those neighbors who can contribute positively to a personalized recommendation for the customer. Since user preference data can often contain information for large numbers of users, it is also important to limit the number of users that are selected as neighbors.

Bieganski, 7:11-16. In this way, Bieganski explicitly explains why a POSITA, in my opinion, would be motivated to group users into “neighborhoods” to improve recommendations. Bieganski accomplishes these goals by building a neighborhood using a “minimum neighbor similarity” and “maximum neighborhood size,” “ensur[ing] that all members of a neighbor have a minimum number of items in common” and that “only the best neighbors” are considered. Bieganski, 7:8-27. These are common ways to narrow a group of similar users in the context of collaborative filtering—requiring all users in a grouping to have some baseline

similarity ensures the value of comparisons from those users will be improved, while limiting groups to a maximum size ensures those that are included will be the most relevant users, further improving the value of results based on their inputs. Thus, in my opinion, a POSITA would have been motivated to look to the teachings of Bieganski to address this issue.

237. Combining Rose and Bieganski in this way would be a simple change—recommendations would largely be performed as contemplated within Rose, with the additional step of identifying “neighborhoods” of users to improve the value of recommendations. Rose already considers actions of the user and actions of correlated users in evaluating the relevance of content, (Rose, 6:51-7:6); similarly, Bieganski’s “recommendation engine” considers both actions of the user and actions of neighbors of that user when recommending content, (Bieganski, 6:1-36). In my opinion, the similarity of these features demonstrates that a POSITA would be able to easily combine their teachings. *See also supra* ¶¶54-55. The calculations Rose uses to correlate users could be used to inform the “minimum neighbor similarity” and “maximum neighborhood size” factors Bieganski discusses when explaining how to organize users into neighborhoods—a correlation score could be used to ensure users have a sufficient “minimum neighbor similarity,” and the system could use this same correlation score to identify the top  $X$  users that should be included in the neighborhood. Thus, in my opinion, a POSITA would have been motivated to

use the teachings from Bieganski to identify “neighborhoods” of users, thereby improving the accuracy of recommendations.

**2. Claim 1**

**a) 1[pre] A computer-implemented system for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented system comprising:**

238. As discussed under Ground 2, Rose teaches 1[pre]. *Supra*, Section X.B.1.a.

**b) 1[a] a computer processor; and**

239. As discussed under Ground 2, Rose teaches 1[a]. *Supra*, Section X.B.1.b.

**c) 1[b] a computer-readable storage medium storing computer program modules configured to execute on the computer processor, the computer program modules comprising:**

240. As discussed under Ground 2, Rose teaches 1[b]. *Supra*, Section X.B.1.c.

**d) 1[c] a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;**

241. As discussed under Ground 2, Rose teaches 1[c]. *Supra*, Section X.B.1.d.

**e) 1[d] a first relevance measurement module 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;**

242. As discussed under Ground 2, Rose teaches 1[d]. *Supra*, Section X.B.1.e.

**f) 1[e] a second relevance measurement module coupled to the monitoring module and configured to:**

243. As discussed under Ground 2, Rose teaches 1[e]. Moreover, in my opinion, a POSITA would have known to take the second relevance module taught in Rose and incorporate teachings from Bieganski, as discussed in limitations 1[f]-1[g], below.

**g) 1[f] 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**

244. In my opinion, as discussed under Ground 2, Rose teaches 1[f]. For example, Rose teaches that when a user provides an “indication of interest” in a piece of electronic content, that information can be used to inform the relevance of that document for “other users whose interests... are similar.” Rose, 2:46-50 (“Preferably, the user provides an indication of interest in each document which he or she retrieves.”), 5:58-61, 6:6-11 (ranking messages based on “indications provided by users who have retrieved the message”), 6:59-7:50, cl. 1 (“determining a measure of correlation between the particular user’s interests and those of other users who have

accessed said item of information”). Thus, Rose already considers input from other “*cognate*” users who have received the same electronic content.

245. To the extent Rose alone does not meet 1[f], in my opinion, 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*). As discussed above in the sections introducing Ground 3, it is my opinion that a POSITA would have been motivated to incorporate Bieganski’s teachings about neighborhoods into the teachings of Rose, including because Bieganski teaches relevance can be improved by selecting better users as part of your “community” feedback. *Supra* ¶¶225-30; *see also* EX-1001, 14:59-15:11 (“*cognate*” individuals can be identified by “historical actions,” “users regarded as most similar,” “by similar past user actions and assessments, and/or a direct input by a user”); Rose, 8:37-40 (discussing feedback from the community.); Bieganski, 6:31-36, 7:11-16 (benefits of grouping users).

246. Bieganski teaches that “automated collaborative filtering” can be used to evaluate the relevance of content by looking to feedback from “matching users who have shared interests” that have been sorted into “affinity groups” or “neighborhoods.” *Id.*, 6:27-36. A “neighborhood” can be formed by identifying “the set of people...who have the profiles most similar to the profile of a user,” where

“similarity” can be “measured by *counting the items that are shared by the two profiles*” (*plurality of users that is a recipient of the piece of electronic content*). *Id.*, 6:30-36. “Items that are shared by the two profiles” refers to users that have provided input or actions on the same electronic content. *Id.*, 1:57-67 (identifying users with “shared” tastes by ratings of movies); 6:30-36, 7:6-39 (identifying users based on those who provided feedback on at least “two shared items,” based on user’s selection of “a circle, a triangle, and a cross”), 11:24-29. Indeed, the primary goal of collaborative filtering techniques like that of Bieganski is to leverage additional activity information from other users. *Supra* ¶¶54-55. Thus, it is my opinion, as with Rose, that a POSITA would understand “items that are shared” to refer to content rated (and, in the context of email, *received*) by both users. Bieganski, 6:30-36.

247. Bieganski teaches that a neighborhood can be constructed dynamically, in response to a user considering a piece of electronic content. *Id.*, 7:6-39 (providing example of identifying five users in a “neighborhood” based on a user’s selection of items). In doing so, Bieganski identifies two parameters—(i) minimum neighbor similarity and (ii) maximum neighborhood size—that allow an administrator to optimize recommendations by specifying how neighborhoods are formed.

248. With Bieganski’s teachings of “neighborhoods,” a POSITA would understand they could continue with Rose’s teachings of how to evaluate the relevance of content relying on input of others, by relying on an optimized

“neighborhood” of users. *See supra* ¶¶225-230 (discussing motivation to combine); Bieganski, 7:11-16 (explaining how using these parameters to control formation of user “neighborhoods” improves relevance determinations). As one example, Rose teaches using “a combination of attribute-based and correlation-based prediction” to rank electronic content. Rose, 7:35-42. Rose continues to explain that “multiple regression analysis” can be used 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.” *Id.*, 6:42-47. Both also discuss examples of how to use weights, alone or in combination with other techniques like the above, to combine different values to estimate a score. *See, e.g.*, Rose, 7:37-47; Bieganski, 4:2-8. Thus, Rose in combination with Bieganski teaches this limitation.

**h) 1[g] 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:**

**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; and**

249. As discussed under Ground 2, Rose teaches 1[g] under MPF or non-MPF.

250. As discussed for 1[f], Rose, when combined with Bieganski, teaches that users can be organized into “neighborhoods.” Then the Rose-Bieganski combination would largely operate as discussed for 1[g] of Ground 2. *See supra* ¶¶119-124. As before, Rose would identify the relevance of content based on “indications” (*e.g.*, actions on the piece of electronic content) provided by this neighborhood of users—for both an individual user and “cognate” users. Rose relies on their individual user profile, “based upon the feedback information received each time the user accesses the system,” to identify the relevance of documents that have

been evaluated. Rose, 6:36-46 (explaining that user's feedback increases weight of "significant terms in that document" in a user's profile), 6:59-63, 7:43-47 (discussing "regression methods" used to evaluate relevance based on "***salient terms in a document*** and ***users having similar feedback responses***"). A POSITA would thus understand the "user correlation information"—based on user "indications" (actions)—to be "*a second measure of relevance of the piece of electronic content as based at least in part on*" "*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.*"

**i) 1[h] a relevance analysis module 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.**

251. The combination of Rose and Bieganski relies on Bieganski's teachings that improve recommendations based on "community" input by identifying "neighborhoods" of users with similar interests. Stated another way, the Rose-Bieganski combination improves Rose's predictions by taking "correlated" users and organizing them into neighborhoods according to Bieganski, i.e., with a "minimum neighbor similarity" and "maximum neighborhood size." Bieganski, 7:16-27, 7:57-65. But Rose would then continue to determine the relevance of

content as discussed in Ground 2. Thus, in my opinion, the combination teaches 1[h] for the same reasons that Rose, alone, teaches 1[h], as discussed in Ground 2, under MPF or non-MPF. *Supra*, ¶¶194-196.

**3. Claim 2.**

**a) The system of claim 1, further comprising:  
a content presentation module 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.**

252. As discussed under Ground 2, Rose teaches claim 2 under MPF or non-MPF.

**4. Claim 3.**

**a) The system of claim 1, further comprising:  
a search module configured to search the electronic content  
in accordance with the determined relevance score.**

253. As discussed under Ground 2, Rose teaches claim 3 under MPF or non-MPF. Bieganski, like Rose, contemplates being used in the context of a search engine. EX-1007, 16:29-46, 17:59-18: 6.

**5. Claim 5.**

**a) The system of claim 1, wherein the electronic content  
comprises at least one of an email, a document, an instant  
message, and an SMS message.**

254. As discussed under Ground 2, Rose teaches claim 5.

**6. Claim 6**

**a) 6[pre] A computer program product for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-program product having a computer-readable storage medium having computer program instructions encoded thereon comprising:**

255. As discussed under Ground 2, Rose teaches 6[pre].

**b) 6[a] a monitoring module configured to track actions by a plurality of users associated with an application for managing electronic content;**

256. See claim 1[c] in Ground 3.

**c) 6[b] a first relevance measurement module 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;**

257. See claim 1[d] in Ground 3.

**d) 6[c] a second relevance measurement module coupled to the monitoring module and configured to:**

258. See claim 1[e] in Ground 3.

**e) 6[d] 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**

259. See claim 1[f] in Ground 3.

**f) 6[e] determine a second measure of relevance of the piece of electronic content based at least in part on 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,**

**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; and**

260. *See* claim 1[g] in Ground 3.

**g) 6[f] a relevance analysis module 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.**

261. *See* claim 1[h] in Ground 3.

## **7. Claim 7**

**a) 7[pre] A computer-implemented method for determining a relevance score of a piece of electronic content sent from a sender to a user, the relevance score determined with respect to the user, the computer-implemented method comprising:**

262. *See* claim 1[pre] in Ground 3.

**b) 7[a] tracking actions by a plurality of users associated with an application for managing electronic content;**

263. *See* claim 1[c] in Ground 3.

**c) 7[b] identifying 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,**

264. *See* claim 1[f] in Ground 3.

**d) 7[c] 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;**

265. *See* claim 1[d] in Ground 3.

**e) 7[d] determining a second measure of relevance of the piece of electronic content based at least in part on 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; and**

266. *See* claim 1[g] in Ground 3.

**f) 7[e] 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.**

267. See claim 1[h] in Ground 3.

**8. Claim 8.**

**a) The system of claim 1, wherein identifying at least one other of the plurality of users that is cognate to the user comprises analyzing historical actions of the at least one other of the plurality of users with respect to historical actions of the user.**

268. Claim 8 depends from claim 1 (*see* 1[pre]). In my opinion, both Rose and Bieganski identify “*cognate*” users based on their historical actions. Rose, 2:46-50, 5:58-61, 6:6-11 (ranking messages based on “indications provided by users who have retrieved the message”), 6:59-7:50 (“second factor” of predicting the user’s interests involves correlating “indications provided by other users...each time a user ...provides an indication of interest”), cl. 1 (“measure of correlation between the particular user’s interests and those of other users who *have accessed* said item of information”); Bieganski, 6:30-36 (measuring similarity by “counting the items that are shared by the two profiles”); *see also supra* ¶¶ 244-48 (discussing 1[f]).

**9. Claim 9.**

**a) The system of claim 8, wherein the at least one other of the plurality of users is cognate to the user, and the user is not cognate to the at least one other of the plurality of users.**

269. As discussed under Ground 2, Rose teaches claim 9. *Supra*, Section VIII.B.2.aa. Moreover, in my opinion, when combining the teachings of Rose with Bieganski to group users into “neighborhoods,” Bieganski contemplates that “*cognate*” groups will not be symmetrical. For example, Bieganski teaches that “neighborhoods” are limited in two ways: (i) minimum neighbor similarity, and (ii) maximum neighborhood size. *Id.*, 7:16-27, 7:57-65. In my opinion, because these neighborhoods are limited with a “maximum” size, a POSITA would understand that these neighborhoods would not necessarily be symmetrical because the top-most users for one user may not be the same for another. *Id.* I explained a similar concept above in Ground 1 for claim 9, (*supra* ¶¶ 157-164)—the same analysis applies here to explain why Rose-Bieganski would render this limitation obvious.

**10. Claim 13.**

**a) The computer program product of claim 6, further comprising:  
a content presentation module 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.**

270. *See* claim 2 in Ground 3.

**11. Claim 14.**

- a) The computer program product of claim 6, further comprising:  
a search module configured to search the electronic content in accordance with the determined relevance score.**

271. *See* claim 3 in Ground 3.

**12. Claim 15.**

- a) The computer program product of claim 6, wherein the electronic content comprises at least one of an email, a document, an instant message, and an SMS message.**

272. *See* claim 5 in Ground 3.

**13. Claim 18.**

- a) The method of claim 7, further comprising:  
presenting the piece of electronic content to the user in accordance with the determined relevance score and  
presenting to the user a value describing the determined relevance score.**

273. *See* claim 2 in Ground 3.

**14. Claim 19.**

- a) The method of claim 7, further comprising:  
searching the electronic content in accordance with the determined relevance score.**

274. *See* claim 3 in Ground 3.

**15. Claim 22.**

**a) The method of claim 7, wherein identifying at least one other of the plurality of users that is cognate to the user comprises analyzing historical actions of the one other of the plurality of users with respect to historical actions of the user.**

275. *See* claim 1[c] in Ground 3.

**XIII. CONCLUSION**

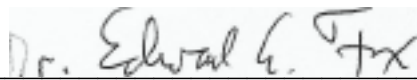
276. In my opinion, the Challenged Claims of the '217 patent are rendered obvious by the prior art.

277. I currently hold the opinions expressed in this declaration. But my analysis may continue, and I may acquire additional information and/or attain supplemental insights that may result in added observations.

278. I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge. I understand that willful false statements are punishable by fine or imprisonment or both. See 18 U.S.C. § 1001.

Date: January 31, 2025

By:

  
\_\_\_\_\_  
Dr. Edward A. Fox