

Declaration of Dr. Loren G. Terveen
U.S. Patent No. 10,180,952

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

X CORP.,
Petitioner

v.

SEARCH AND SHARE TECHNOLOGIES, LLC,

Patent Owner

Case IPR2026-00244
U.S. Patent No. 10,180,952

DECLARATION OF LOREN G. TERVEEN, PH.D.

CLAIMS 1–14

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I, Loren G. Terveen, declare as follows.

1. My name is Loren G. Terveen.
2. I have been retained as an independent expert in connection with the above-captioned Petition for *Inter Partes* Review (“IPR”) to provide my analyses and opinions on certain technical issues related to U.S. Patent No. 10,180,952 (hereinafter “the ’952 Patent”).

I. Introduction

3. I am currently a Professor of Computer Science & Engineering at the University of Minnesota.

4. I received a B.A. Degree in Computer Science, Mathematics, and History from the University of South Dakota in 1984. I received a M.S. Degree in Computer Science from the University of Texas in 1988, and a Ph.D. in Computer Science from the University of Texas in 1991.

5. My research and teaching focus on human-computer interaction, user interface design, and social computing. I have several decades of experience in these specialties of computer science in both industry and academia. I worked for AT&T Laboratories from 1991 through 2002, during which time I conducted research and developed systems that solved problems in software engineering, web information seeking and organization, and recommender systems. As part of this research, I developed a number of systems on the World Wide Web, which involved, among

other things, storing information in databases, generating HTML pages in response to user requests, and providing interactive search and browsing interfaces to users through the Common Gateway Interface (CGI) and other technologies. In all my research, I designed, implemented, and tested graphical user interfaces. I have been employed full-time as a professor at the University of Minnesota since 2002, during which time I have taught classes in computer science, human-computer interaction and social computing, and have conducted, supervised, and published research in the field, much of which has involved information organization and seeking systems.

6. I have taught numerous courses at the University of Minnesota in computer science, human-computer interaction, and user interface design. Additionally, I have published over 150 peer-reviewed articles related to these subjects, a book, contributed chapters in six additional books, and have given over 50 presentations all across the United States and internationally similarly on these topics.

7. I am a named inventor in thirteen issued U.S. patents. Some of these patents are related to user interfaces, rule-based agents, web-based applications, and methods for selecting and displaying information to users. My published research and patents have addressed searching for information on the World Wide Web, creating databases for Web information, and the design and implementation of user interfaces for intelligent systems.

8. I am a member of multiple societies, including the Association for Computing Machinery (ACM), the oldest, largest, and most prestigious computing society in the world. From 2015-2018 I served as President of ACM's Special Interest Group on Computer Human Interaction, one of its largest and most active special interest groups. I also am a member of the ACM Council, the highest governing body of the ACM. I received the ACM Distinguished Scientist Award in 2009. I have served on the editorial board of ACM's Transactions on Human-Computer Interaction and the Communications of the ACM, and I have served as a reviewer for numerous journals, including ACM Computing Surveys, IEEE Transactions on Data and Knowledge Engineering, the International Journal of Human-Computer Studies, and the Journal of Computer-Supported Cooperative Work.

9. A copy of my curriculum vitae ("CV") is attached as Appendix A.

10. I am familiar with the technology of the '952 Patent.

11. I understand that the '952 Patent was filed on April 29, 2016, as a U.S. Patent Application No. 15/142,479. As shown on the cover page of the '952 Patent, the U.S. Patent Application No. 15/142,479 is a continuation of application No. 13/420,503, which was filed on March 14, 2012. EX1001, Cover. As also shown on the cover page of the '952 Patent, the '952 Patent claims priority to the provisional application No. 61/452,595, which was filed on March 14, 2011. EX1001, Cover.

12. I am familiar with the knowledge and capabilities of a person of ordinary skill in the art at the time of the earliest possible priority date of the '952 Patent – March 14, 2011.

13. I have reviewed the following references in preparing this declaration, all of which I understand to be prior art to the '952 Patent:

- U.S. Patent No. 7,899,829 (“Malla”) (EX1003), which issued on March 1, 2011 and was filed on December 14, 2006;
- U.S. Patent Application Publication No. 2005/0216457 (“Walther”) (EX1004), which published on September 29, 2005;
- U.S. Patent Application Publication No. 2006/0069699 (“Smadja”) (EX1005), which published on March 30, 2006.

14. I provide below the list of exhibits that I have considered in preparing this Declaration. I have reviewed and considered the following exhibits, and all other documents mentioned in my declaration. Additionally, my opinions are based on my technical education, training and experience in the field.

Exhibit No.	DESCRIPTION
1001	U.S. Patent No. 10,180,952 (“’952 Patent”)
1003	U.S. Patent No. 7,899,829 To Malla (“Malla”)
1004	U.S. Patent Publication No. 2005/0216457 to Walther <i>et al.</i> (“Walther”)
1005	U.S. Patent Publication No. 2006/0069699 to Smadja <i>et al.</i> (“Smadja”)
1006	File History of U.S. Patent No. 10,180,952
1007	File History of U.S. Patent Application No. 13/420,503

Exhibit No.	DESCRIPTION
1008	File History of U.S. Patent No. 7,899,829

15. I am being compensated at my usual and customary rate for the time I spent in connection with this IPR. My compensation is not and will not be affected by the outcome of this IPR.

16. I have no financial interest in the outcome of the case. I also do not have any financial interest in X Corp., X Holdings Corp., or X.AI Holdings Corp.

17. I do not have personal contact with nor knowledge of the named inventors of the '952 Patent.

II. Relevant Law

18. I am not an attorney. For the purposes of this declaration, counsel has informed me about the following aspects of patent law, which I have applied in my analysis and conclusions.

A. Person of Ordinary Skill in the Art

19. 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, including that of the named inventor; the types of problems encountered in the field; the teachings of the prior art regarding solutions to such problems; the sophistication and general state of the technology at the time of the

alleged invention; and, where relevant, the types of testing described in the patent and the skills required to perform such testing.

20. I understand that a person of ordinary skill in the art (“POSITA”) is not a specific real individual, but rather is a hypothetical person having the qualities reflected by the factors described above. I further understand that, for purposes of my analysis, a POSITA would have been aware of the prior art that was publicly accessible as of the patent’s priority date, and would have possessed ordinary creativity—i.e., a POSITA is not an automaton and would have been able to consider and combine teachings from multiple prior art references.

B. Claim Construction

21. I have been informed that claim construction is a matter of law that will ultimately be determined by the Board. To determine the meaning of claim terms for purposes of this inter partes review, I have been informed that one should generally use the ordinary and customary meaning as understood by a POSITA at the time of the claimed priority date, in view of the claim language, the patent specification, and the file history/prosecution history. I also understand that, under limited circumstances, treatises and dictionaries may be consulted to inform the meaning attributed by a POSITA to a claim term.

22. Further, I understand that although a claim term should be read in light of the specification, limitations should not be imported into the claim from the

specification. I understand that interpreting a claim term in a manner that excludes a preferred embodiment is often inaccurate. I have also been informed that the prosecution history can facilitate the meaning of a claim term or claim by demonstrating how the inventor understood the invention and by showing whether the inventor limited a claim term or claim during the course of prosecution or otherwise caused the claim scope to be narrower than it otherwise would be.

C. Anticipation

23. I understand that a patent claim is invalid as anticipated if a single prior art reference discloses each and every limitation of the challenged claim, either explicitly or implicitly, including by inherency.

24. I also understand that the words used in a prior art reference need not be identical to the claim language for the reference to disclose a claim limitation.

25. I understand that, to establish inherency, the prior art reference must necessarily disclose the limitation; it is not sufficient that the reference might possibly practice or contain the claimed limitation.

26. I also understand that a reference anticipates if a POSITA, upon reviewing the reference, would have been able to make and use the subject matter disclosed in the reference in the manner claimed.

27. I further understand that drawings and photographs in a prior art reference can disclose claim limitations where they depict the structure or features that are claimed.

D. Obviousness

28. I understand that a claim is unpatentable if it would have been obvious. Obviousness of a claim requires that the claim would have been obvious from the perspective of a POSITA at the time of the claimed priority date, considering the claim as a whole. I understand that a claim could have been obvious from a single prior art reference or from a combination of two or more prior art references.

29. I have been informed that in an *inter partes* review, the Patent Trial and Appeal Board (the “Board”) evaluates obviousness of a claim under a preponderance of the evidence standard, which means that the Board determines that a claim is unpatentable for being obvious when the claim is more likely obvious than nonobvious.

30. I understand that an obviousness analysis considers, among other things, the scope and content of the prior art, differences (if any) between the claimed subject matter and the prior art, and the level of ordinary skill in the pertinent art. I also understand that, for purposes of an obviousness analysis, prior art references considered should be from the same field of endeavor or reasonably pertinent to the particular problem addressed.

31. I further understand that a claim would have been obvious if it unites old elements with no change to their respective functions, or merely substitutes one element for another known in the field, and that combination yields predictable results. While it may be helpful to identify a reason for this combination, I understand that there is no strict requirement of finding an express teaching, suggestion, or motivation to combine within the references. When a product is available, design incentives and other market forces can prompt variations of it, either in the same field or different one. If a POSITA can implement a predictable variation, obviousness likely bars its patentability. For the same reason, if a technique has been used to improve one device and a POSITA would recognize that it would improve similar devices in the same way, using the technique would have been obvious. I understand that a claim would have been obvious if common sense directs one to combine multiple prior art references or add missing features to reproduce the alleged invention recited in the claims.

32. I further understand that, for combinations of references, a claim may be unpatentable for obviousness where a POSITA would have been motivated to combine or modify the prior art to arrive at the claimed subject matter and would have had a reasonable expectation of success in doing so. I understand that the reason to combine or modify may be found in the prior art as a whole, the nature of the

problem to be solved, design incentives or other market forces, or the background knowledge of a POSITA.

33. I further understand that certain factors may support or rebut the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of invention, unexpected results of the invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a nexus—a connection—between any such secondary considerations and the alleged invention.

34. I understand that in considering obviousness, it is important not to determine obviousness using the benefit of hindsight derived from the descriptions found in the patent being considered.

III. Summary of Opinions

35. For the reasons explained below, I conclude that claims 1-14 of the '952 Patent are anticipated and rendered obvious by the prior art.

Grounds	Claims	Statutory Ground	Prior Art Reference(s)
I	1-3	35 U.S.C. §102	U.S. 7,899,829 (“Malla”) (EX1003)
II	1-3	35 U.S.C. §103	Malla
III	1-6	35 U.S.C. §103	Malla in view of

Grounds	Claims	Statutory Ground	Prior Art Reference(s)
			US2005/0216457 (“Walther”) (EX1004)
IV	7-10, 14	35 U.S.C. §103	Malla in view of US2006/0069699 (“Smadja”) (EX1005)
V	7-14	35 U.S.C. §103	Malla in view of Walther and Smadja

IV. Overview of the ’952 Patent

A. Summary of the ’952 Patent

36. I have reviewed the ’952 Patent. *See* EX1001.

37. The ’952 Patent describes and claims a web-based search system in which search results are generated in response to input provided by users. EX1001, 8:37-45. For instance, the ’952 Patent states that conventional Internet search engines “typically use bots or web crawlers to follow links in web pages to discover content, index the content, and then sort the indexed content through an algorithm.” EX1001, 1:23-26. According to the ’952 Patent, the disclosed system improves upon such automated approaches by incorporating “human input” to identify web content, provide commentary regarding that content, and rank the content for presentation in search results, rather than relying exclusively on automated crawling and algorithmic sorting. EX1001, 8:43-45.

38. Figures 1A and 1B depict the operational sequence by which the disclosed system enables user-driven indexing and ranking of web content. As

illustrated in Figure 1A, a client computer (105) executes a web browser application (120) that renders web content (135) within a primary browser display region referred to as the main browser window (130). In addition to the main window (130), the browser environment includes a distinct user interface element (150) that is spatially and functionally separate from the main browser window. EX1001, 1:51-2:4; 4:13-19. Through this separate user interface, the user transmits “user content”—such as descriptive keywords, tags, ratings, or other annotations—along with an identifier corresponding to the web content currently displayed in the main window, for example the URL of that page. EX1001, 4:19-27. The ’952 Patent further explains that the separate interface is configured to automatically extract and present a selected portion of the third-party web content, such as an excerpt or “snippet,” based on user-defined display settings that determine which portions of the content are shown—e.g., the first few sentences of the page, the first graphic together with associated text, or the entirety of the page content. EX1001, 5:40-48 (“In one embodiment, the user interface 150 automatically selects for *display the portion of the web content 155* from the received web content 135. Further, in one embodiment the user of the client computer 105 can provide settings as to what the user interface 150 will display when web content 135 is displayed in the web browser 120 (e.g., display the *first few sentences of the web content* 135, display the *first*

graphic and first few sentences of web content 135, display the *entire web content* 135 (e.g., a web page), etc.)”), 6:50-61.

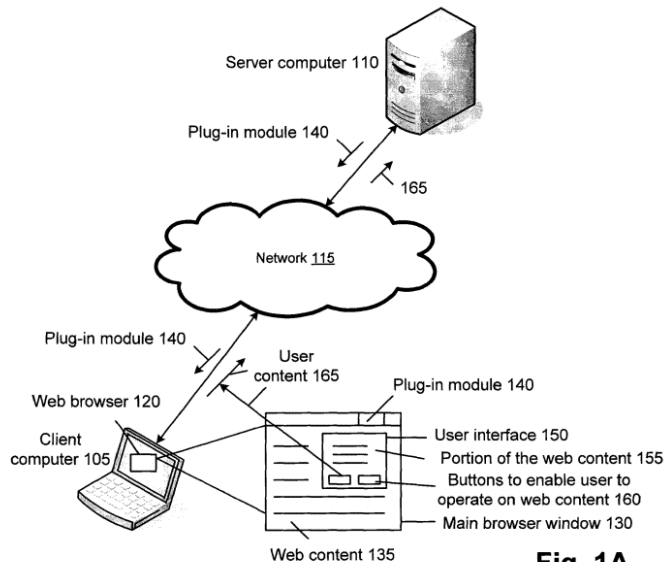


Fig. 1A

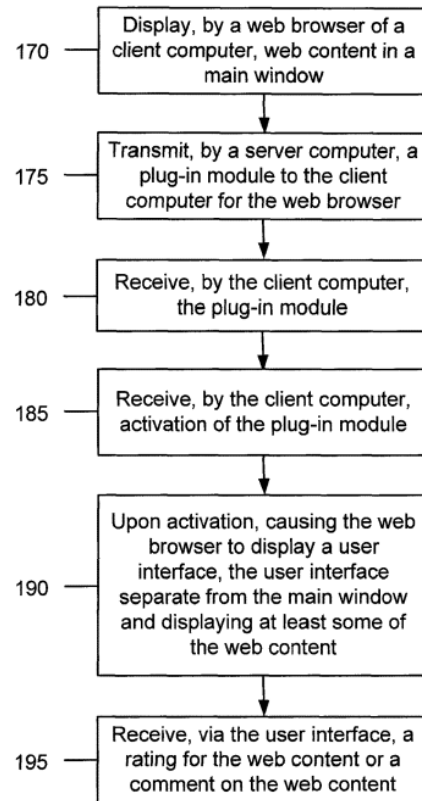


Fig. 1B

EX1001, Figures 1A, 1B.

39. Figure 3B depicts a representative implementation of the separate user interface (325) described in the '952 Patent. As shown, the separate user interface (325) includes input fields and controls that enable the user to enter the URL corresponding to a website and to associate that URL with user-generated metadata,

including keywords, free-form comments, and ratings reflecting the user's evaluation of the content. EX1001, 10:25-29.

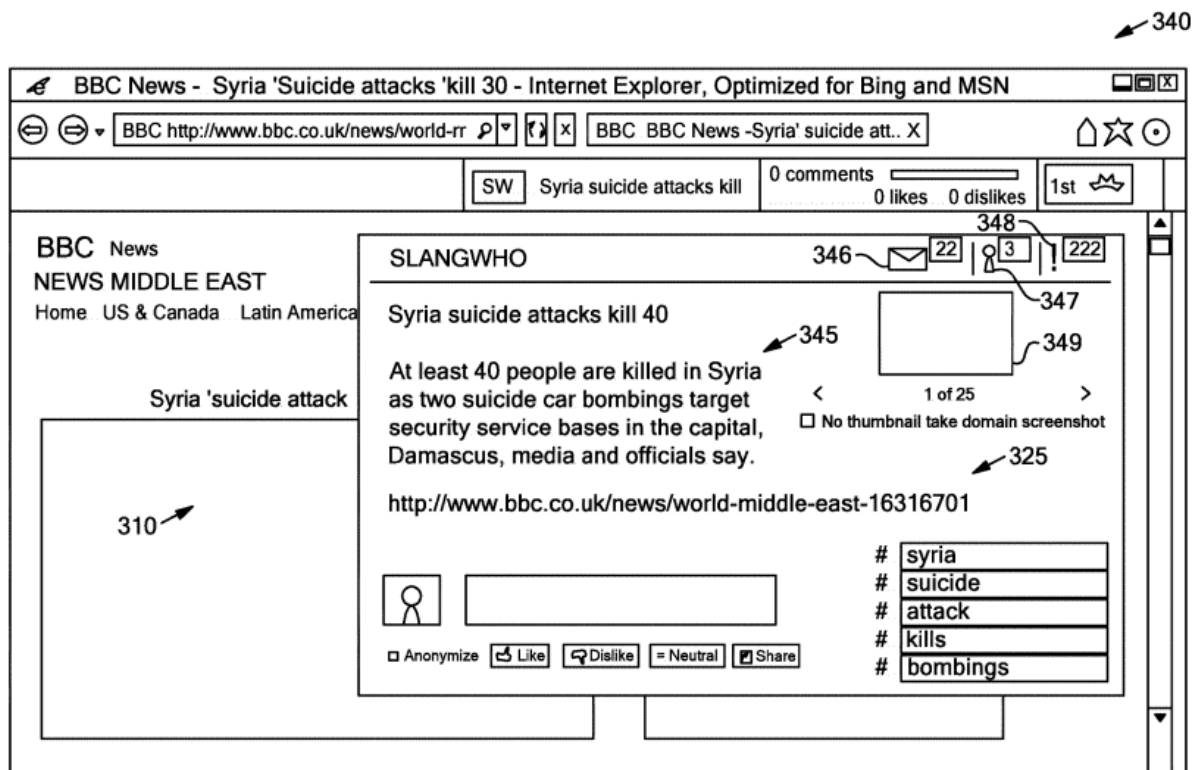


Fig. 3B

EX1001, Figure 3B.

40. Figure 2B illustrates the corresponding server-side operations that occur after the client transmits the user-supplied identification and associated user content. As depicted at Operation 255, the server computer receives the identification of the web content and proceeds to “index[] the web content” for “inclusion in search results.” EX1001, 8:9-13, Figure 2B. The '952 Patent further explains that this indexing process includes “receiving keywords for the first web

content” and associating those received keywords with the identified web content within the server’s index so that the content may later be located and retrieved in response to subsequent search queries submitted by users. EX1001, 1:60-62.

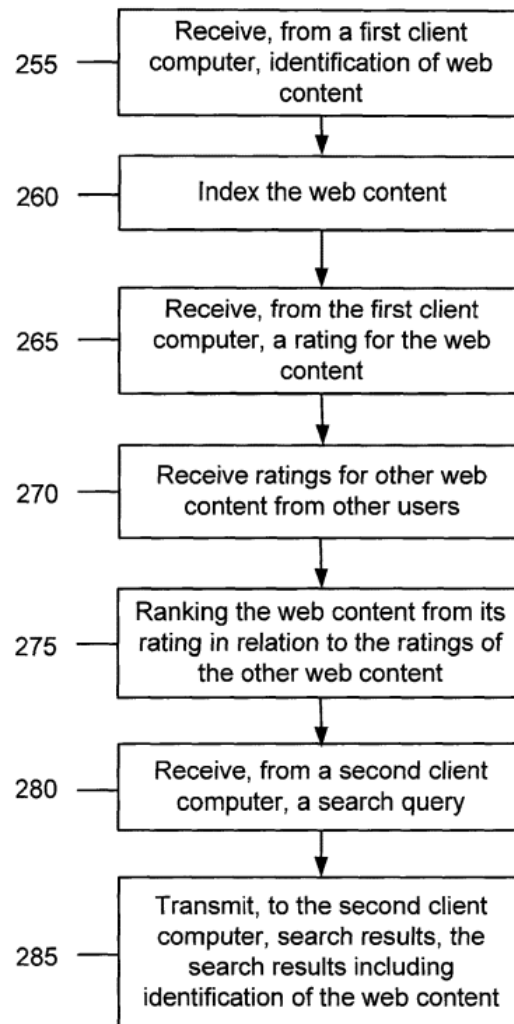


Fig. 2B

EX1001, Figure 2B.

B. Summary of Relevant Prosecution Histories

41. I have reviewed the file history of the '952 Patent, which I summarize below. *See* EX1006.

42. The application for the '952 Patent was filed on April 29, 2016 as U.S. Patent Application No. 15/142,479 (the "'479 Application"). EX1001, Cover. The '479 Application is a continuation of U.S. Patent Application No. 13/420,503 (the "'503 Application"), filed March 14, 2012. EX1001, Cover. The '503 Application claims priority to U.S. Provisional Application No. 61/452,595, filed March 14, 2011. EX1001, Cover.

1. Prosecution History Of The '952 Patent

43. During examination of the '479 Application that matured into the '952 Patent, the Examiner issued two substantive Office Actions setting forth various rejections. EX1006, 69–87, 138–156. In the first, a Non-Final Office Action, the Examiner rejected claims 1–15 under 35 U.S.C. §101. EX1006, 76-78. The Examiner further rejected claims 1–2, 6–9, 13–15 as obvious under 35 U.S.C. §103 over Murdock (U.S. 2009/0271388) in view of Cierniak (U.S. 2011/0161413), and rejected claims 3–5 and 10–12 as obvious over Murdock and Cierniak further in view of Uy (U.S. 2010/0257184). EX1006, 78-86. In addition, the Examiner issued an obviousness-type double patenting rejection over the parent U.S. Patent No.

9,338,215, asserting that the pending claims were not patentably distinct from claims of the earlier-issued patent. EX1006, 71.

44. In response to the Non-Final Office Action, Applicant amended the independent claims to add the limitation “ranking, by the server computer, the 3rd party content based on a rating of the 3rd party content submitted from the first user.” EX1006, 100-102. Applicant contended that none of the two cited references (Murdock and Cierniak) disclose providing 3rd party content “in a first user interface that is separate from a main window of a web browser, indexing and ranking that 3rd party content based on input from the first user, and responding to a search query by selecting results based on such indexing and ranking.” EX1006, 104.

45. The Examiner then issued a Final Office Action in which the rejection under 35 U.S.C. §101 was maintained. EX1006, 140-143. In the same Final Office Action, the Examiner also rejected claims 1-2 and 4-15 under pre-AIA §103 as unpatentable over the combined teachings of Murdock, Cierniak, and Uy. EX1006, 143.

46. In response to the Final Office Action, Applicant further amended the independent claims by adding a limitation that the first user interface selects a portion of the 3rd party content and displays the portion of the 3rd party content within the first user interface “*based on settings received from the user via the user interface to display selected portions of the 3rd party content.*” EX1006, 181-183.

Applicant argued that none of the cited references—individually or in combination—discloses or suggests this functionality of the user interface automatically selecting and displaying content portions according to user-defined display settings. EX1006, 186-187.

47. The Examiner issued a Notice of Allowance on April 29, 2016. EX1006, 204. The '952 Patent was issued on January 15, 2019. EX1001, Cover.

48. However, as I explain in detail below, the functionality of selecting a portion of 3rd party content and displaying that portion within a separate user interface “based on settings received from the user via the user interface to display selected portions of the 3rd party content” was well known in the art at the relevant time.

V. Level of Ordinary Skill in the Art

49. As I noted above in Paragraph 28, I have been informed by the counsel that a patent and the prior art should be analyzed within the framework of a POSITA.

50. I considered the factors I noted in the Paragraphs 19-20. I have been unable to locate any information regarding the education level of the inventors. The references applied by the Examiner in rejecting the claims during the prosecution of the '952 Patent indicate that the relevant work involved building and comparing search systems that retrieve and rank web content in response to user queries, and

that also involve user-facing mechanisms for providing inputs and receiving results.
EX1006, 69-87, 138-156.

51. Accordingly, in my opinion, a POSITA as of the earliest claimed priority date of the '952 Patent (i.e., March 14, 2011) would have a bachelor's degree in computer science, computer engineering, electrical engineering, or equivalent training, and a minimum of two years of experience in the field of information retrieval and user interfaces in computer systems. I note that a higher level of education or specific skills in the industry may make up for less experience and vice versa.

52. I met or exceeded these requirements for POSITA as of March 14, 2011, for at least the reasons provided above in Paragraphs 3-11.

VI. Claim Construction

53. I have been asked to determine if any particular claim terms should be construed so the Board can understand how the prior art references read on the challenged claims.

54. As such, I have reviewed the claims, specification, and file history of the '952 Patent.

55. I have not identified any terms that the Board needs to construe for the purposes of this IPR.

VII. Specific Invalidity Grounds

56. As I explained in Paragraph 35, I conclude that claims 1-14 of the '952 Patent are anticipated and/or rendered obvious by the prior art. In the sections below, I explain in detail how claims 1-14 of the '952 Patent are not patentable over prior art.

A. Grounds I and II: Malla Anticipates (Ground I) Or Renders Obvious (Ground II) Claims 1–3

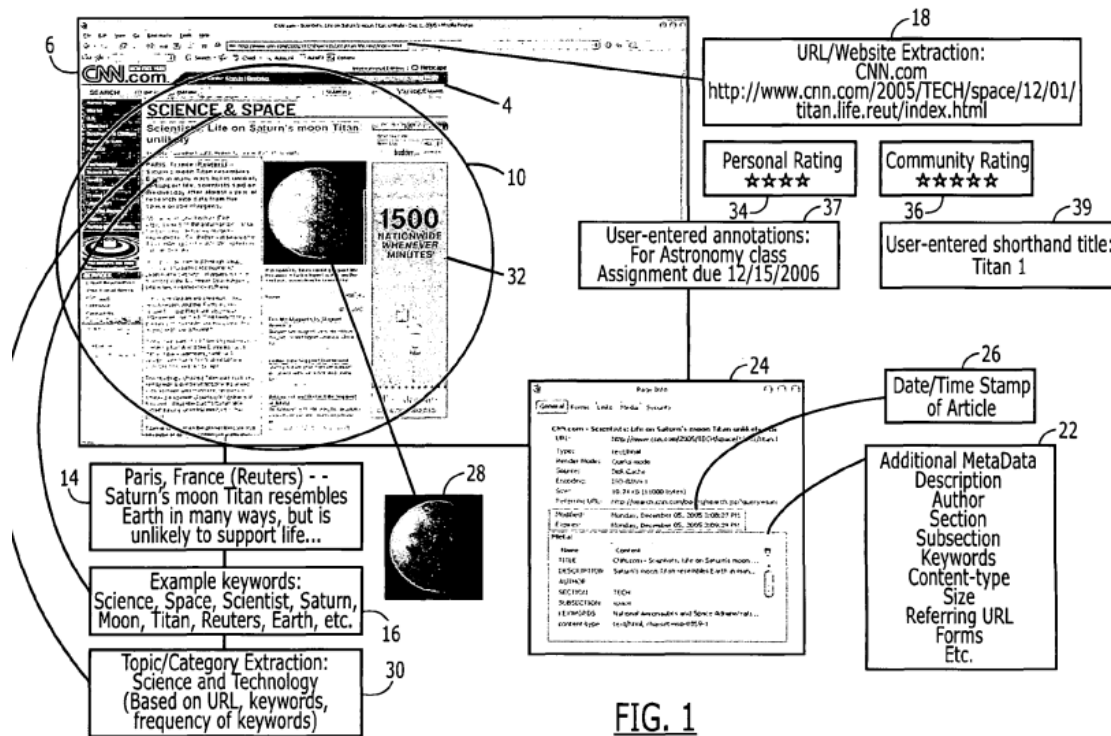
57. In my opinion, claims 1–3 are all anticipated or rendered obvious by Malla for at least the following reasons.

1. Overview of Malla (EX1003)

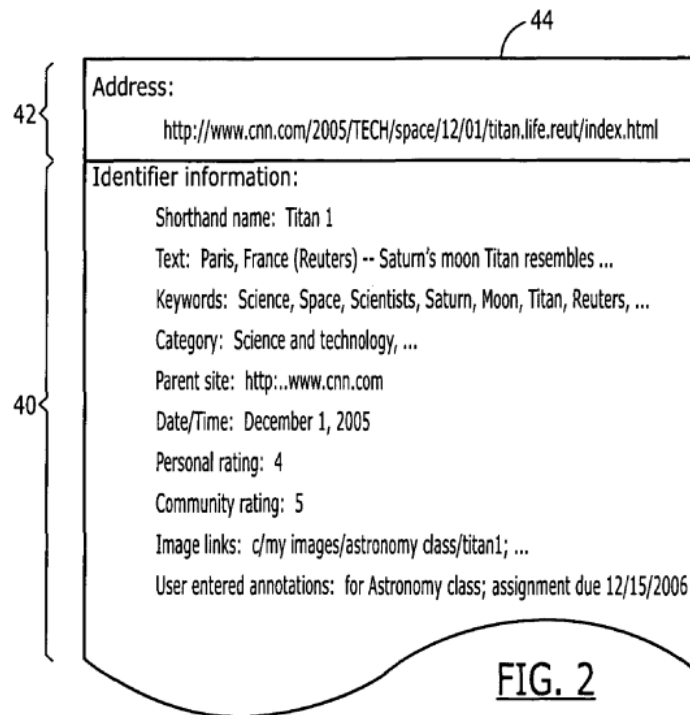
58. Malla is a U.S. Patent No. 7,899,829, issued on March 1, 2011, and filed on December 14, 2006. EX1003, Cover. I have been informed by counsel that Malla is prior art to the '952 Patent.

59. Malla discloses systems and methods for creating and managing a database of stored webpage records, which Malla calls “intelligent bookmarks.” EX1003, Abstract; *see also* EX1003, 1:21-24. Malla described an intelligent bookmark as “a collection of information, including an address (e.g., a URL),” together with additional associated data that may be automatically extracted from the webpage and that may further include “user entered annotations.” EX1003, 3:38-45.

60. Malla illustrates the process of creating an intelligent bookmark in Figure 1, which shows an internet webpage rendered within a web browser application. EX1003, 8:20-22. Malla explains that the information contained within area 10 of Figure 1 constitutes the “source for data which will form an intelligent bookmark.” EX1003, 8:22-30. As depicted, the data extracted from the displayed webpage can include, for example, text 14 from the page body, keywords 16 derived from the content, the URL of the website 18, metadata information 22, and other related information elements. EX1003, 8:35-55. Figure 2 of Malla further illustrates a corresponding database record structure in which the collected address and associated identifier information are stored as part of the intelligent bookmark. EX1003, Figure 2.



EX1003, Figure 1.



EX1003, Figure 2.

61. Malla additionally discloses “an interface 46 in which a user may create, view, edit, preview, etc. intelligent bookmarks.” EX1003, 9:34-36. Malla explains that the scope and manner in which information is captured from a webpage and subsequently processed by the system is governed by user-selected settings—e.g., “how much information should be extracted/stored, or if special functions needed to be performed” is determined by user “interface preferences.” EX1003, 9:12-21. Consistent with that disclosure, Malla teaches that information presented within the interface can be extracted from the underlying document (such as a webpage) automatically, and that such “automatically extracted information may be supplemented manually by the user.” EX1003, 6:48-51.

62. Malla further explains that although “[b]y default, the image captured in the process of constructing the intelligent bookmark is the whole screen the user is currently viewing,” “this may be set to other selection choices by the user in appropriate applications.” EX1003, 8:30-34. Malla likewise discloses that “[b]ased on user-selectable preferences, the user can also choose to have images and non-textual information 28 scanned by OCR (Optical Character Recognition) to extract further text and information.” EX1003, 8:56-59. In addition, because OCR processing is described as “a moderately high demand feature,” Malla teaches that the user can, and would benefit from, disabling such a feature through interface

preferences, which correspondingly determines what information and which portions of the underlying webpage are captured, processed, and ultimately displayed within the intelligent bookmark interface. EX1003, 9:12-21.

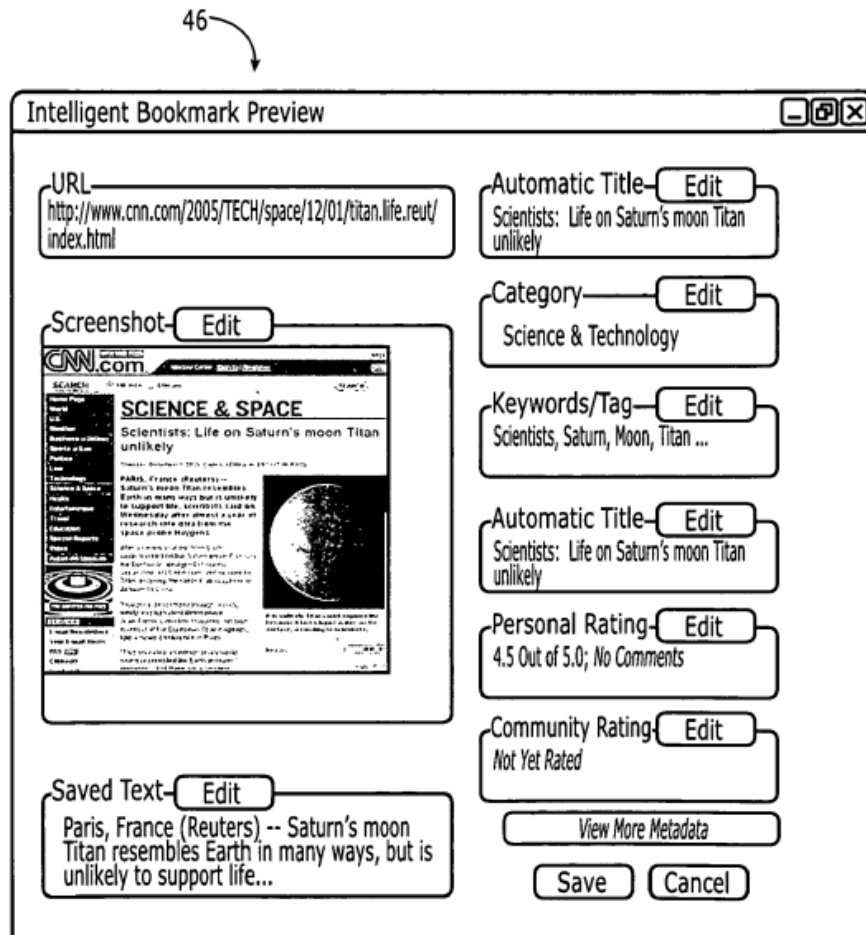


FIG. 3

EX1003, Figure 3.

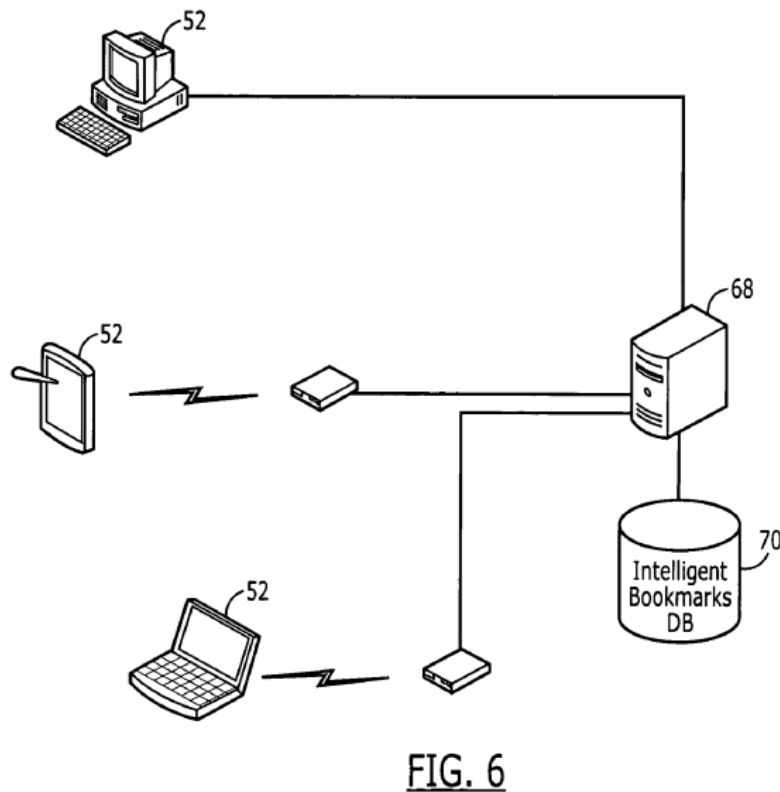
63. Malla further discloses that users are able to evaluate the intelligent bookmarks by rating. EX1003, Abstract; 3:32-36. Specifically, Malla teaches that a “user can manually rate the bookmark at 34 depending on his/her interest,”

indicating that the system supports user-supplied qualitative or quantitative assessments associated with a stored bookmark record. EX1003, 8:64-65. Malla additionally explains that the bookmarked site can be “checked for a community rating” and that the user can “further update the community rating,” reflecting functionality for aggregating ratings across multiple users and permitting subsequent modification of the shared rating data. EX1003, 8:65-67.

64. Malla discloses that its intelligent bookmarks are maintained within a bookmark database that supports search operations over the stored records. EX1003, 5:21-30 (“[A] *database* for intelligent bookmarks can be accessed and managed by requesting a user to enter a search term, searching the database for intelligent bookmarks containing the search term, displaying a list of intelligent bookmarks with the search term.”). For example, Malla teaches that “[a] user can easily search through[,] and sort intelligent bookmarks based on identifier information 40.” EX1003, 9:66-67. And Malla’s Figure 2 illustrates that identifier information 40 encompasses fields such as extracted text, keywords, categorical labels, rating data, and user-entered annotations associated with each stored bookmark record. EX1003, Figure 2.

65. Malla’s Figure 6 shows Malla’s network-based architecture, described as an “on-line model in which a number of users 62, 64, 66 are in communication with a server 68,” where the server is further “in communication with intelligent

bookmark database 70.” EX1003, 11:24-27. Malla explains that this configuration supports “providing a community of users with access to intelligent bookmarks to documents” via “an interface to the server which allows *multiple user[s]* to: create of an intelligent bookmark to a document; view an intelligent bookmark: *search for an intelligent bookmark*; edit an intelligent bookmark; rank an intelligent bookmark; upload an intelligent bookmark.” EX1003, 7:6-20. Within this community-based system, Malla teaches that a user may “search, browse, copy, follow links in, etc. the intelligent bookmarks stored in [the] database,” and that the capability for “searching by keywords, metadata, dates, ratings, etc.” facilitates efficient retrieval and identification of relevant bookmark records and their associated URLs. EX1003, 11:32-43; *see also* EX1003, 12:31-35 (“An intelligent bookmark may be shared through internet communities ... there is significant value in providing intelligent bookmarks to an appropriate networked community, with its members able to *search*, rate, add to, etc. those bookmarks.”). Malla further explains that “searching by keywords, metadata, dates, ratings, etc.” enables “URLs of sites others have found relevant to a topic” to be “efficiently and quickly identified.” EX1003, 11:41-43.



EX1003, Figure 6.

2. Independent Claim 1

i. [1Pre] A method comprising:

66. I understand that the preamble may not limit the claim. Regardless, in my opinion, Malla discloses [1Pre].

67. Malla discloses “a *method* for creating and managing bookmarks which provide search and organizational elements within a bookmark database.” 1:21-24.

See also EX1003, 3:32-36, 6:35-48, 7:6-20.

- i. **[1A] providing, by a server computer, a first user interface operating on the first client computer and displaying 3rd party content on the first client computer, wherein the first user interface is separate from a main window of a web browser, and**

68. In my opinion, Malla discloses [1A].

69. Because limitation [1A] includes multiple requirements, I address Malla's disclosure on an element-by-element basis and explain how Malla satisfies each portion of [1A]. **First**, Malla discloses "*providing, by a server computer, a first user interface operating on the first client computer.*" Malla describes a bookmark interface ("*first user interface*") through which "a user may create, view, edit, preview etc. intelligent bookmarks," as illustrated in Figure 3, thereby teaching an interactive graphical interface that enables user interaction with bookmark records. EX1003, 9:34-36.

70. Malla additionally discloses that, in an "online" embodiment, "the intelligent bookmark is saved on a remote server, [and] can be accessed by any user with access to the remote server," indicating that bookmark data and associated functionality are maintained in a server-based environment. EX1003, 4:22-25. To implement this configuration, the user's computer communicates with the remote server and permits "[t]he user [to] access *an interface* to view, add or modify the intelligent bookmarks." EX1003, 10:57-65. Malla further explains that this "bookmark interface ... may be *resident on a remote server*," demonstrating that

the executable interface logic may be hosted server-side rather than locally on the client machine. EX1003, 13:59-65. See also EX1003, 11:29-34 (“For example, a user 66 can initiate access to intelligent book marks stored in database 70 through use of a ***community portal*** (software, not shown) ***resident on server 68***. User 66 can then search, browse, copy, follow links in, etc. the intelligent bookmarks stored in database 70.”). Accordingly, the remote server is disclosed as hosting not only the bookmark database but also the software-based interface through which users interact with that database, such that the interface functionality is delivered from the server and rendered on the client device via network communication.

71. Accordingly, in Malla’s embodiments in which the bookmark interface is described as being “resident on a remote server,” the server computer supplies the bookmark interface for execution, visual display, and interactive use on the client device, thereby satisfying “*providing, by a server computer, a first user interface operating on the first client computer.*”

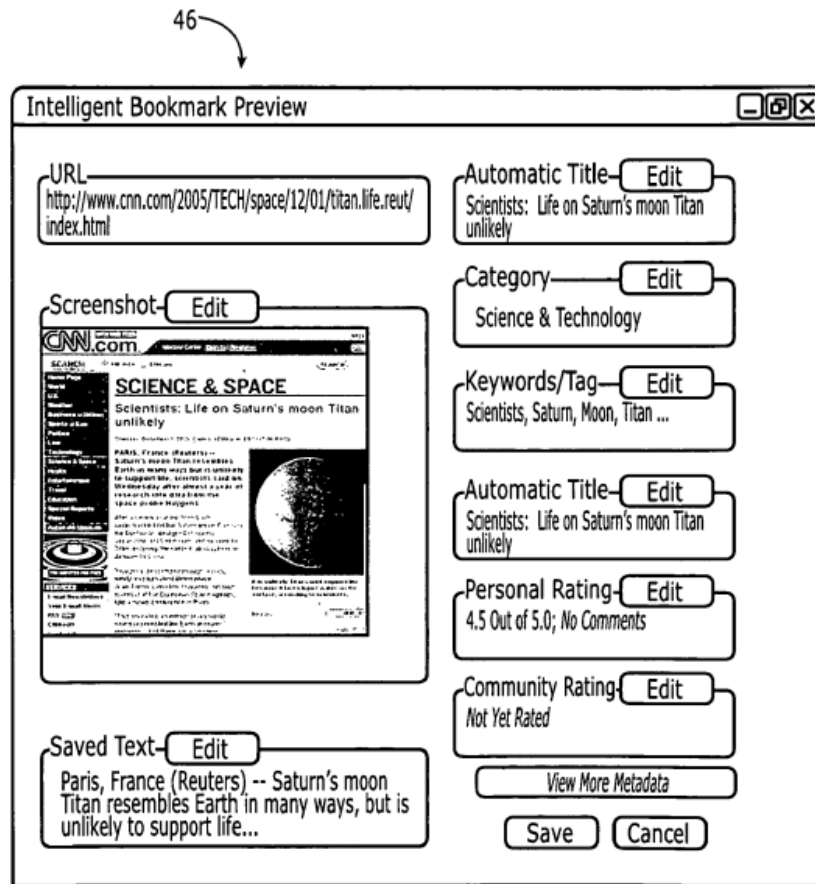
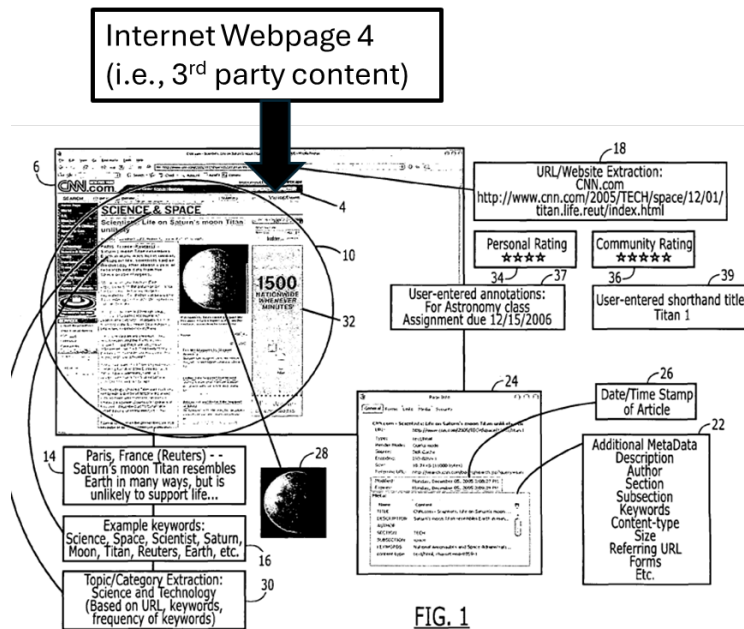


FIG. 3

EX1003, Figure 3.

72. **Second**, Malla discloses “displaying 3rd party content on the first client computer.” Malla teaches that “FIG. 1 illustrates a sample, representative **Internet webpage 4**, displayed in a window 6 by a web browser application,” and explains that portions of that displayed webpage are captured for purposes of constructing an intelligent bookmark record. EX1003, 8:20-30. Malla further states that the “image captured in the process of constructing the intelligent bookmark is the whole screen the user is **currently viewing**” (EX1003, 8:30-34), which confirms that the third-

party webpage content is actively rendered and visible within the browser window on the client device at the time of capture. EX1003, 8:20-30. *See also* EX1003, 8:7-13 (“the term intelligent bookmark is used to refer to an associated collection of information, including an address (e.g., a URL) for a *document (e.g., web page)* or other hyper-media enabled item and selected other information (referred to herein as identifier information).”), which reflects that the bookmarked document is an externally sourced webpage displayed through the browser on the client computer.



EX1003, Figure 1.

73. **Third**, Malla teaches “wherein the first user interface is separate from a main window of a web browser.” Malla explains that “FIG. 1 illustrates a sample, representative Internet webpage ... displayed in a window 6 by a web browser application,” which corresponds to the primary content display region of the browser

and therefore to “a *main window of a web browser.*” EX1003, 8:20-22; Figure 1. Malla additionally discloses a distinct “bookmark preview and editing interface,” described as “an interface 46 in which a user may create, view, edit, preview, etc. intelligent bookmarks,” which is presented separately from the webpage display rendered by the browser application. EX1003, 7:45-47, 9:34-36. Malla’s Figure 3 further demonstrates that the “bookmark preview and editing interface” is separate from the web browser’s main window because it is depicted as an independent interface window (interface 46) that includes its own window control elements, such as a close control (e.g., an “X” button), as well as dedicated “Save” and “Cancel” controls for committing or discarding edits to the bookmark record, reflecting that it is a distinct graphical interface component that can be managed independently of the browser window. EX1003, 7:45-47, 9:34-36. The depiction of independent window controls and discrete interaction elements in Figure 3 indicates that the bookmark preview and editing interface operates as a separate user interface region apart from the browser’s main content window, rather than being embedded within or limited to the main browser display area.

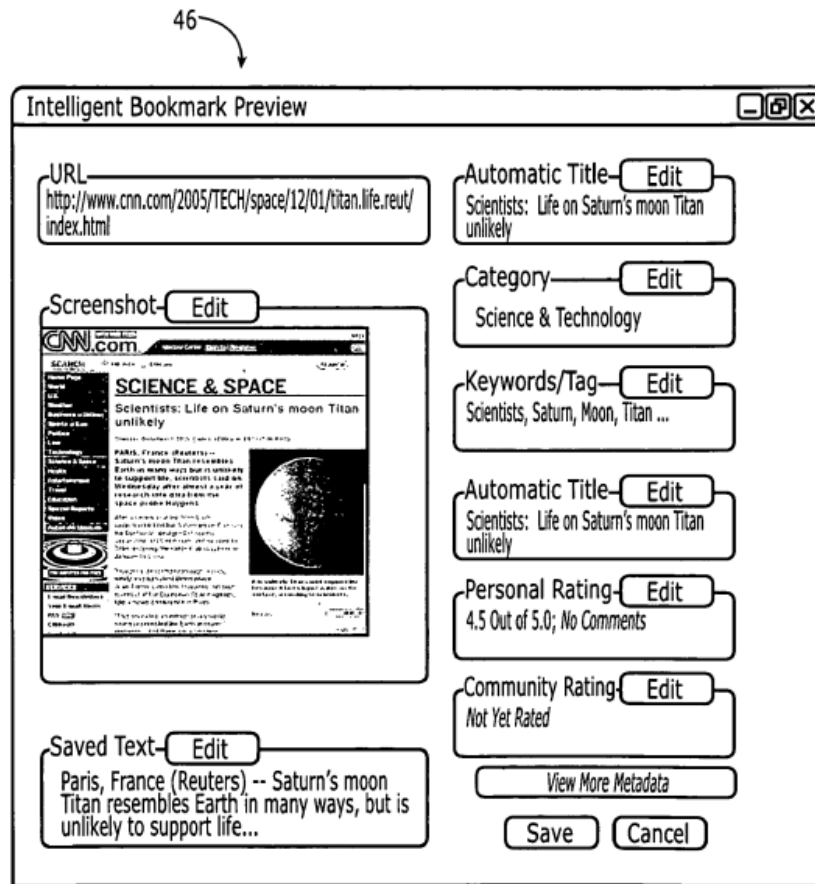


FIG. 3

EX1003, Figure 3.

74. Accordingly, Malla illustrates and describes (i) a web browser window rendering an Internet webpage to the user (e.g., window 6 in Figure 1) and (ii) a distinct bookmark preview and editing interface (e.g., interface 46 in Figure 3) that is presented separately from that browser window, thereby satisfying the requirement that “the first user interface is separate from a main window of a web browser.” EX1003, 8:20-22; 9:34-36; Figures 1, 3.

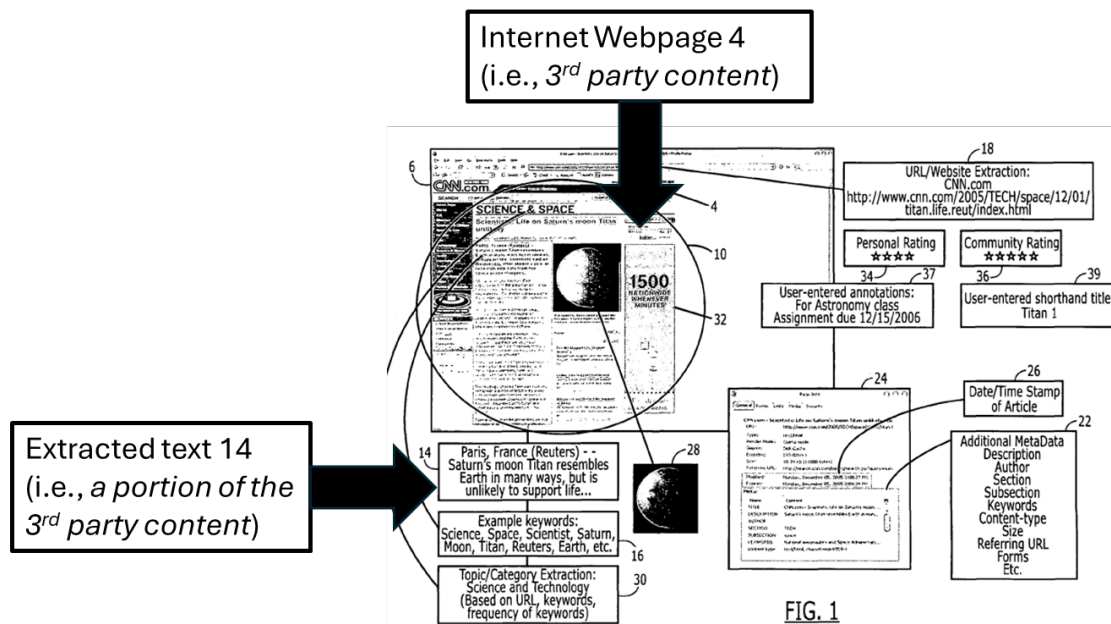
- ii. **[1B] wherein the first user interface automatically selects a portion of the 3rd party content and displays the portion of the 3rd party content within the first user interface based on settings received from the user via the user interface to display selected portions of the 3rd party content;**

75. In my opinion, Malla discloses [1B].

76. **First**, Malla teaches that “*the first user interface automatically selects a portion of the 3rd party content.*” Malla explains that, during the process of constructing an intelligent bookmark, the system automatically captures and extracts portions of the third-party webpage content that is currently displayed, thereby populating the bookmark record with information derived from that webpage without requiring manual re-entry by the user. Malla specifically discloses that an “intelligent bookmark ... is a collection of information ... [that] may be ... ***automatically*** obtained from the document.” EX1003, Abstract; *see also* EX1003, 3:38-45.

77. Malla shows this automatic selection functionality in Figure 1, which illustrates a “representative Internet webpage 4, displayed in a window 6 by a web browser application,” thereby showing third-party web content rendered within a browser window on the client device. EX1003, 8:20-22. Malla further explains that “a user may capture a selectable area, 10, which the user may wish to bookmark.” EX1003, 8:22-24. Malla additionally teaches that “[b]y default, the image captured

in the process of constructing the intelligent bookmark is the whole screen the user is currently viewing (although this may be set to other selection choices by the user in appropriate applications of the present invention),” which reflects that the system automatically captures a predetermined portion of the displayed third-party content—namely, the entire visible webpage by default—but this can be changed by the user. EX1003, 8:30-34.



EX1003, Figure 1.

78. “Once the page is captured, the process of creating identifier information by *extracting portions of the page* in the best-suited manner is initiated.” EX1003, 8:35-37. *See also* EX1003, 6:35-48 (“a computer-implemented method for creating an intelligent bookmark to a document,... extracting certain identifier information from the body of the document.”). “For example, text and html

information that can be extracted from the webpage are identified and saved at 14.”
EX1003, 8:35-55. Malla further teaches that this extraction occurs automatically as part of the bookmark-creation process, explaining that “[t]he extraction may *advantageously be automatic*, without requiring specific user input. The automatically extracted information may be supplemented manually by the user.”
EX1003, 6:35-56; *see also* Claims 2, 4-8, 10.

79. Malla further explains that the breadth and detail of the extraction process are controlled by “[i]nterface preferences,” which specify “how much information should be extracted.” EX1003, 9:12-21 (“*Interface preferences* ... will be set as a *function of the desired level of complexity* of the intelligent bookmarks (i.e., how much information should be extracted/stored, or if special functions needed to be performed).” Therefore, not only does Malla disclose that the extraction is automatic (EX1003, 6:35-56), Malla also discloses that the extraction happens according to predefined settings, such that the volume and type of captured information are determined by stored preference parameters rather than by requiring the user to manually select and copy each specific element for inclusion in the intelligent-bookmark record.

80. *Second*, Malla teaches “display[ing] the portion of the 3rd party content within the first user interface.” As illustrated in Figure 3, the “Intelligent Bookmark Preview” interface presents content that has been captured and extracted

from the underlying webpage—such as a “Screenshot” or preview image and corresponding “Saved Text”—directly in the bookmark preview and editing interface. EX1003, 9:34-36 (“FIG. 3 illustrates an interface 46 in which a user may create, view, edit, preview, etc. intelligent bookmarks.”); Figure 3. The extracted textual content and preview image are rendered inside the bookmark interface window (interface 46), rather than remaining in the web browser’s main display window, thereby demonstrating that the selected portion of the third-party webpage content is displayed “*within the first user interface.*”

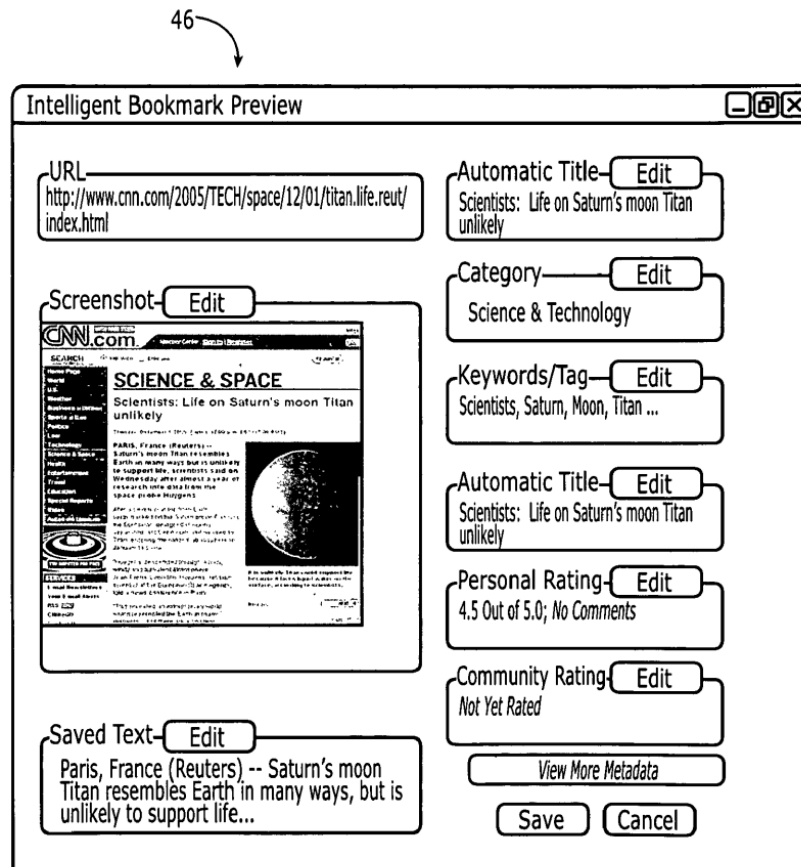
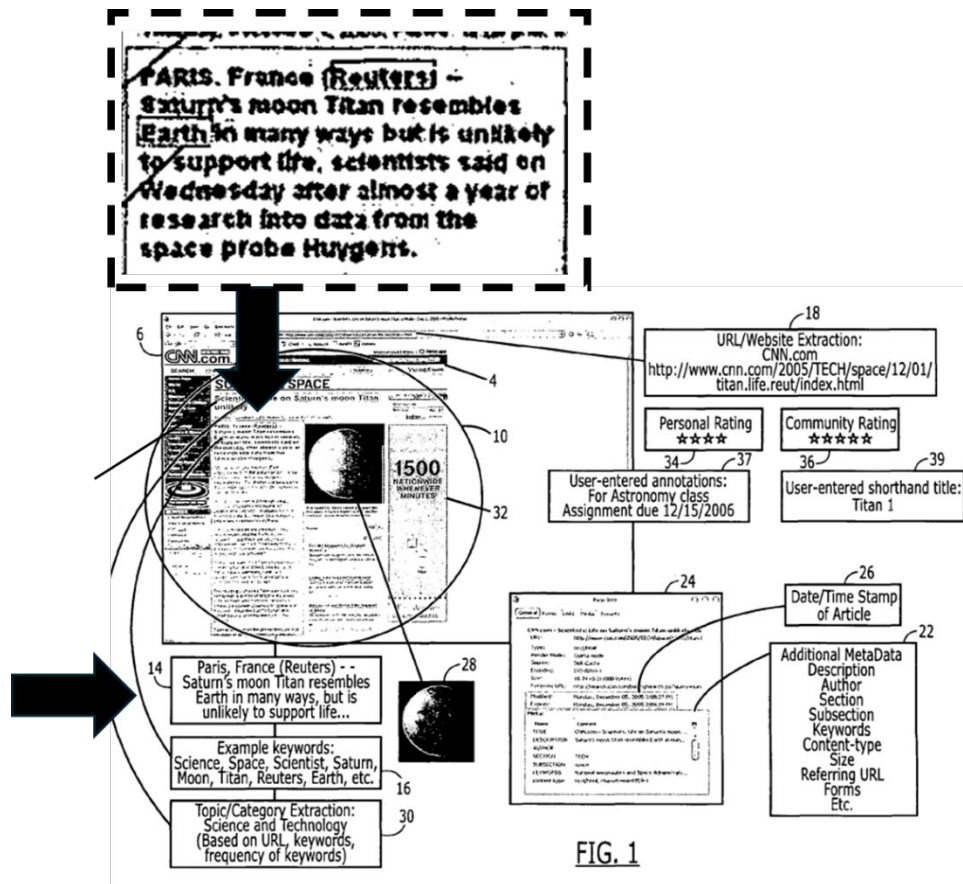


FIG. 3

EX1003, Figure 3.

81. And in fact, Malla teaches, in connection with Figure 1, that “[o]nce the page is captured ... text and html information that can be extracted from the webpage are identified and saved at 14.” EX1003, 8:35-39. By way of illustration, Figure 1 depicts Internet webpage 4 displaying the text: “Paris, France Reuters – Saturn’s moon Titan resembles Earth in many ways but is unlikely to support life, scientists said on Wednesday after almost a year of research into data from the space probe Huygens.” A portion of that webpage text is extracted and captured, as indicated by item 14 in Figure 1 (identified by arrow), thereby showing that specific textual content from the displayed third-party webpage is selected and saved as part of the intelligent bookmark record.



EX1003, Figure 1.

82. Note that in the illustration of Figure 1 of Malla above, the dotted inset is reproduced from the original Figure 1 submitted in Malla's original application, for readability. EX1008, 49.

83. As further illustrated in Figure 3, the captured text—representing a portion of the displayed webpage (the “*3rd party content*”)—is presented within the bookmark preview and editing interface itself. EX1003, 8:37-39 (“For example, text and html information that can be extracted from the webpage are identified and saved at 14”); 9:67-10:1 (“For example, *the text/html 14* captured in the intelligent

bookmark 44 ...”). Figure 3 also depicts a screenshot image that includes a visual portion of the underlying webpage, rendered within the same bookmark interface window. Accordingly, Malla teaches “*display[ing] the portion of the 3rd party content [e.g., extracted text] within the first user interface [e.g., shown in Figure 3],*” because both the extracted textual content and the captured visual image from the webpage are displayed inside the bookmark preview and editing interface.

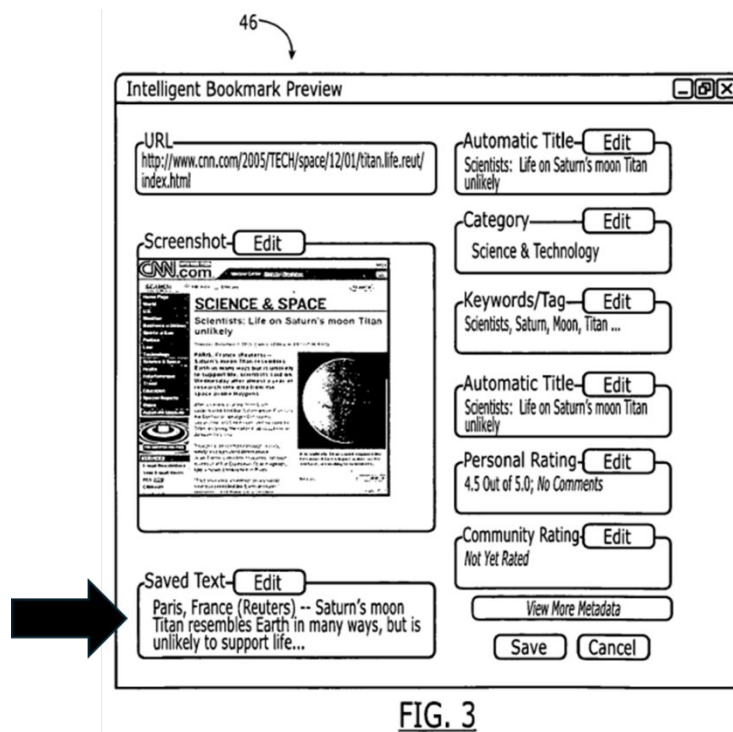
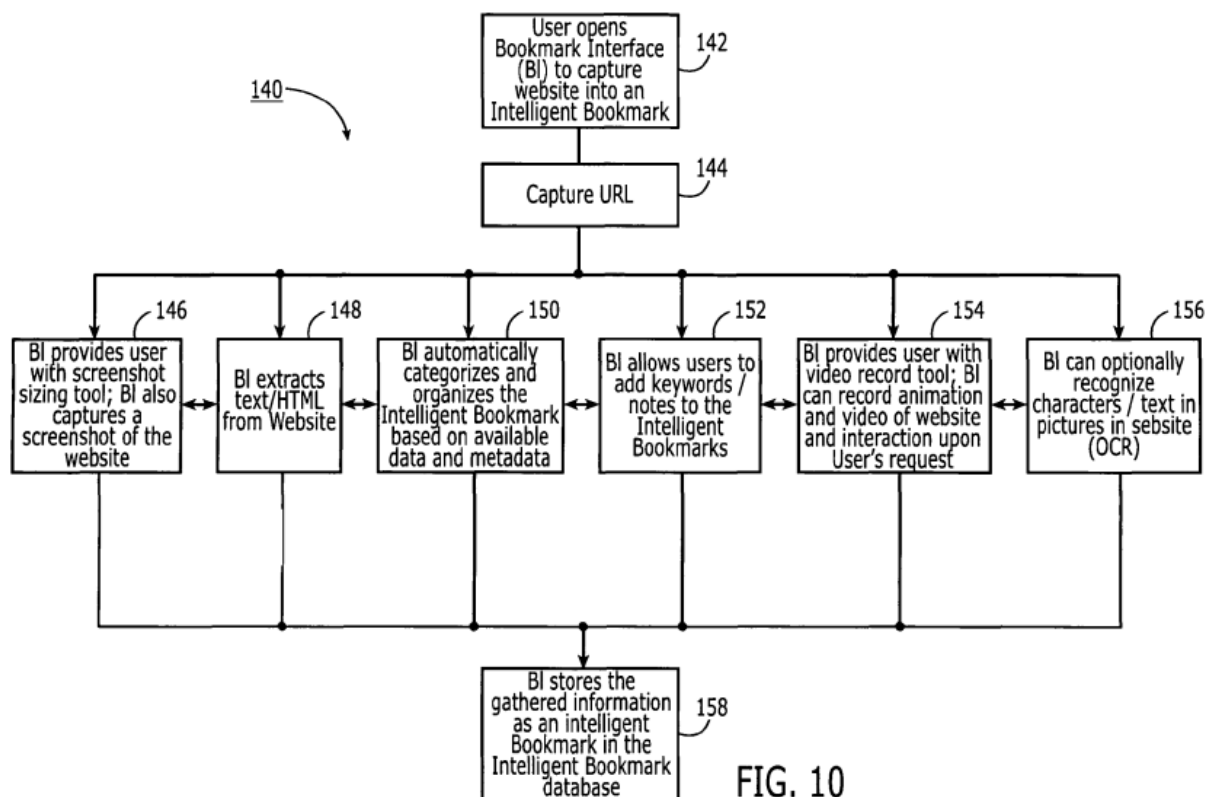


FIG. 3

EX1003, Figure 3.

84. **Third**, Malla discloses that displaying the portion of the 3rd party content within the first user interface is “*based on settings received from the user via the user interface to display selected portions of the 3rd party content.*” Malla explains that “how much information should be extracted/stored” is governed by

user-defined “*interface preferences*,” thereby indicating that configurable settings determine which portions of the webpage are selected and presented within the bookmark interface. EX1003, 9:12-16. For example, Malla teaches that the “image captured in the process of constructing the intelligent bookmark” is, “by default,” “the whole screen the user is currently viewing,” but that this capture behavior “*may be set to other selection choices by the user in appropriate applications*,” demonstrating that the scope of the captured and displayed webpage content is controlled by user-specified settings. EX1003, 8:30-34.



EX1003, Figure 10.

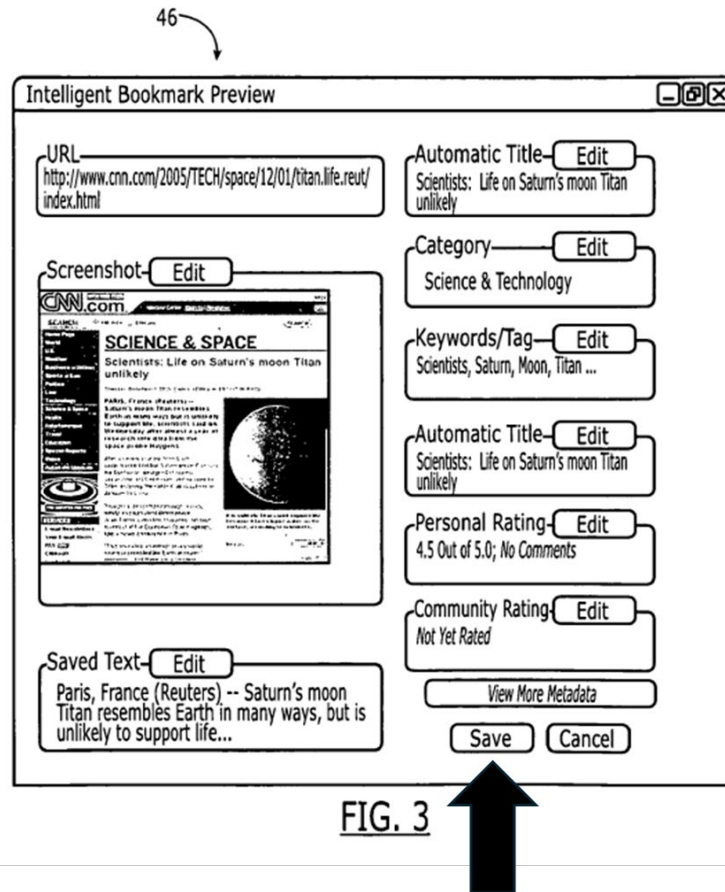
85. Malla discloses that “[b]ased on *user-selectable preferences*,” the user may choose to have “images and non-textual information ... scanned by OCR ... to extract further text and information,” thereby allowing the system to extract additional textual content from graphical elements of the displayed webpage when such processing is enabled. EX1003, 8:56-59; Figure 10 (Step 156). Because the intelligent-bookmark interface presents the extracted textual and image content within the bookmark preview and editing window, the user’s selection to enable or disable OCR processing directly affects which portions of the third-party webpage content are extracted and, consequently, which portions are displayed within that interface. As I explained above, Malla’s intelligent-bookmark interface displays the extracted content—such as the captured text/html 14—as part of the bookmark record. EX1003, 8:35–39; 9:34–36; Figures 1 and 3. Accordingly, the disclosed “user-selectable preferences” constitute settings through which the user controls the scope of extraction, thereby determining the portion of the third-party content that is selected and shown in the user interface.

86. Accordingly, Malla teaches that the system obtains, through the bookmark interface, user preferences that govern the extent and manner in which portions of third-party webpage content are captured, extracted, and subsequently presented within the first user interface. EX1003, 9:12-36; Figure 3; Figure 10.

- iii. [1C] receiving, by the server computer, a submission associated with the 3rd party content from the first user via the first user interface;

87. In my opinion, Malla discloses [1C].

88. **First**, Malla discloses “*receiving, by the server computer, a submission associated with the 3rd party content.*” As I discussed in Paragraphs 75–86, Malla depicts in Figure 3 a bookmark preview and editing interface “in which a user may create, view, edit, preview, etc. intelligent bookmarks.” EX1003, 9:34-36. Malla explains that an intelligent bookmark may include multiple elements associated with the underlying webpage, such as “the URL of the webpage, text within the webpage, non-text materials (e.g., images) and metaheaders.” EX1003, 4:38-41. These components are illustrated in Figure 3, which shows captured and extracted webpage information displayed within the “Intelligent Bookmark Preview” interface prior to saving. Malla further discloses that “[o]nce created, an intelligent bookmark can be ***saved*** and accessed ... ***online***,” where “the user’s computer 52 is connected to a ***remote server*** 56,” indicating that the completed bookmark record is transmitted from the client device to the remote server for storage. EX1003, 10:14-15, 10:22-24. Figure 3 also depicts a “Save” control within the bookmark interface, indicating the user action that initiates transmission of the bookmark submission—including the URL and associated extracted content—to the server computer.



EX1003, Figure 3.

89. Malla further discloses that the intelligent bookmark created through the client-side interface is transmitted from the user's computer to the remote server and received by that server for storage within its bookmark database. For example, Malla explains that a "bookmark database 58 [which] resides on the server 56." EX1003, 10:23-24. *See also* EX1003, 4:22-24 ("In another embodiment in accordance with the first aspect of the invention, the intelligent bookmark is *saved on a remote server*."). Accordingly, when the user activates the save functionality

for an intelligent bookmark, the associated bookmark data—including the URL and extracted webpage content—is transmitted from the user's computer to server 56 and received by that server for storage within the server-side bookmark database 58.

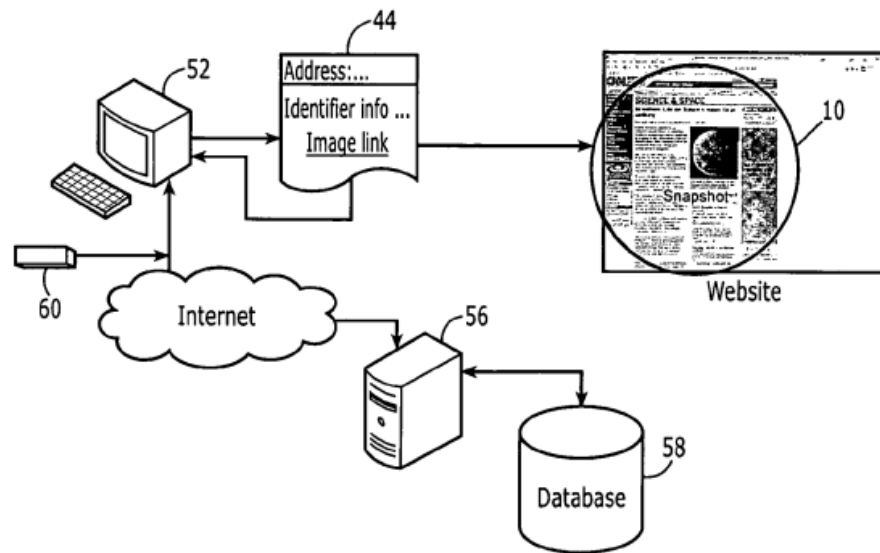
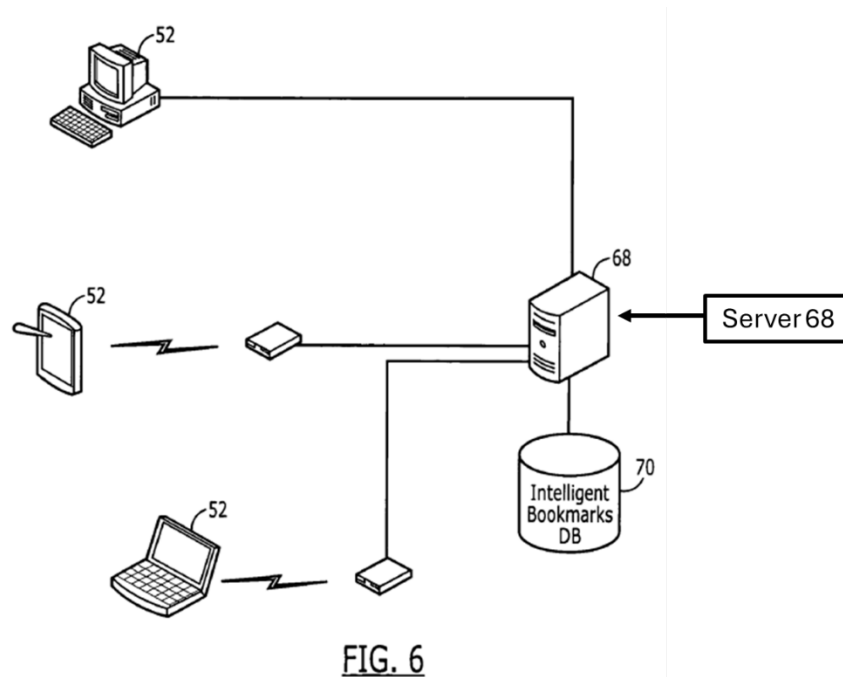


FIG. 5B

EX1003, Figure 5B.

90. This server-based submission and storage model is illustrated in Malla's Figure 6, which depicts "an on-line model in which a number of users 62, 64, 66 are in communication with a server 68, which is in turn in communication with intelligent bookmark database 70." EX1003, 11:24-27. Malla explains that, in this configuration, "a community of users may share, edit, *add*, etc. individual intelligent bookmarks or collections of intelligent bookmarks," indicating that bookmark records created by individual users are stored on the server and made

accessible for subsequent retrieval and modification. EX1003, 11:27-32. In this architecture, a user generates an intelligent bookmark based on third-party webpage content displayed in the browser and, upon saving, transmits that bookmark record to the server, where it is received and stored in the intelligent bookmark database for ongoing storage, search, and community-based management.



EX1003, Figure 6.

91. **Second**, Malla discloses “*submission ... from the first user via the first user interface.*” Malla explains that “[t]he user can access an **interface** to view, **add** or modify the intelligent bookmarks,” thereby indicating that bookmark creation and modification actions—including saving a bookmark—are performed through the disclosed interface. EX1003, 10:64-65. As illustrated in Figure 3, the bookmark

preview and editing interface includes a “Save” control, indicating that the user submits and stores the intelligent bookmark by interacting with that interface element. EX1003, Figure 3. And as I already explained in Paragraphs 68–74, the bookmark preview and editing interface shown in Figure 3 corresponds to the claimed “*first user interface operating on the first client computer,*” and therefore the individual who interacts with that interface to create and save the bookmark constitutes the claimed “*first user.*” EX1003, 9:34-36.

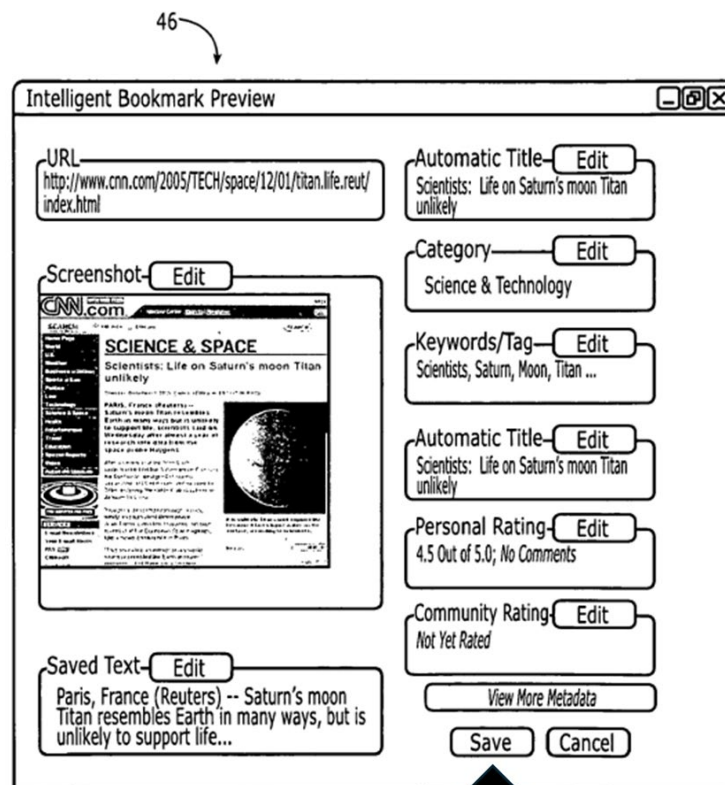


FIG. 3

EX1003, Figure 3.

iv. **[1D] indexing, by the server computer, the 3rd party content based on the submission from the first user;**

92. In my opinion, Malla discloses [1D].

93. As an initial matter, the '952 Patent describes "*indexing*" the first web content as including "receiving keywords for the first web content" (EX1001, 1:60-62) and then using those keywords to associate the first web content "for inclusion in search results." *See* EX1001, 8:11-13 ("The server computer 110 indexes the web content (Operation 260) for, for example, *inclusion in search results.*"); 8:51-53 ("the human user may specify a few *keywords* for the content identified by the user, and the content is indexed *using the human identified keywords.*"); 9:15-19 ("The snippet 155 is populated into the user interface 150 to help the user create a 'blog-entry' like submission to the server computer 110 to *index the article with user content 165* (e.g., user selected keywords, rating, comments)."). In my opinion, Malla discloses [1D] to the same extent as the '952 Patent.

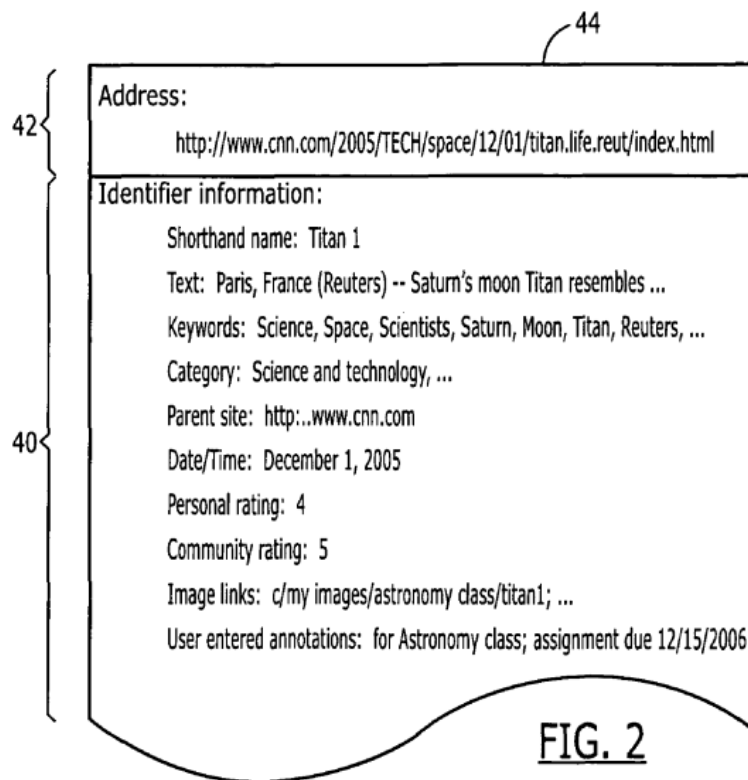
94. Malla discloses making a record that associates a webpage with corresponding identifier information. For instance, Malla teaches that an "intelligent bookmark is created by retrieving an address of a document, for example a web page, extracting identifier information from the document, and *saving the address in conjunction with the identifier information* as an intelligent bookmark." EX1003, 3:60-64. Malla further describes that "[a]n intelligent bookmark ... is a collection of

information, including an address (e.g., a URL) ... bundled together with selected other information,” which may include extracted content and “user entered annotations,” thereby forming a composite data record that links the webpage address with associated metadata. EX1003, 3:38-45. Malla also reiterates that “the term intelligent bookmark is used to refer to an *associated collection of information*, including an address (e.g., a URL) for a document (e.g., web page) ... and selected other information (referred to herein as identifier information),” confirming that the system generates and stores a record that explicitly associates the webpage identifier with extracted and user-supplied information. EX1003, 8:7-11.

95. Furthermore, Malla teaches that the identifier information associated with an intelligent bookmark includes keywords corresponding to the webpage. For instance, Malla discloses that “identifier information” may include a “search *keyword* used to locate the Internet webpage.” EX1003, 4:6-10; *see also* Figure 2. Malla also explains that “[*k*]eywords ... may be identified and extracted from text” within the webpage content or that “*keywords can be added by the user*,” demonstrating that keywords may be generated automatically or provided explicitly by the user. EX1003, 8:35-55. *See also* EX1003, 9:36-44 (“a user may create ... *keywords*, adding them to those automatically generated as identifier information discussed above....”); Figures 2 and 3, which depict keyword fields within the bookmark interface. Accordingly, the keywords that are used to categorize,

associate, and enable later retrieval of the webpage are incorporated into the intelligent bookmark record through user interaction with the interface, such that the indexing of the webpage within the bookmark database is performed “*based on the submission from the first user.*”

96. Furthermore, Malla discloses storing the URL of the webpage together with associated keywords and other identifier information in a server-side database. As I already explained in Paragraphs 87–91, Malla discloses that intelligent bookmarks are maintained within a “bookmark database 58 [which] resides on the server 56,” thereby indicating that the bookmark records are centrally stored on the server rather than locally on the client device. EX1003, 10:23-24. Malla further explains that the intelligent bookmark is embodied as a database record that includes both the address of the webpage (e.g., a URL) and associated identifier information (e.g., keywords and related metadata), stating that “[c]ollectively, the details captured above are referred to as identifier information 40, and *the address 42 and associated identifier information 40 are collectively referred to as an intelligent bookmark 44*, as shown in FIG. 2 embodied as a database record.” EX1003, 9:22-26; *see also* Figure 2, which depicts identifier information 40 including keywords and address 42 including the URL, thereby illustrating storage of the webpage identifier and associated keywords within the server-resident bookmark database.



EX1003, Figure 2.

97. Since the URL of a webpage is stored on the server in association with keywords, the server can later “*search* through and sort intelligent bookmarks *based on identifier information*,” such as those stored keywords. EX1003, 9:66-67; *see also* EX1003, claim 15 (“association between said address and said identifier information permits a search of said identifier information in order to obtain said address.”). The disclosed capability to search and sort bookmark records using the stored identifier information reflects that the server maintains an indexed data structure in which the third-party webpage address is retrievable through keyword-

based queries, demonstrating that the third-party content has been indexed according to the submitted keywords.

98. Therefore, Malla teaches associating the third-party content—namely, the webpage corresponding to the stored URL—with user-supplied keywords in the server-side database so that the content may be searched and retrieved based on those keywords, thereby disclosing [1D] to the same extent as the '952 Patent.

v. **[1E] ranking, by the server computer, the 3rd party content based on a rating of the 3rd party content submitted from the first user;**

99. In my opinion, Malla discloses or at a minimum renders obvious [1E].

100. **First**, Malla discloses that the server receives “*a rating of the 3rd party content submitted from the first user.*” In particular, Malla teaches that the “user can manually **rate** the bookmark [that the user is creating]... depending on his/her interest,” and as such discloses that the user provides a rating value as part of the intelligent-bookmark record. EX1003, 8:64-67. Figure 3 further illustrates this functionality by depicting a user-provided “personal rating” field within the bookmark preview and editing interface. EX1003, Figure 3. Malla also teaches that by providing a personal rating, the user can contribute to a community rating of that web content. EX1003, 8:64-67 (“The user can **manually rate** the bookmark at 34 depending on his/her interest. The bookmarked site can be checked for a community rating at 36 as well, allowing for the user to further **update the community rating.**”).

Because Malla permits the user who creates or edits the intelligent bookmark to provide and update the personal rating associated with that bookmark, Malla discloses that the rating (“*rating of the 3rd party content*”) is “*submitted from the first user.*”

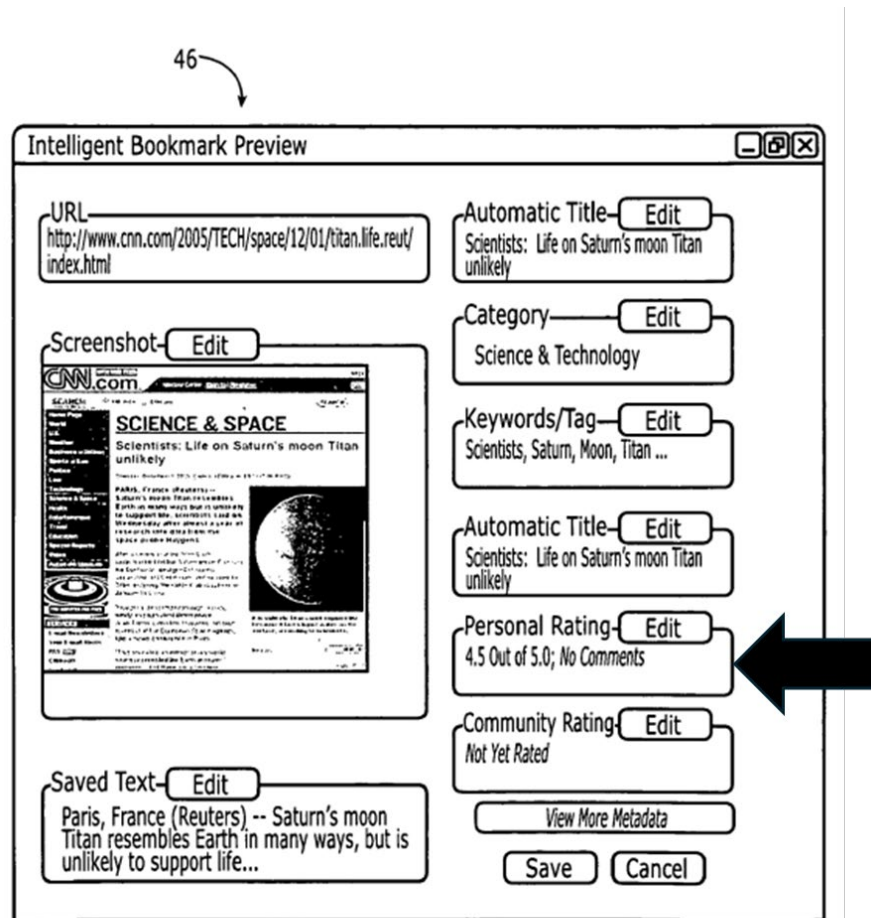


FIG. 3

EX1003, Figure 3.

101. **Second**, in my opinion, Malla discloses or, at a minimum, renders obvious “*ranking, by the server computer, the 3^d party content based on a rating....*”

Malla teaches that users can “search through and **sort** intelligent bookmarks based

on identifier information,” thereby indicating that the server processes stored bookmark records and orders them according to selected metadata fields, including ratings. EX1003, 9:66-67. Malla further provides an example in which “[u]sers can view intelligent bookmarks in a time-line type display, illustrated in FIG. 4 which sorts bookmarks based on the data and time stamp on the bookmark (for example filtered by a keyword, *bookmark rating*, etc.),” demonstrating that bookmark records—and thus the associated third-party webpages—may be ordered or filtered according to rating values maintained in the server-side database. EX1003, 10:9-13.

102. As I already explained in Paragraphs 87–91, Malla discloses that “the user’s computer 52 is connected to a remote server 56,” and the bookmark database 58 “resides on the server 56.” EX1003, 10:22-24. Malla further explains that users may “contribute to a *community rating* ... according to a rating system, designed for example to help users *quickly narrow a search to relevant material*,” which indicates that rating values are aggregated and utilized to influence how bookmarks are presented in response to user searches. EX1003, 11:37-41. Malla additionally states that by searching using “*ratings*, [] URLs of sites others have found *relevant to a topic* are *more efficiently and quickly identified*,” reflecting that rating-based criteria are employed by the server to order or filter bookmark results so as to prioritize content deemed more relevant. EX1003, 11:41-43. *See also* EX1003, 12:40-42 (“The community may allow users to have automatic ratings of bookmarks

and to find similar bookmarks based on topics, categories, etc.”), which further supports that the server utilizes rating information in determining the relative presentation of bookmarked third-party content within search results.

103. Malla’s disclosure that ratings are employed to “help users quickly narrow a search to relevant material” and to “efficiently and quickly identif[y]” webpages indicates that the system uses the associated community ratings as a basis for ordering or prioritizing bookmark records in response to search operations—for example, presenting webpages associated with higher community ratings more prominently than those with lower ratings. EX1003, 11:41-43; *see also* EX1003, 11:37-41 (“User 66 may contribute to a **community rating** 36 of the intelligent bookmarks in database 70 according to a rating system, designed for example to help users **quickly narrow a search to relevant material.**”). Because the bookmark database and the corresponding rating information reside on the remote server (EX1003, 10:22-24; 11:37-41; Figure 2), the server processes the stored rating values when executing search queries and, in doing so, ranks or orders the bookmark records—and thus the associated third-party webpages—based on those community ratings when generating and delivering search results.

104. A POSITA would also understand that Malla’s community rating is an aggregation of multiple users’ personal ratings. Malla depicts ratings on a scale of 1 to 5; therefore, community ratings of intelligent bookmarks would be real numbers

between 1 and 5 inclusive, so would form a ranking of the entire set of intelligent bookmarks.

105. At a minimum, in my opinion, it would have been obvious to modify Malla so that the server explicitly ranks bookmarks or corresponding webpages using their associated rating values when generating search results. As I explained above, Malla teaches employing a community rating associated with a webpage or bookmark “to help users *quickly narrow a search to relevant material*,” thereby identifying rating information as a mechanism for improving the relevance and efficiency of search output. EX1003, 11:37-41. In view of that stated purpose, a POSITA would have understood that ordering search results according to the stored rating values—such that higher-rated bookmarks are presented more prominently than lower-rated bookmarks—would directly achieve the disclosed objective that “URLs of sites others have found relevant to a topic are *more efficiently and quickly identified*.” EX1003, 11:41-43. Implementing such rating-based ordering in Malla would have been an application of a known technique—ranking search results based on user-supplied ratings, as was well established in the art (EX1004, [0019], [0047], [0143], [0176]-[0177])—to improve a similar search-and-retrieval system (Malla’s server-based bookmark search functionality) in the same manner, namely by presenting search results ordered according to rating information so that webpages deemed more relevant by users are identified and surfaced more efficiently.

106. A POSITA would have been motivated to configure Malla's server to rank search results using stored rating information because Malla expressly teaches that the "community rating" is intended to help users "quickly narrow a search to relevant material," thereby identifying rating data as a mechanism for improving the efficiency and relevance of search output. EX1003, 11:37-41. In light of that disclosure, a POSITA would have recognized that ordering bookmark records—and thus the associated webpages—according to their community rating or user rating values when generating search results would directly advance the stated objective, and that implementing such rating-based ranking on the server side would constitute a straightforward and predictable software enhancement within the ordinary technical skill of a POSITA.

- vi. **[1F] receiving, by the server computer, a search query from a second client computer operated by a second user;**

107. In my opinion, Malla discloses [1F].

108. Malla discloses that multiple users, each operating their respective client computers, communicate with a centralized server that stores, organizes, and manages intelligent bookmarks within a shared database environment. EX1003, 11:24-27 ("[In] FIG. 6, an on-line model in which a number of users 62, 64, 66 are in communication with a server 68, which is in turn in communication with intelligent bookmark database 70, is illustrated."). Consistent with this multi-user

architecture, Malla further teaches “saving the intelligent bookmark to a bookmark community, wherein said bookmark community is accessible by *multiple users*,” thereby describing a shared repository in which bookmark records created by one user may be accessed and utilized by others. EX1003, 5:44-46. Malla additionally explains that “there is significant value in providing intelligent bookmarks to an appropriate networked community, with its *members able to search*, rate, add to, etc. those bookmarks.” EX1003, 12:32-35.

109. Malla further teaches that members of the bookmark community submit search requests to the community server for retrieval of stored intelligent bookmarks. For example, Malla discloses that “a user 66 can initiate access to intelligent bookmarks stored in database 70 through use of a community portal (software, not shown) resident on server 68,” and that the user “*can then search ... the intelligent bookmarks* stored in database 70,” thereby describing a server-resident search interface through which client devices transmit search queries to the server. EX1003, 11:29-34. *See also* EX1003, Figure 6, which illustrates multiple distinct user computers (62, 64, 66) communicating with server 68, and EX1003, 11:54-58 (“While the community aspect of the present invention is, in one sense, an adjunct to traditional web searches, the community server may itself have search engine type technology to make *searches for intelligent bookmarks* very efficient.”) Accordingly, Malla discloses that server 68 (“*a server computer*”) receives a search

query submitted by one community member (“*a second user*”) operating a separate client device (“*a second client computer*”) distinct from the client device used by the user who originally created and saved the intelligent bookmark.

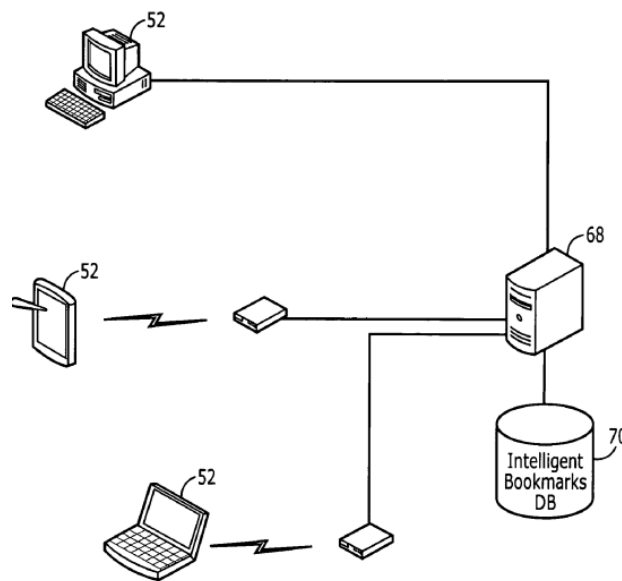


FIG. 6

EX1003, Figure 6.

- vii. **[1G] in response to receiving the search query, selecting, by the server computer and based on the indexing and the ranking of the 3rd party content, a set of search results that include an identification of the 3rd party content;**

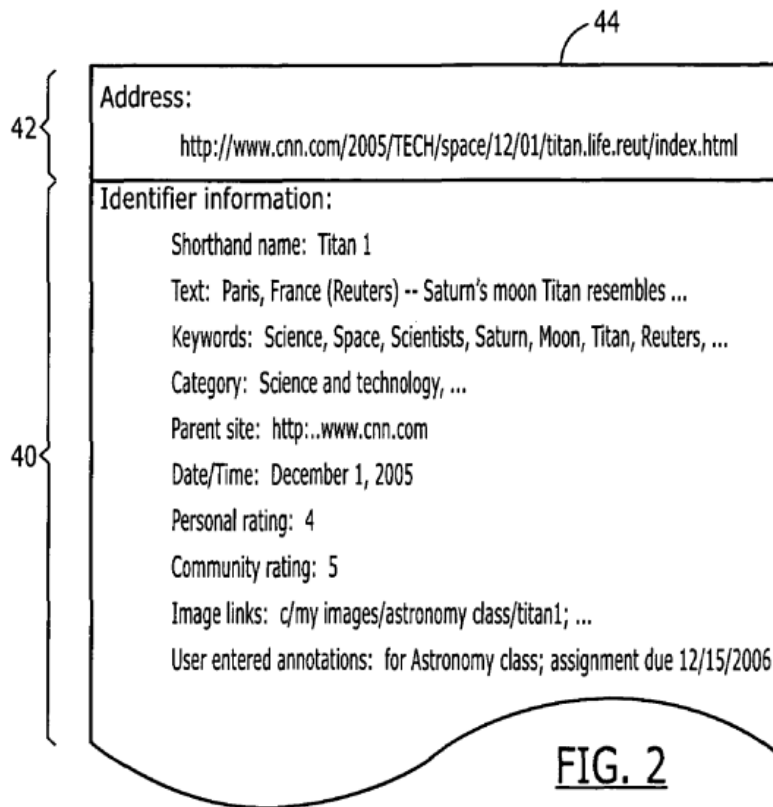
110. In my opinion, Malla discloses, or at a minimum renders obvious [1G].

111. First, Malla discloses “*in response to receiving the search query, selecting... a set of search results that include an identification of the 3rd party content.*” Malla teaches that “a database for intelligent bookmarks can be accessed and managed by requesting a user to enter a search term, *searching the database for*

intelligent bookmarks containing the search term, displaying a list of intelligent bookmarks with the search term.” EX1003, 5:21-30. In this disclosed workflow, the act of searching the database for intelligent bookmarks is triggered by the user entering a search term, such that the selection and display of matching bookmark records—including their associated webpage identifiers—occurs “*in response to receiving the search query.*”

112. Malla further explains that an “intelligent bookmark” is a collection of information that includes an “address (e.g., a URL)” for the bookmarked webpage. EX1003, Abstract; 3:38-42; 8:7-11 (“In the following description the term intelligent bookmark is used to refer to an associated collection of information, including an address (e.g., a URL) for a document (e.g., web page) ... and selected other information (referred to herein as identifier information).”). Malla also teaches that “[i]n searching by keywords, metadata, dates, ratings, etc., *URLs of sites* others have found relevant to a topic are more efficiently and quickly *identified*,” thereby indicating that the search process selects and returns bookmark records that include the stored URL corresponding to the underlying webpage. EX1003, 11:41-43. Accordingly, when the server searches the bookmark database in response to a user’s query, the resulting list of intelligent bookmarks includes the URL of the associated third-party webpage, which constitutes an identification of that content.

113. In particular, Malla's Figure 2 illustrates a database record corresponding to an intelligent bookmark created for the representative webpage as I already explained in Paragraphs 75–86. As shown in Figure 2, the bookmark record includes identifier information fields such as keywords—e.g., “Science, Space, Scientists, Saturn, Moon, Titan, Reuters....”—and the webpage address shown as Address 42 (in the example: “http://www.cnn.com/2005/TECH/space/12/01/titan life.reut/index.html”). EX1003, Figure 2. When this bookmark record is stored in the server-resident bookmark database, a user who submits a search query containing one or more of these keywords would retrieve the corresponding intelligent bookmark record, including the URL stored as Address 42. EX1003, 11:41-43; *see also* EX1003, 9:22-26 (“Collectively, the details captured above are referred to as identifier information 40, and the **address 42** and associated identifier information 40 are collectively referred to as an intelligent bookmark 44, as shown in FIG. 2 embodied as a database record.”). The URL stored as Address 42 therefore constitutes the required identification of the underlying third-party web content returned in the selected search results.



EX1003, Figure 2.

114. **Second**, Malla discloses that a set of search results are produced “*based on the indexing ... of the 3rd party content.*” As I already explained in Paragraphs 92–98, Malla discloses that an intelligent bookmark is stored as a structured database record that associates the URL of a webpage with identifier information such as keywords, which may be automatically extracted from the webpage content or manually supplied by the user. EX1003, 8:35-55 (“Keywords 16 may be identified and extracted from text 14 or other portions of the webpage... Further, the bookmark can also be manually categorized, and keywords can be added by the user.”); *see also* EX1003, 4:6-10; 9:22-26; Figure 2. By storing the webpage address in

conjunction with such keywords, the server indexes the third-party content according to those identifier fields within the bookmark database. Malla further explains that search operations are performed using this association between webpage addresses and keywords, stating that “[i]n searching by **keywords**..., URLs of sites others have found relevant to a topic are more efficiently and quickly identified,” which reflects that the search results are generated based on the stored keyword associations corresponding to the indexed webpages. EX1003, 11:41-43.

115. **Third**, Malla discloses or, at a minimum, renders obvious that the results are “*based on the ... ranking of the 3rd party content.*” As I explained above in Paragraphs 99–106, Malla teaches that community ratings are associated with intelligent bookmarks and are used to help users “quickly narrow a search to relevant material,” and that searching using ratings enables “URLs of sites others have found relevant to a topic” to be identified efficiently, which reflects that rating information influences the order or prioritization of returned bookmarks. EX1003, 11:37-43. Because the intelligent bookmarks—including their associated ratings—are stored on the server and used during search operations, a POSITA would have understood that the server produces search results ordered or filtered according to those rating values, thereby basing the returned results on the ranking of the corresponding third-party webpages according to their ratings.

viii. [1H] transmitting, by the server computer, the set of search results to the second client computer.

116. In my opinion, Malla discloses [1H].

117. Malla discloses that “a database for intelligent bookmarks can be accessed and managed by requesting a user to enter a search term, searching the database for intelligent bookmarks containing the search term, *displaying a list of intelligent bookmarks with the search term.*” EX1003, 5:21-30; *see also* EX1003, 11:41-43 (“In searching by keywords, metadata, dates, ratings, etc., URLs of sites others have found relevant to a topic are more efficiently and quickly identified.”) As I already explained above in Paragraphs 87–91 and 107–109, Malla teaches that the intelligent bookmarks are maintained within a server-resident bookmark database and that user computers communicate with the server to initiate search requests and retrieve bookmark records. EX1003, 10:22-24; 11:24-34; Figure 6. In this client–server configuration, the server performs the database search in response to the user’s entered search term and then provides the resulting list of intelligent bookmarks—including their associated webpage identifiers—to the requesting user’s computer, thereby disclosing that the server computer transmits the set of search results to the second user’s client device.

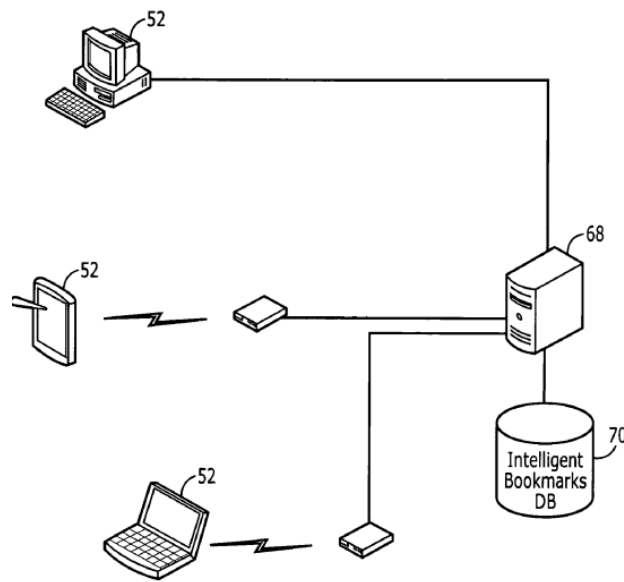


FIG. 6

EX1003, Figure 6.

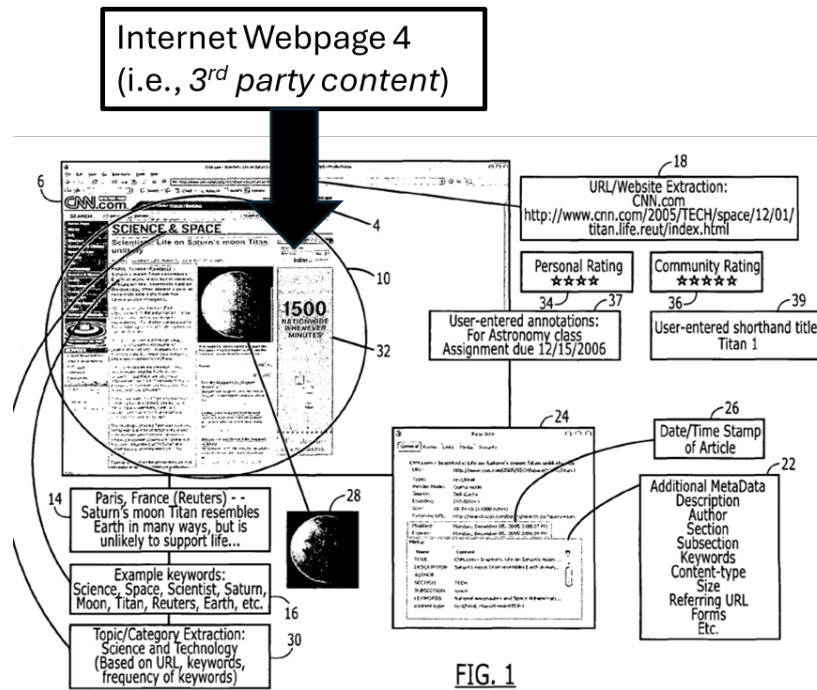
3. Claim 2

- i. [2] The method of claim 1, wherein the 3rd party content comprises of web content.

118. In my opinion, Malla discloses the additional limitation of claim 2.

119. Malla teaches that “the term intelligent bookmark is used to refer to an associated collection of information, including an address (e.g., a URL) for a *document (e.g., web page)* or other hyper-media enabled item and selected other information (referred to herein as identifier information).” EX1003, 8:7-11. *See also* EX1003, 3:60-64 (describing retrieving an address of a document, “for example a web page”); 8:20-22 (“*Internet webpage 4*, displayed in a window 6 by a web browser application.”). These disclosures confirm that the underlying content

associated with each intelligent bookmark is a webpage rendered through a web browser and identified by a URL. Accordingly, the third-party content referenced in Malla comprises “web content.”



EX1003, Figure 1.

4. Claim 3

- i. [3] The method of claim 1, wherein ranking the 3rd party content is further based on ratings of the content from other users.

120. In my opinion, Malla discloses the additional limitation of claim 3.

121. As I already explained in Paragraphs 99–106, Malla teaches or at least renders obvious “*ranking the 3rd party content*” based on community ratings associated with intelligent bookmarks. EX1003, 8:64-67; *see also* EX1003, Figure

3. For instance, Malla discloses a multi-user online architecture in which “a number of users 62, 64, 66 are in communication with a server 68, which is in turn in communication with intelligent bookmark database 70,” thereby establishing a shared server environment in which multiple users contribute bookmark records and associated metadata. EX1003, 11:24-29; Figure 6. Malla further explains that “[i]n such a model, a community of users may share, edit, add, etc. individual intelligent bookmarks or collections of intelligent bookmarks,” confirming that bookmark data are collectively maintained and accessed. EX1003, 11:27-29.

122. Within this multi-user framework, Malla teaches that users may “contribute to a *community rating* ... according to a rating system,” and that such rating information is used to assist users in narrowing searches and identifying relevant bookmarks and their associated webpages. EX1003, 11:37-43. Malla further discloses that rating data is stored as part of the identifier information for each intelligent bookmark, including fields reflecting personal and community ratings, as shown in Figure 2 and described in connection with identifier information 40. EX1003, 9:22-26; Figure 2; see also EX1003, 4:6-10.

123. As I already explained in Paragraphs 99–106, using the stored community rating to influence search result presentation teaches or at least renders obvious ranking webpages according to those rating values. Because the community rating associated with a particular bookmark or webpage reflects input from multiple

users within the community, ranking bookmarks or webpages based on that community rating constitutes ranking “*the 3rd party content*” based on ratings provided by users other than the first or second users.

B. Ground III: Malla In View Of Walther Renders Obvious Claims 1–6

1. Walther (EX1004)

124. Walther describes improving a traditional search process by using information that users provide about webpages (or sites) to influence how search results are displayed and ordered. In particular, Walther teaches collecting user-supplied metadata for documents and then relying on that metadata when ranking and presenting search results. Walther calls this user-supplied metadata “annotations.” EX1004, [0009], [0019]. *See also* EX1004, [0018] (“the term ‘annotation’ refers generally to any descriptive and/or evaluative metadata related to a document (e.g., a Web page or site) that is collected from a user and thereafter stored in association with that user.”). Walther further explains that the annotations can take several forms, including “a rating (which may be favorable or unfavorable) of the document, a list of keywords identifying a topic (or topics) of the document, a free-text description of the document.” EX1004, [0018].

125. Walther explains that users can provide annotations through an interface that is presented as part of the search workflow. For example, Walther

describes a search results page that includes a “Save This” button next to a result, which “launches a page ... via which the user can annotate that particular hit.” EX1004, Figure 6; [0113]; [0119] (“At step 806, an *annotation editing interface* for the subject page is displayed. The editing interface is advantageously displayed in a *separate window* or dialog box that opens when a ‘Save This’ button is activated.”). Walther refers to this *separate window* as an annotation editing interface, and it allows the user to enter information such as ratings, keywords, or free-text comments for the selected page, as illustrated in Figure 9. EX1004, [0046], [0122]. Walther further states that the interface is configured so the user can review the page being annotated while supplying the annotation, or can readily switch between the page and the annotation interface. EX1004, [0119] (“[T]he editing interface is arranged on the user’s display in such a way that the user can look at both the subject page and the annotation or easily flip back and forth between the two.”).

Save This

URL: 902

Title 904

Save what? 908

☒ This page only

☐ All URLs beginning with 910 912

Keywords 916

Description 914 918

Rating: 920

☐

☐

☒ None

922 924

FIG. 9

EX1004, Figure 9.

126. Walther also describes relying on previously stored annotations to improve how search results are shown to a user and how they are ordered. In particular, Walther explains that “stored annotations can be used ... to enhance and personalize search and browsing operations,” including “to affect the manner in which search results are presented” and ranked. EX1004, [0019], [0047], [0129]-[0132]. As an example, Walther teaches that the results can be ranked based on user ratings—for example, by using “an aggregate rating (e.g., an average rating)” derived from “every user who has provided ... a rating.” EX1004, [0068] (“In one

embodiment, user annotation module 164 also initiates an automatic refresh of the results page in response to the new annotation data. During this refresh operation, the hits listed on the results page may be reranked using the new data, and an updated results page reflecting the new rankings is transmitted to the user. In cases where the new annotation includes a favorable rating, the new page may also list the newly annotated site among the “favored” results. Accordingly, the user’s new annotations can have an immediate effect on the displayed results of the current search, as well as being stored for use in processing future queries from that user.”). *See also* EX1004, [0176]-[0177].

2. Malla In View of Walther (“Malla-Walther Combination”)

i. Malla In View Of Walther’s Rating-Based Ranking Of Search Results

127. As I already explained in Paragraphs 58–65, Malla discloses that the “user can manually *rate* the bookmark ... depending on his/her interest” and may also “update the community rating,” thereby teaching that both individual and collective rating values are associated with intelligent bookmarks corresponding to third-party webpages. EX1003, 8:64-67. Malla further explains that these ratings are “designed for example to help users quickly narrow a search to relevant material,” and that by using ratings, “URLs of sites others have found *relevant to a topic*” can be “efficiently and quickly identif[ied],” which reflects that rating information is

intended to influence the identification and prioritization of bookmarks during search operations. EX1003, 11:37-43. Malla also teaches that such ratings are stored as part of the intelligent bookmark record within the server-side database, including user “preference ratings” maintained as identifier information associated with the bookmarked URL. EX1003, 4:6-10; 9:22-26; Figure 2.

128. To the extent it is argued that Malla does not expressly disclose using the stored ratings to rank search results, that technique was well known in the art. For example, as I already explained in Paragraphs 124–126, Walther teaches using user-provided ratings to influence and rank search results in response to a query. EX1004, [0019], [0047], [0130]-[0131]. Walther specifically discloses “extracting user rating information from the annotations and using such information to affect the manner in which search results are presented,” thereby identifying rating data as a ranking factor. EX1004, [0019]. Walther further teaches that “ratings can also be used for ranking search results in response to the user’s queries, with favorable judgments tending to increase the ranking of a given page or site and unfavorable judgments tending to decrease the ranking”. EX1004, [0047]; *see also* EX1004, [0132] (explaining that “ratings data might be used as a **factor in ranking** the hits”), [0137] (“Conventional ranking algorithms may be used to generate ... ranking.”); [0143]-[0145] (“the results list is optionally **reranked using ratings** contained in the annotations.”).

129. Walther additionally discloses a multi-user implementation in which the ranking factor is derived from an aggregate or global rating based on ratings submitted by multiple users. EX1004, [0068], [0176]-[0177]. Walther explains that reranking may be based on “an aggregate rating (e.g., an average rating)” calculated from “every user who has provided an annotation with a rating.” EX1004, [0068]; see also EX1004, [0176]. Furthermore Walther teaches that the resulting “global rating of a page or site may be used as a factor in the search-results ranking algorithm when the URL of the page or site matches a hit for a given search.” EX1004, [0177].

130. In my opinion, a POSITA would have found it obvious to combine Malla with Walther such that Walther’s rating-based ranking and reranking techniques are incorporated into Malla’s intelligent-bookmark search system. In particular, a POSITA would have found it obvious to modify Malla such that two things happen. *First*, when Malla’s server searches the bookmark database for intelligent bookmarks responsive to a user’s query (EX1003, 11:41-43), the server further orders or reranks the resulting list based on the associated rating values, consistent with Walther’s teaching that ratings can be used “to affect the manner in which search results are presented” and to rank hits in response to a query (EX1004, [0047], [0132], [0143]). And *second*, where multiple users have provided ratings for a given bookmarked URL—including in the form of a community rating (EX1003, 8:64-67; 11:37-41)—Malla’s server computes and applies an aggregate or global

rating as a ranking factor, in accordance with Walther's disclosure that search result ranking may be based on "an aggregate rating (e.g., an average rating)" derived from ratings submitted by multiple users (EX1004, [0068], [0176]-[0177]).

131. In my opinion, a POSITA would have been motivated to combine Malla with Walther's teachings as described above for multiple independent reasons. **First**, Malla expressly teaches that rating information, including a community rating, is intended to improve the search experience by assisting users in narrowing results to relevant material. EX1003, 11:37-43 ("User 66 may contribute to a community rating 36 of the intelligent bookmarks in database 70 according to a rating system, *designed for example to help users quickly narrow a search to relevant material.*"). Walther similarly teaches that user ratings can be used to influence the ordering of search results, including by increasing the ranking of favorably rated pages and decreasing the ranking of unfavorably rated pages. EX1004, [0047], [0143]. In view of these aligned objectives, a POSITA would have recognized that incorporating Walther's explicit reranking-by-rating methodology into Malla's server-based bookmark search would further advance Malla's stated goal of narrowing and efficiently identifying relevant URLs using rating information, rendering the two systems technically compatible and complementary in purpose.

132. **Second**, Walther teaches that ratings and other aggregated annotations can be used to refine search results and "enhance the user's experience." EX1004,

[0185]. Walther further explains that “where the user’s identity or particular interests are not known, this aggregate information [that includes ratings] can be used for purposes such as resolving ambiguity in search queries, selecting and arranging content of a Web page, and so on,” thereby identifying rating-derived aggregate information as a general-purpose mechanism for improving search relevance and result presentation. EX1004, [0187]. In view of these teachings, a POSITA would have been motivated to apply Walther’s established rating-based reranking technique within Malla’s intelligent-bookmark search system to improve how bookmark search results are selected, ordered, and presented to users, particularly where community rating data is already stored and available for use by the server.

133. *Third*, Malla and Walther are technically highly compatible and address the same type of technical problems—improving the relevance and presentation of search results using user-supplied metadata associated with web content. Malla teaches associating ratings with bookmarked URLs and using those ratings to assist users in narrowing searches and identifying relevant bookmarked webpages. EX1003, 11:37-43. Walther similarly teaches leveraging user-provided ratings to influence the ordering of search results, including ranking or reranking the results list returned in response to a query. EX1004, [0019], [0047], [0143]. Because both systems rely on rating information as a mechanism for improving search relevance and result presentation, a person of ordinary skill in the art would have

readily understood that Walther's explicit rating-based ranking techniques are directly applicable to Malla's server-based bookmark search system, which already collects and stores rating data as part of its intelligent-bookmark records.

134. A POSITA would have had a reasonable expectation of success in combining Malla and Walther for multiple independent reasons. **First**, Malla already discloses collecting and storing rating information for intelligent bookmarks, including individual and community ratings, and using those ratings to assist in narrowing searches and identifying relevant URLs. EX1003, 8:64-67; 11:37-43. Walther, in turn, discloses established techniques for using such rating information to rank or rerank search results, including by applying an aggregate or global rating derived from multiple users. EX1004, [0047], [0068], [0176]-[0177]. Walther's aggregate or global rating simply makes explicit what a POSITA would have understood Malla's "community rating" to be—a compilation of multiple users' ratings used to order results. Because Malla supplies the rating inputs and Walther supplies a known method for applying those inputs to order search results, the two systems are technically compatible and complementary in function. **Second**, incorporating Walther's reranking approach into Malla would have required only routine software implementation, such as sorting or weighting search results based on an existing rating field stored in the bookmark database, and would have produced predictable results—namely, presenting higher-rated URLs more

prominently in the returned results list. EX1004, [0047], [0088], [0143], [0177]; Figure 9.

135. Furthermore, the combination would have been obvious because it would have entailed applying Walther's known technique of rating-based ranking or reranking of search results to Malla's existing bookmark-search system, which already collects and utilizes rating information to improve retrieval of relevant URLs. EX1003, 11:37-43; EX1004, [0047], [0143]. Implementing Walther's approach within Malla's framework would have predictably resulted in improved ordering of search results based on the aggregate or global rating information already maintained in the server-side bookmark database, thereby advancing Malla's stated objective of efficiently identifying relevant webpages without altering the fundamental architecture or operation of the underlying system.

ii. Malla Further In View Of Walther's Rating Mechanism

136. Malla discloses collecting user ratings associated with bookmarked third-party web content as part of the intelligent-bookmark record. Specifically, Malla discloses that the "user can manually rate the bookmark at 34 depending on his/her interest" and may also "update the community rating," thereby indicating that both individual user ratings and shared community ratings are associated with the bookmarked webpage and maintained within the system. EX1003, 8:64-67. Figure

3 further illustrates a user-provided “personal rating” within the bookmark preview and editing interface, and Figure 2 depicts a corresponding database record for an intelligent bookmark that includes rating fields for both community rating and personal rating, confirming that rating information is stored in association with the bookmarked URL in the server-side database.

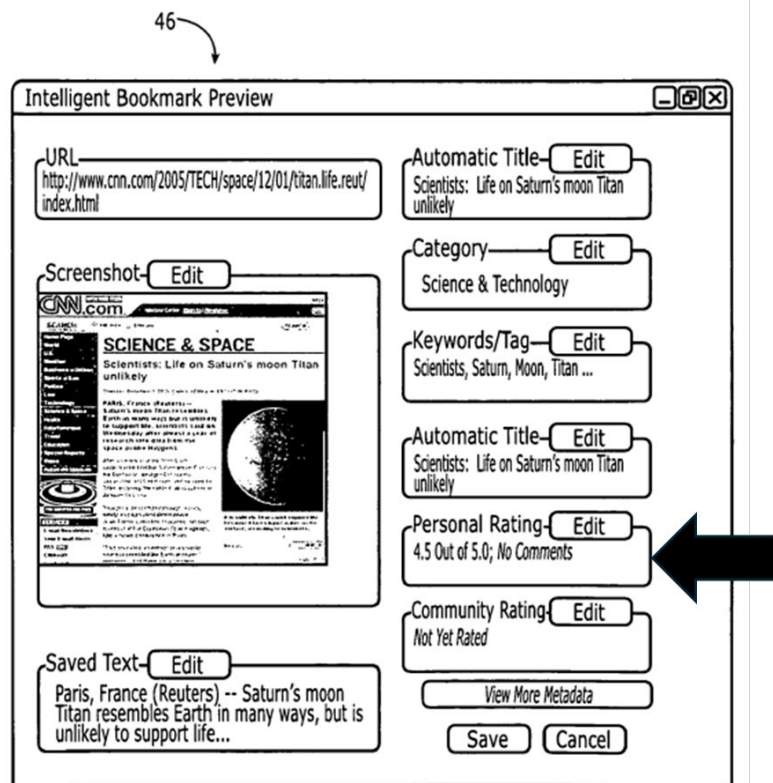
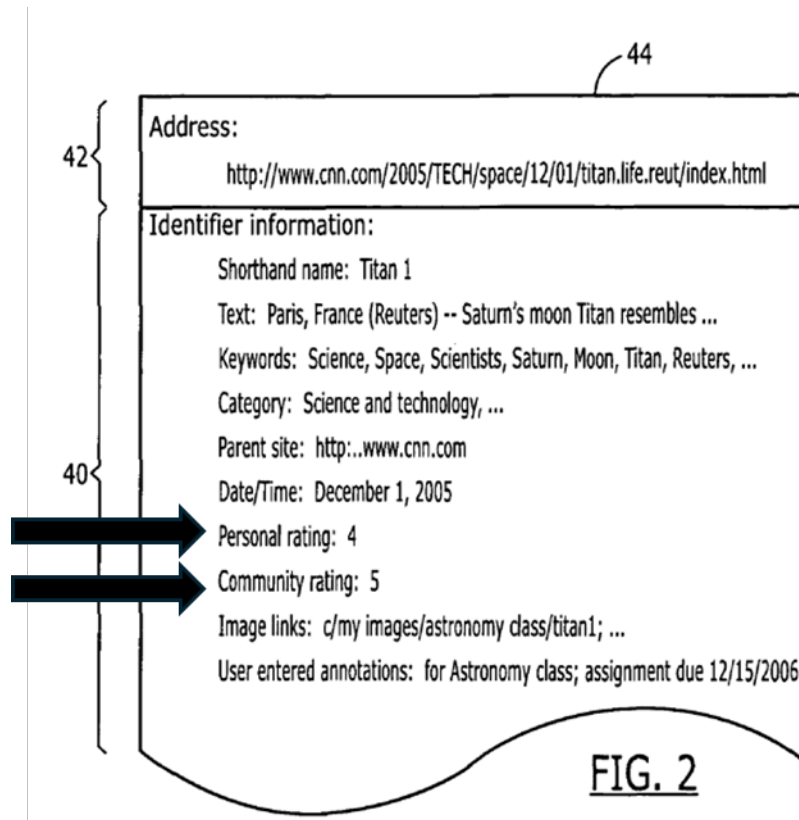


FIG. 3

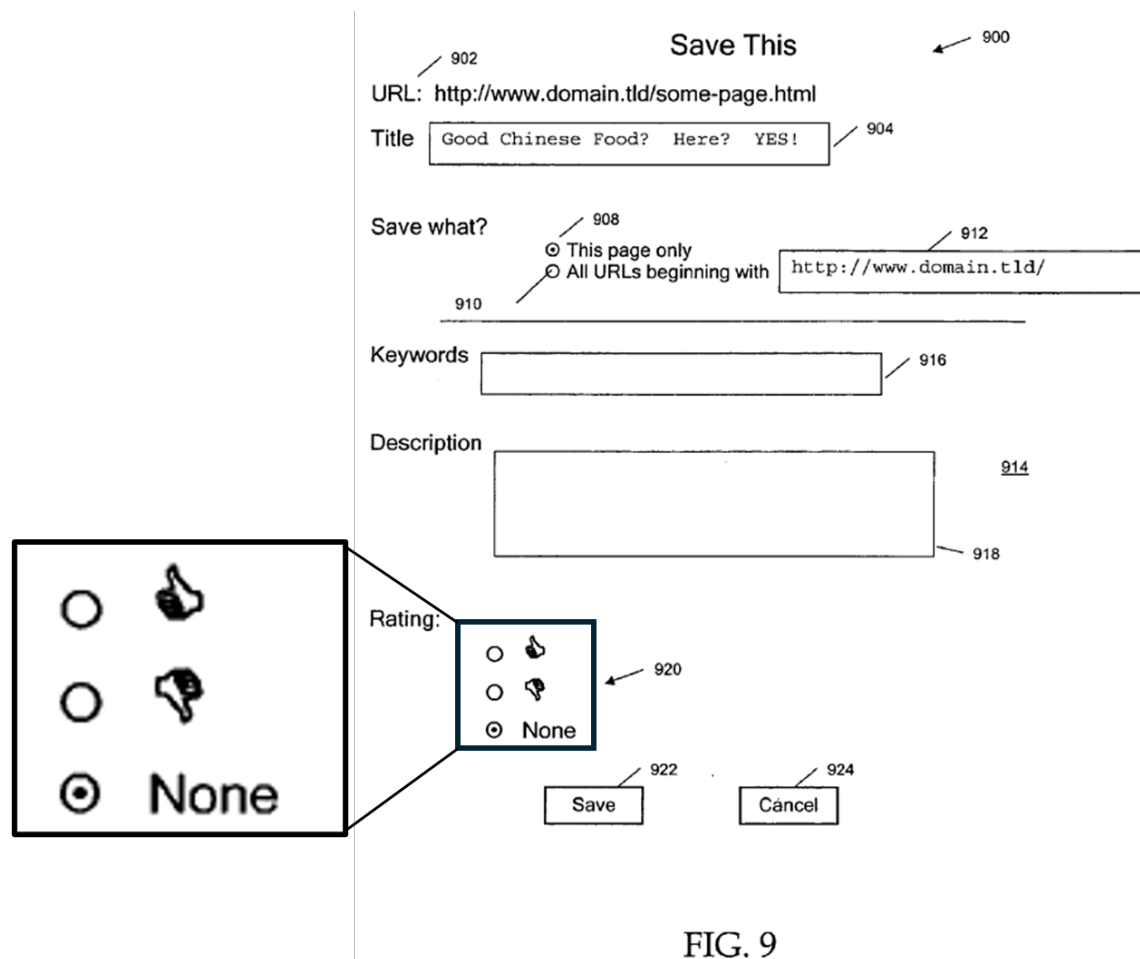
EX1003, Figure 3.



EX1003, Figure 2.

137. Malla discloses that the rating associated with an intelligent bookmark may be implemented as a numerical value, as illustrated in Figure 2. However, it was well known in the art that rating information could also be implemented using categorical indicators reflecting favorable, unfavorable, or neutral evaluations. For example, Walther teaches that “[r]atings may be provided using various scales, and the scale preferably allows at least *‘favorable,’ ‘unfavorable’ and ‘neutral’ ratings,*” thereby expressly identifying these three rating categories. EX1004, [0088]. Walther also explains that such ratings may be implemented using “a *favorable (e.g., thumbs-up)* or *unfavorable (e.g., thumbs-down)* rating to the

annotated page,” with favorable and unfavorable ratings assigned corresponding numeric values (e.g., +2 and −2, respectively), and that “unrated pages ... [are] given a default (*neutral*) rating of zero.” EX1004, [0088]; Figure 9. Walther’s disclosed thumbs-up, thumbs-down, and default neutral controls correspond directly to like, dislike, and neutral rating types, demonstrating that alternative, non-numeric rating implementations were conventional in search and annotation systems.



EX1004, Figure 9.

138. A POSITA would have found it obvious to combine Malla with Walther such that Walther's three-type rating scale is incorporated into Malla's intelligent-bookmark rating functionality. In particular, a POSITA would have found it obvious to modify Malla such that two things would happen: *first*, when a user submits a "personal rating" or contributes to a "community rating" for an intelligent bookmark (EX1003, 8:64-67; Figure 3), the rating input is implemented as a three-state selection—like, dislike, or neutral—consistent with Walther's favorable, unfavorable, and neutral rating interface (EX1004, [0088]; Figure 9); and *second* the selected rating type is stored within the existing rating field or fields of the intelligent-bookmark record as part of the identifier information associated with the URL (EX1003, 4:6-10; 9:22–26; Figure 2), and is subsequently used by the server when ranking or ordering search results based on rating values (EX1003, 8:64-67; 11:37-43).

139. A POSITA would have been motivated to combine Malla with Walther's teachings as described above for multiple independent reasons. *First*, Malla discloses collecting and using rating information, including both personal ratings and community ratings, to assist users in locating relevant bookmarked material and narrowing search results. EX1003, 8:64-67; 11:37-43. Walther provides a well-known and conventional implementation approach for capturing such rating information—namely, a favorable, unfavorable, and neutral (like/dislike/neutral)

rating scale—which standardizes user input and simplifies the rating interface while preserving the underlying functionality of associating evaluative metadata with web content. EX1003, 8:64-67; EX1004, [0088].

140. **Second**, Walther discloses its three-type rating scale as a preferred and general-purpose design choice, stating that the scale “preferably allows at least ‘favorable,’ ‘unfavorable’ and ‘neutral’ ratings,” and implements this scale using a straightforward user interface control, such as thumbs-up and thumbs-down indicators with a default neutral state. EX1004, [0088]; Figure 9. In view of this disclosure, a POSITA would have been motivated to adopt Walther’s preferred rating control in Malla as a routine user interface design decision to capture rating information in a simple, intuitive, and predictable manner. Incorporating Walther’s three-type rating scheme into Malla would have merely specified the allowable rating categories for Malla’s existing rating field or fields, without altering Malla’s underlying functionality of associating ratings with bookmarks and using those ratings—including community contributions—for searching, filtering, and identifying relevant URLs. EX1003, 8:64-67; 11:37-43; EX1004, [0088].

141. **Third**, Malla and Walther are technically compatible and directed to the same type of problem—capturing user ratings of web pages and storing those ratings in association with a URL. Malla discloses storing user “preference ratings” as part of the identifier information linked to the bookmarked webpage address in the

server-side database. EX1003, 4:6–10; 9:22–26; Figure 2. Walther likewise addresses user evaluation of web pages and teaches a specific, conventional rating-type scheme—favorable, unfavorable, and neutral—for recording such evaluations in connection with a Web page or site. EX1004, [0088]. Because both systems collect and store rating metadata associated with URLs in support of search and retrieval operations, a POSITA would have readily recognized that Walther’s three-type rating control could be directly implemented within Malla’s existing rating field or fields as an appropriate and conventional user-interface mechanism for capturing evaluative input.

142. A POSITA would have had a reasonable expectation of success in combining Malla and Walther for multiple independent reasons. *First*, Malla already discloses the necessary rating infrastructure, including a rating input mechanism within the bookmark interface (EX1003, 8:64–67; Figure 3) and a database record structure that stores “user entered preference ratings” as part of the intelligent-bookmark identifier information associated with the bookmarked URL (EX1003, 4:6–10; 6:16–20, 9:22–26; Figure 2). Walther, in turn, provides a conventional and well-understood method for implementing the rating input itself as a three-type selection—favorable, unfavorable, or neutral—with a default neutral state. EX1004, [0088]; Figure 9. Because Malla already collects and stores rating values and Walther merely specifies a known user-interface scheme for capturing those values,

integrating Walther's three-type rating control into Malla's existing rating framework would have been a straightforward and predictable modification within the ordinary skill of a POSITA.

143. *Second*, implementing Walther's rating-type scheme within Malla's system would have required only routine software and user-interface engineering, namely constraining Malla's existing rating input mechanism to three discrete states and storing the selected state within the already defined rating field or fields of the intelligent-bookmark record. EX1003, 4:6–10; 9:22–26; Figure 2; EX1004, [0088]. This modification would have predictably produced the intended outcome: users select a like, dislike, or neutral option through the interface, and the system records that selection in association with the bookmarked URL in the server-side database. Because Malla already provides the structural framework for storing rating information and Walther merely specifies a conventional input scheme for capturing that information, implementing the three-type rating control would have been a straightforward and technically routine task within the skill of a POSITA.

144. Additionally, the combination would have been obvious because it would have involved a straightforward substitution of one known rating-scale implementation—Walther's favorable, unfavorable, and neutral control—in the place of another rating input mechanism within a system that already collects and stores rating information, namely Malla's intelligent-bookmark framework.

EX1003, 8:64-67; 4:6-10; EX1004, [0088]. Such a substitution would have predictably resulted in defining the permissible rating types as like, dislike, or neutral while preserving Malla's disclosed storage of rating data within the bookmark record and its use of that data for searching and identifying relevant URLs, without altering the underlying Malla's use and storage of ratings. Moreover, substituting Walther's explicit favorable/neutral/unfavorable control merely makes explicit the same evaluative distinctions commonly implemented through multi-point rating inputs.

145. At a minimum, it would have been obvious to try to implement Walther's three-type rating scheme within Malla's intelligent-bookmark system because of several reasons. **First**, Malla already discloses the mechanisms necessary to capture and store rating information, including a rating input within the bookmark interface and database fields for storing user "preference ratings" as part of the identifier information associated with the URL. EX1003, 8:64-67; 4:6-10; 9:22-26; Figures 2-3. **Second**, Walther identifies a conventional and finite set of rating options—favorable, unfavorable, or neutral—and provides an explicit and straightforward user-interface implementation using thumbs-up and thumbs-down controls with a default neutral state. EX1004, [0088]; Figure 9. **Third**, the universe of commonly used rating systems at the time was small and well-defined, consisting primarily of either numeric scales (such as a 1-5 scale) or categorical sentiment designations (positive/negative/neutral). Thus, a POSITA would have recognized

Walther's three-type scheme as one of a limited number of predictable design choices for implementing user preference input. **Fourth**, the technical outcome of incorporating this scheme into Malla would have been predictable: a user selects one of three discrete rating types through the interface, and the selected rating is stored in the existing rating field of the intelligent-bookmark record for later use in searching, filtering, or ranking. Because the available options are limited and well-defined, and because Malla already provides the underlying storage and processing framework, implementing Walther's rating-type scheme would have been a predictable and routine variation within the ordinary skill of a POSITA.

3. Independent Claim 1

146. The Malla-Walther Combination teaches [1Pre]-[1D], [1F] and [1H] for the reasons I already explained in Paragraphs 66–98, 107–109, and 116–117.

- i. [1E] ranking, by the server computer, the 3rd party content based on a rating of the 3rd party content submitted from the first user;**

147. In my opinion, the Malla-Walther Combination teaches [1E].

148. **First**, Malla discloses that the server receives “*a rating of the 3rd party content submitted from the first user*” for the reasons I already explained in Paragraphs 99–106, including that the user who creates the intelligent bookmark may provide a personal rating through the bookmark interface, with such rating

information stored in association with the bookmarked URL on the server. EX1003, 8:64-67; *see also* EX1003, Figure 3.

149. ***Second***, the Malla–Walther combination teaches “*ranking, by the server computer, the 3rd party content based on a rating...*” As I explained in Paragraphs 124–135, Walther explains that user annotations, including ratings, can “affect the manner in which search results are presented.” EX1004, [0019]. Walther further discloses that “[t]he ratings can also be used for ranking search results in response to the user’s queries, with favorable judgments tending to increase the ranking of a given page or site and unfavorable judgments tending to decrease the ranking.” EX1004, [0047]; *see also* EX1004, [0064] (“query response module 162 might incorporate the user’s ratings of particular pages or sites in the ranking of search results.”); [0143] (“At step 1420, after comparisons between hits and annotations are completed, the results list is optionally reranked using ratings contained in the annotations.”).

150. Walther additionally explains that such reranking can be based on “an aggregate rating (e.g., an average rating)” derived from “every user who has provided ... a rating.” EX1004, [0068]. For instance, Walther teaches that the server may “collect all ratings that any user might have assigned to the page or site having that URL,” and “[t]hese ratings are then averaged or combined in some other manner to determine a ***global rating*** for the page or site.” EX1004, [0176]. Walther further

teaches that the resulting global rating “may be used as a factor in the search-results ranking algorithm.” EX1004, [0177].

151. As I already explained in Paragraphs 127–135, a POSITA would have found it obvious to combine Malla with Walther so that Malla’s server ranks the webpages returned in response to a search query based on the associated global ratings stored with the intelligent bookmarks. In such a configuration, Malla’s server “*rank[s] ... the 3rd party content based on a rating of the 3rd party content submitted from the first user*” relative to other web contents based on their respective global ratings. Because Walther’s global rating is calculated from ratings provided by “every user who has provided ... a rating” (EX1004, [0068]), the global rating for the “*first web content*” necessarily incorporates—and, where applicable, may consist solely of—the rating submitted by the first user. Specifically, where the “*first web content*” has been rated only by the first user, the global rating for that content corresponds directly to the rating provided by that first user.

- ii. **[1G] in response to receiving the search query, selecting, by the server computer and based on the indexing and the ranking of the 3rd party content, a set of search results that include an identification of the 3rd party content;**

152. In my opinion, the Malla-Walther Combination teaches [1G].

153. **First**, Malla discloses “*in response to receiving the search query, selecting... a set of search results that include an identification of the 3rd party*

content,” for the reasons I already explained in Paragraphs 110–115, including that the server searches the bookmark database in response to a user-entered search term and returns intelligent bookmark records containing the URL identifying the underlying webpage. EX1003, 5:21-30, 11:41-43.

154. ***Second***, Malla discloses that the search results are “*based on the indexing ... of the 3rd party content*,” for the reasons I already explained in Paragraphs 110–115.

155. ***Third***, Walther discloses that the search results are “*based on the ... ranking of the 3rd party content*.” Walther expressly discloses that, after hits are identified in response to a query, the results list may be ranked or reranked using ratings contained in user annotations. EX1004, [0019] (annotations can “affect the manner in which search results are presented”); *see also* EX1004, [0047] (“The ratings can also be used for ranking search results in response to the user’s queries, with favorable judgments tending to increase the ranking of a given page or site and unfavorable judgments tending to decrease the ranking.”); [0062]; [0137].

4. Claim 2

i. [2] The method of claim 1, wherein the 3rd party content comprises of web content.

156. In my opinion, Malla-Walther Combination discloses the additional limitation of claim 2 for the reasons I already discussed in Paragraphs 118–119.

5. Claim 3

- i. [3] The method of claim 1, wherein ranking the 3rd party content is further based on ratings of the content from other users.**

157. In my opinion, Malla-Walther Combination renders obvious the additional limitation of claim 3.

158. In particular, as I already explained in Paragraphs 127–135, Walther teaches ranking search results using “an aggregate rating (e.g., an average rating)” derived from “every user who has provided ... a rating.” EX1004, [0068]. Walther explains that the server may “collect all ratings that any user might have assigned to the page or site having that URL,” and that “[t]hese ratings are then averaged or combined in some other manner to determine a global rating for the page or site.” EX1004, [0176]. Walther further discloses that this resulting global rating “may be used as a factor in the search-results ranking algorithm.” EX1004, [0177]. Accordingly, when Walther’s aggregation and global-rating methodology is applied to Malla’s multi-user intelligent-bookmark system—where multiple users can provide personal and community ratings for bookmarked webpages—the server ranks the corresponding third-party content based not only on an individual user’s rating but also on ratings provided by other users, thereby producing search results that are “*further based on ratings of the content from other users.*”

6. Claim 4

- i. [4] The method of claim 3, wherein the rating associated with the content is selected from a group of rating types consisting of like, dislike, and neutral.**

159. In my opinion, Malla-Walther Combination renders obvious the additional limitation of claim 4.

160. As I already explained in Paragraphs 99–106, Malla discloses collecting user ratings associated with bookmarked third-party web content. Specifically, Malla teaches that the “user can manually rate the bookmark at 34 depending on his/her interest” and may also “update the community rating,” and thus discloses that rating values are associated with the intelligent bookmark corresponding to the underlying webpage. EX1003, 8:64-67. Figure 3 illustrates a user-provided “personal rating” within the bookmark interface and indicates the presence or absence of a community rating, while Figure 2 depicts a database record for an intelligent bookmark that includes fields reflecting both a community rating and a personal rating stored in association with the URL. EX1003, Figures 2 and 3. Accordingly, Malla teaches a “*rating associated with the content.*”

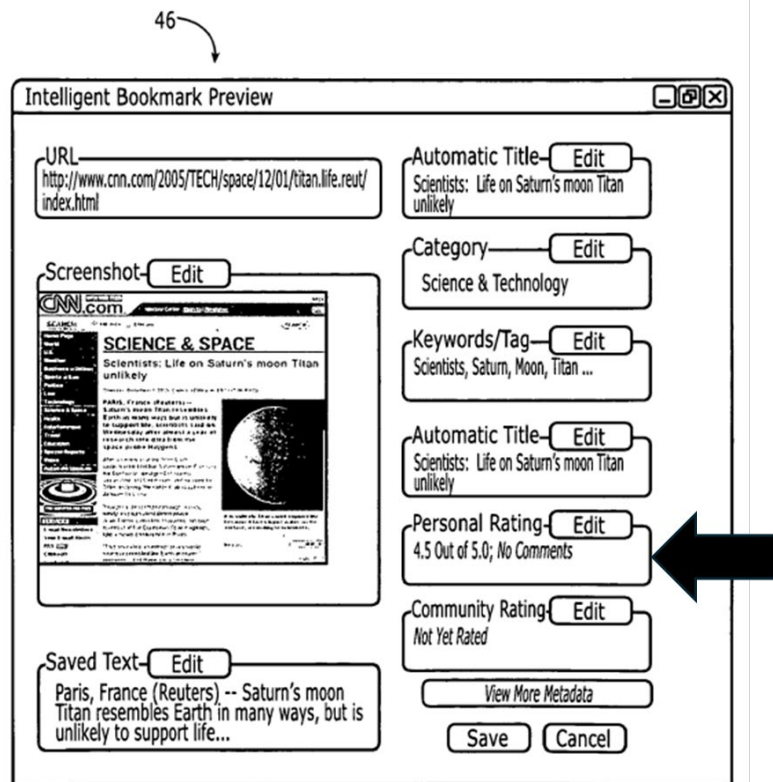
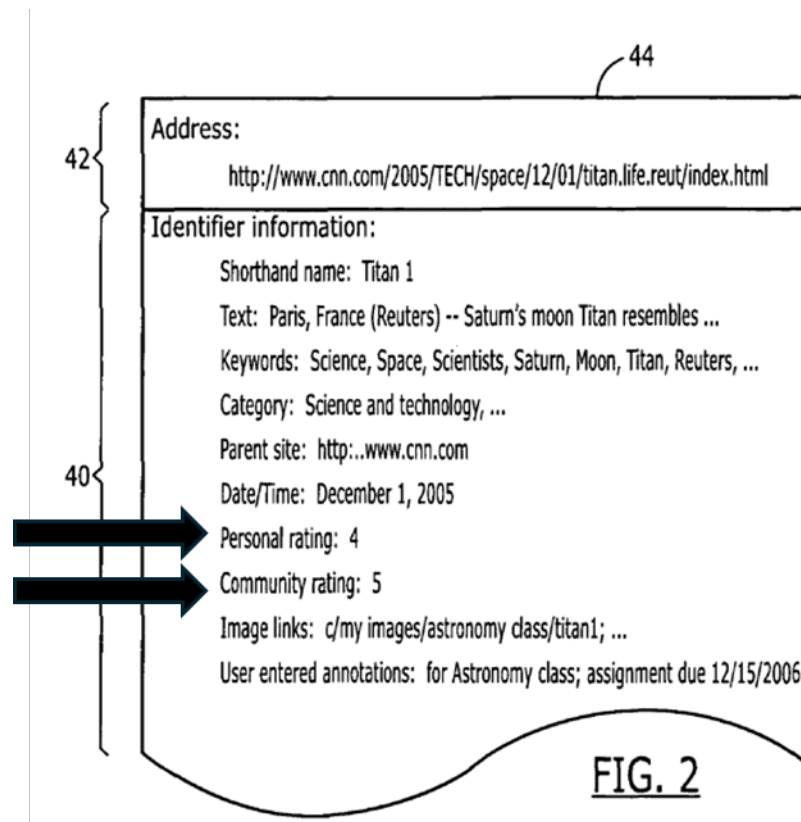


FIG. 3

EX1003, Figure 3.



EX1003, Figure 2.

161. The Malla–Walther combination also discloses that the rating “*is selected from a group of rating types consisting of like, dislike, and neutral.*” Walther expressly discloses that “[r]atings may be provided using various scales, and the scale preferably allows at least *‘favorable,’ ‘unfavorable’ and ‘neutral’ ratings,*” thereby identifying a three-type evaluative scheme. EX1004, [0088]. Walther further explains that favorable and unfavorable ratings may be implemented using “a *favorable (e.g., thumbs-up)* or *unfavorable (e.g., thumbs-down)* rating to the annotated page,” with such ratings assigned corresponding numeric values (e.g., +2

and -2, respectively), and that “unrated pages ... given a default (*neutral*) rating of zero.” EX1004, [0088]; Figure 9.

162. As I already explained in Paragraphs 136–145, Walther’s thumbs-up, thumbs-down, and default neutral controls correspond directly to like, dislike, and neutral rating types. EX1004, [0088]; Figure 9. Walther’s interface presents favorable and unfavorable rating inputs using graphical indicators (e.g., thumbs-up and thumbs-down), with unrated content assigned a neutral state, thereby implementing a three-category rating selection. This structure aligns with the disclosure of the ’952 Patent, which similarly depicts a thumbs-up icon for “Like,” a thumbs-down icon for “Dislike,” and a “Neutral” option within its user interface. Compare EX1001, Figure 3B (showing 👍 “Like,” 👎 “Dislike,” and “Neutral” buttons) with EX1004, Figure 9 (showing corresponding thumbs-up and thumbs-down rating controls).

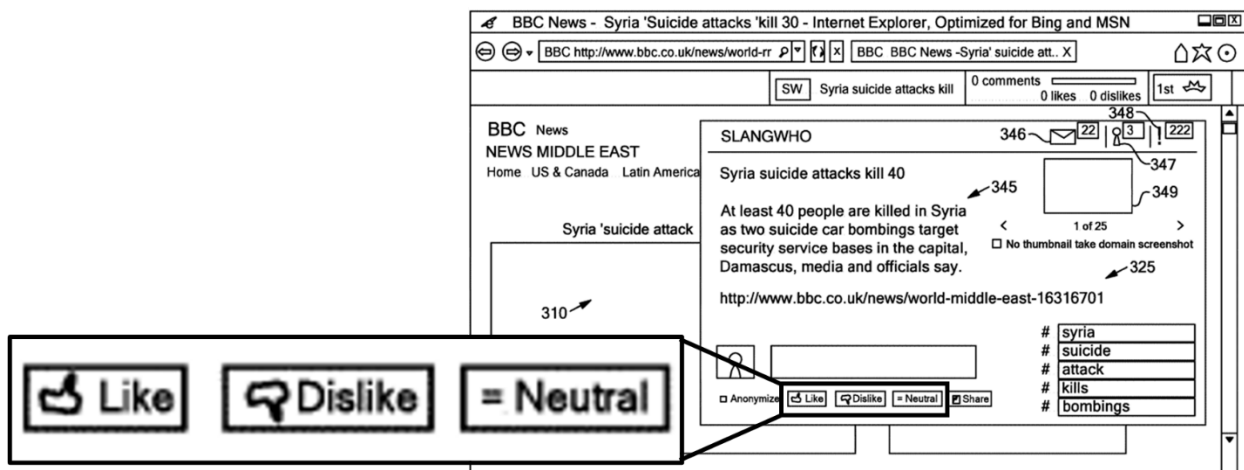


Fig. 3B

EX1001, Figure 3B.

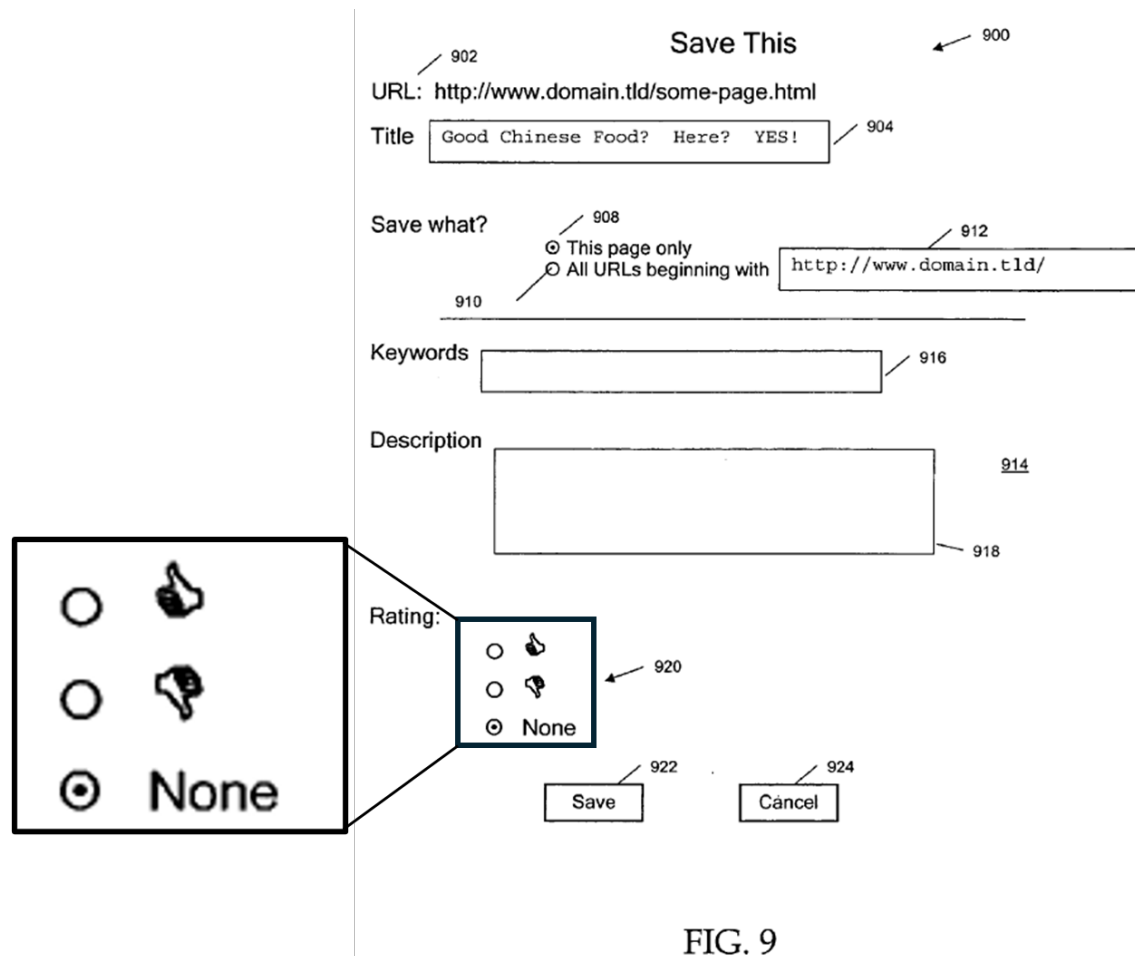


FIG. 9

EX1004, Figure 9.

7. Claim 5

- i. [5] The method of claim 4, wherein indexing the content comprises indexing the content based on keywords associated with the content in the submission from the first user.

163. In my opinion, Malla-Walther Combination discloses the additional limitation of claim 5.

164. As I already explained in Paragraphs 92-98, Malla teaches creating an intelligent bookmark where a webpage address is associated with identifier information in a structured database record. Specifically, Malla explains that an “intelligent bookmark is created by retrieving an address of a document, for example a web page, extracting identifier information from the document, and *saving the address in conjunction with the identifier information as an intelligent bookmark.*” EX1003, 3:60-64; *see also* EX1003, 3:38-45; 10:23-24 (explaining that intelligent bookmarks are stored in a bookmark database residing on the server).

165. Malla further teaches that the identifier information associated with an intelligent bookmark may include keywords corresponding to the webpage content. In particular, Malla explains that keywords “may be identified and extracted from text” within the webpage or may be “*added by the user,*” thereby providing both automatic and user-supplied keyword association mechanisms. EX1003, 8:35-55; Figure 2.

166. Accordingly, as I already explained in Paragraphs 92-98, Malla teaches “*indexing the content*” by associating keywords with the identifier (e.g., URL) of a bookmarked webpage submitted by the first user, such that the webpage can later be retrieved from the server-side database based on those keyword associations.

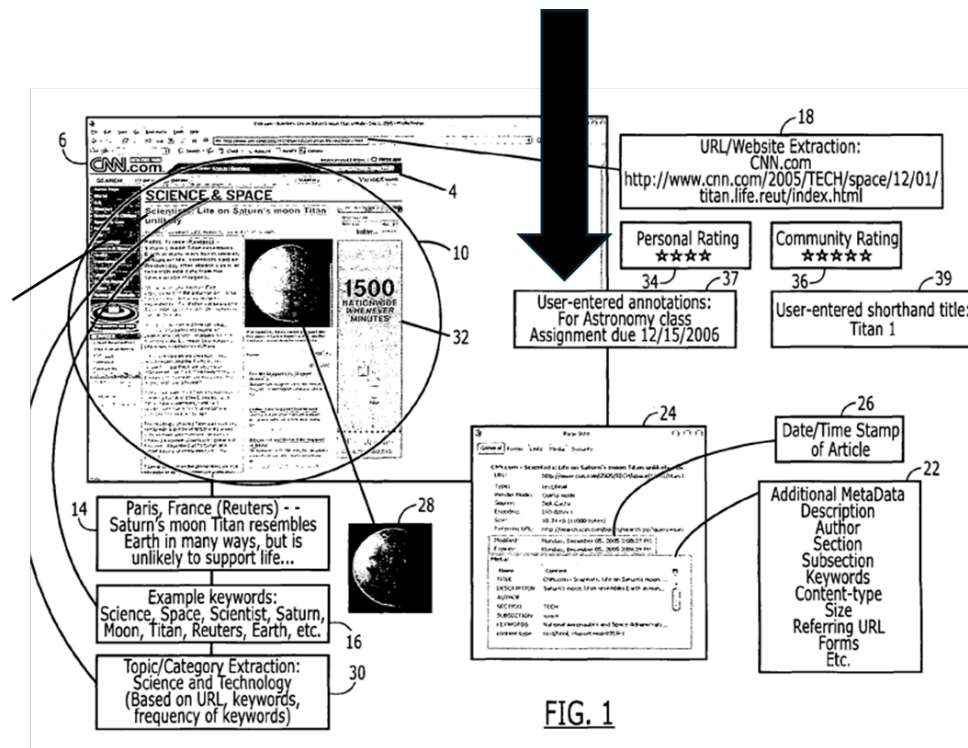
8. Claim 6

- i. [6] The method of claim 5, wherein the submission from the first user further comprises a user comment on the content.**

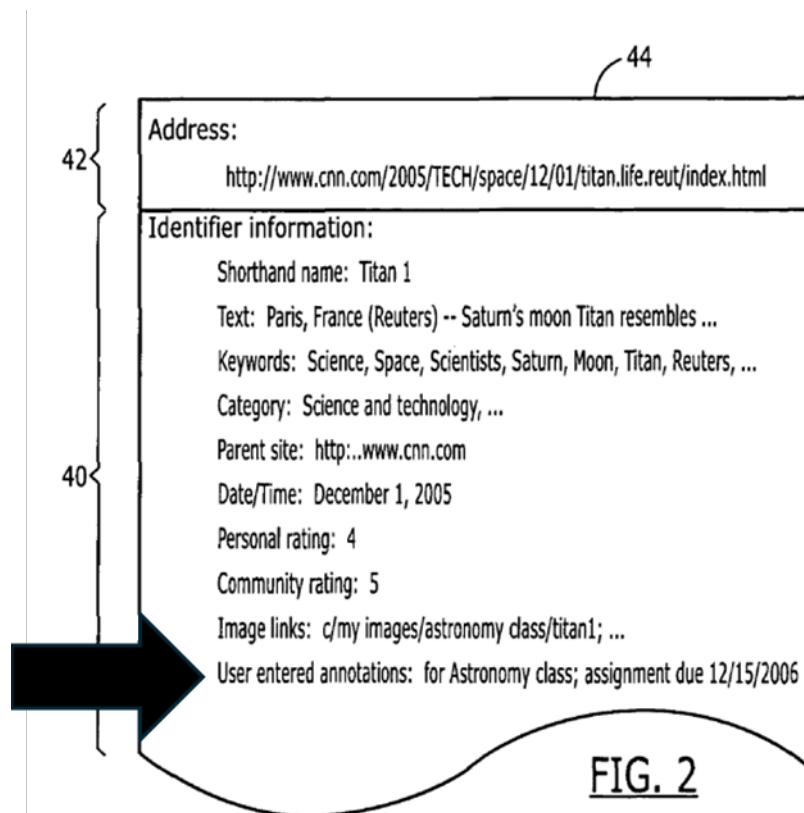
167. In my opinion, Malla-Walther Combination discloses the additional limitation of claim 6.

168. As I explained in Paragraph 59, Malla teaches that the intelligent bookmark submitted by the first user may include “user entered annotations.” EX1003, Abstract; 3:42-45. Malla’s Figures further illustrate that the intelligent-bookmark submission includes user comments associated with the bookmarked webpage. For example, Figure 1 depicts “User-entered annotations” such as “For Astronomy class Assignment due 12/15/2006,” which constitutes a user-authored comment appended to the bookmark record. Similarly, Figure 2, which illustrates the intelligent-bookmark database record, shows “User entered annotations” as part of the stored identifier information associated with the webpage address. EX1003, Figure 2. Accordingly, Malla teaches that the user’s submission of bookmarked third-party content includes a user comment on that content, stored in association with the URL in the server-side database.

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EX1003, Figure 1.



EX1003, Figure 2.

C. Ground IV: Malla In View Of Smadja Renders Obvious Claims 7-10, 14

169. As I will further explain below, Ground IV builds upon the disclosures and combinations addressed in Grounds I and II.

1. Malla In View of Smadja (“Malla-Smadja Combination”)

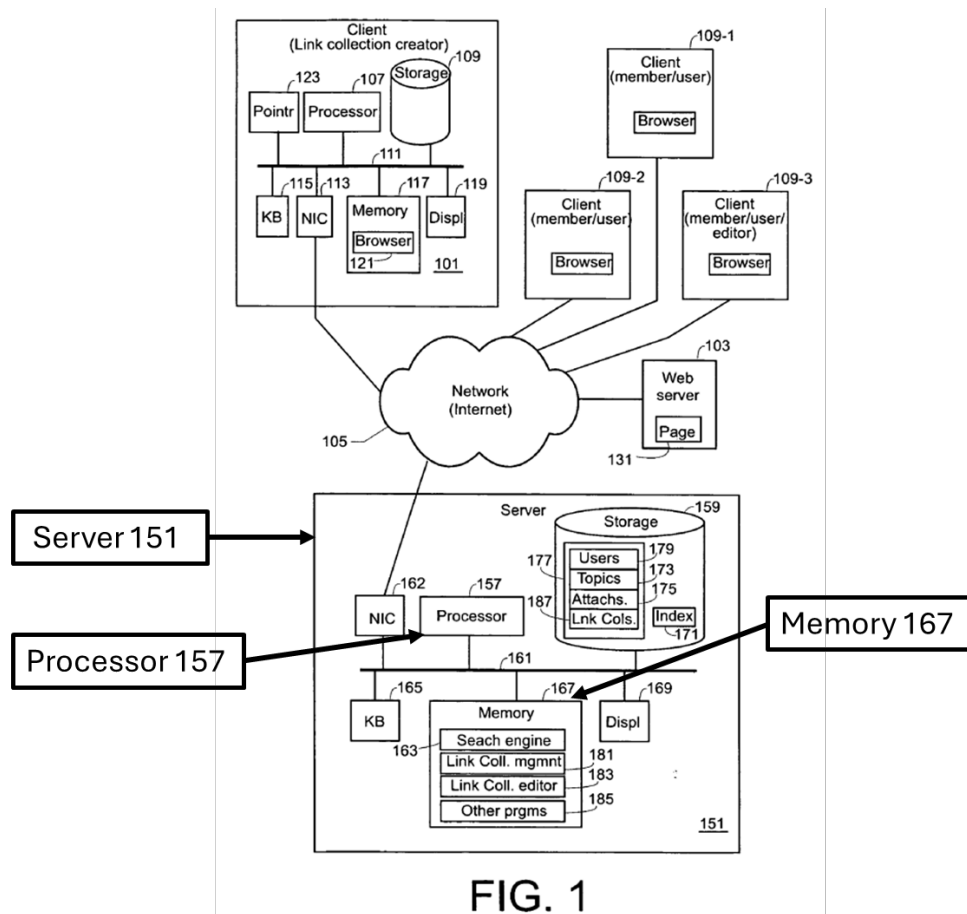
i. Malla In View Of Smadja’s Server Components

170. Malla teaches a client–server architecture that includes a remote “server 56.” EX1003, 10:22-23 (“In the online model shown in FIG. 5B, the user’s computer 52 is connected to a *remote server 56*.”); *see also* EX1003, 11:24-27 (“Referring now to FIG. 6, an on-line model in which a number of users 62, 64, 66 are in communication with a *server 68*, which is in turn in communication with intelligent bookmark database 70, is illustrated.”).

171. Although Malla does not expressly enumerate internal server components such as a processor and memory, it was well understood in the art that a networked server hosting a remotely stored database and providing online bookmark access and management functionality includes at least one processor executing software instructions stored in memory.

172. One such example is illustrated in Smadja. For example, Smadja describes an “exemplary search server” (server 151) that “includes a processing

system of at least one processor 157” and “a memory subsystem 167.” EX1005, [0082]. Smadja further discloses that the “search server 151 includes a search engine application 163 shown ... as being in memory 167,” and that the search engine “includes aspects of the present invention, that is, a *set of instructions implementing an embodiment of the invention.*” EX1005, [0087]. Smadja also discloses additional server-side programs for “Link collection management” and “Link collection authoring,” further reflecting executable software stored in memory and executed by the server processor. EX1005, [0087].



EX1005, Figure 5.

173. In my opinion, a POSITA would have been motivated to combine Malla and Smadja such that Malla's remote server has Smadja's conventional server architecture. Specifically, Malla-Smadja combination would result in a computing device including at least one processor and memory storing executable program instructions, and a POSITA would be motivated to provide such a combination because both references address network-based management and retrieval of collections of web-based documents and rely on server-side functionality delivered to client devices over a network. EX1003, 10:22-23; 11:24-27; EX1005, [0082], [0087]. Smadja provides standard implementation details for the server platform that Malla implicitly requires but does not expressly describe. EX1005, [0082], [0087].

174. A POSITA would have had a reasonable expectation of success in making this combination because Smadja's server architecture reflects conventional client-server design used to implement Internet-accessible services that store and manage link collections and provide browser-based access—the same type of networked functionality disclosed by Malla. EX1003, 10:22-23; 11:24-27; EX1005, [0082], [0087].

175. At a minimum, it would have been obvious to implement Malla's bookmark services on a server platform such as Smadja's, including a processor executing instructions from memory, because doing so represents a finite and predictable implementation choice for deploying such online services and would

have been expected to yield the predictable result of a functioning server providing the disclosed bookmark and link-management features.

2. Claim 7

i. [7Pre] A computing device comprising:

176. I understand that the preamble may not limit the claims. Regardless, in my opinion, Malla-Smadja Combination discloses [7Pre].

177. Malla discloses a client-server system that includes a remote “server 56.” EX1003, 10:22-23 (“In the online model shown in FIG. 5B, the user’s computer 52 is connected to a *remote server 56*.”); *see also* EX1003, 11:24-27 (“Referring now to FIG. 6, an on-line model in which a number of users 62, 64, 66 are in communication with a *server 68*, which is in turn in communication with intelligent bookmark database 70, is illustrated.”). Malla further describes its client-server system as “computer server-implemented” and refers to a “server computer,” including “providing an interface to the server” and “providing storage, in communication with said server computer, on which said intelligent bookmarks may be stored.” EX1003, 7:6-20. These disclosures identify the server as a computing device that executes software to provide bookmark-management functionality and communicates with client computers over a network, and therefore Malla’s disclosed server (e.g., server 56 or server 68) constitutes a server computer, i.e., a “*computing device*.”

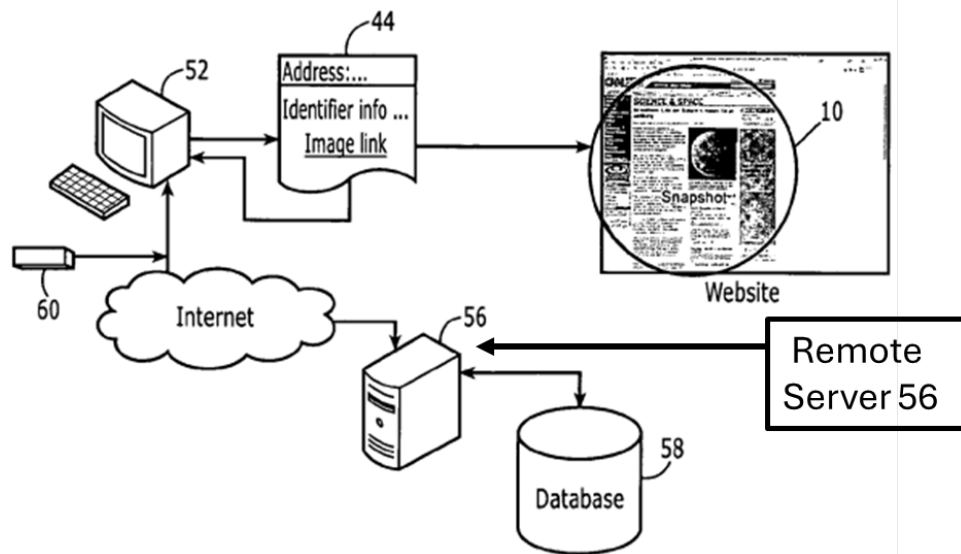


FIG. 5B

EX1003, Figure 5B.

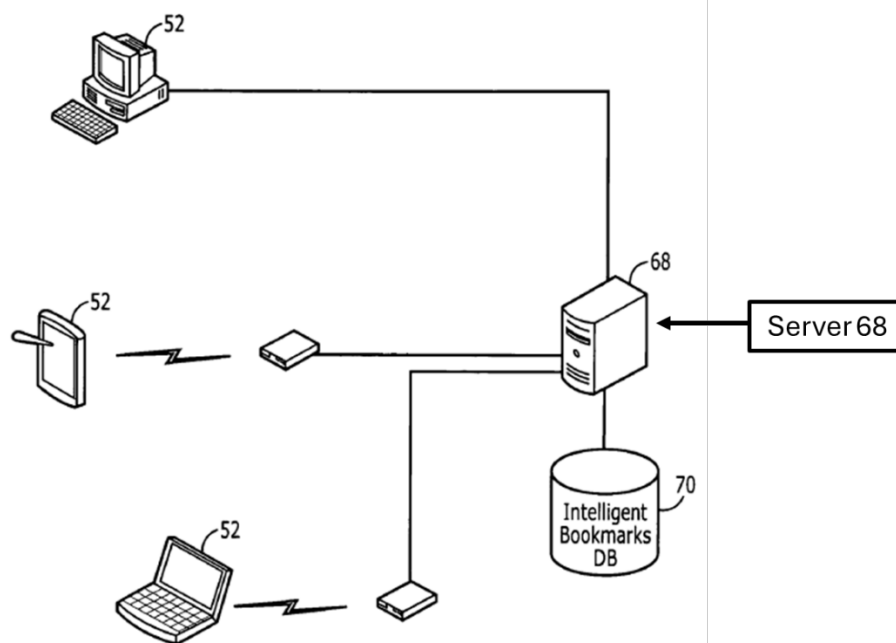


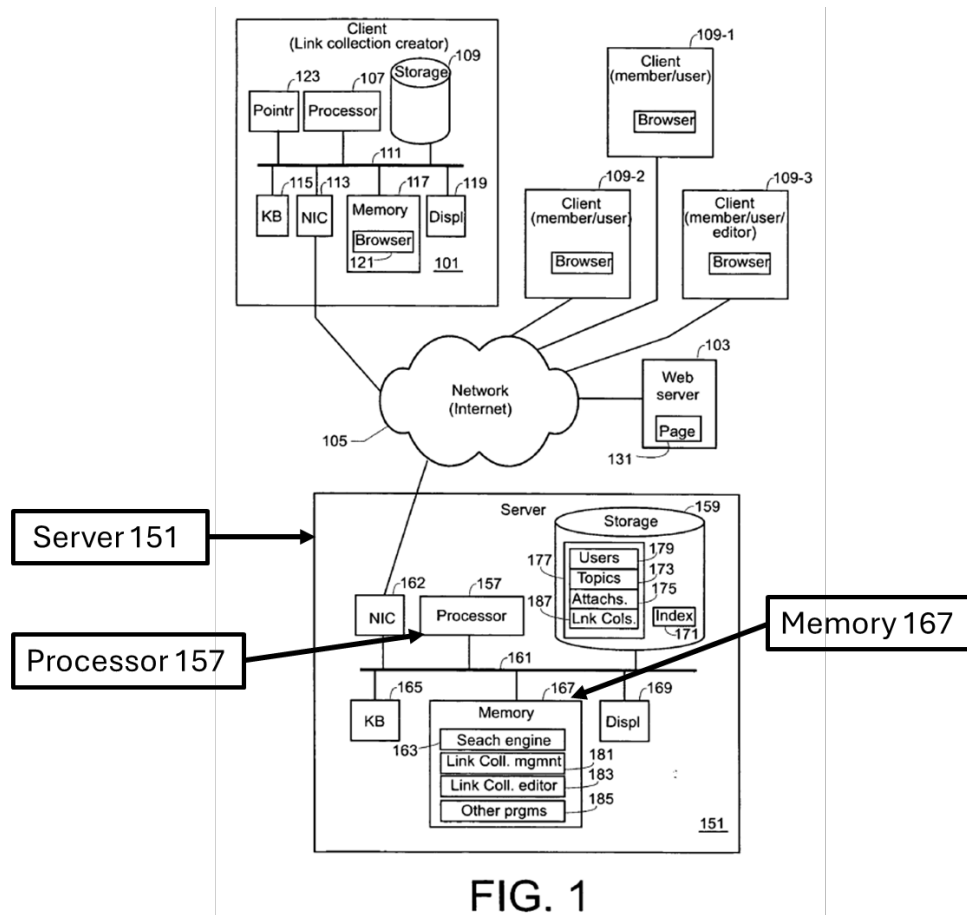
FIG. 6

EX1003, Figure 6.

- ii. **[7A] a processor; and memory coupled to the processor and storing instructions that, when executed by the processor, cause the computing device to:**

178. In my opinion, Malla-Smadja Combination teaches [7A].

179. As I already explained in Paragraphs 170–175, Smadja describes an “exemplary search server” (server 151) that “includes a *processing system of at least one processor 157*” and “a *memory subsystem 167*,” thereby identifying the conventional hardware components of a server computing device. EX1005, [0082]. Smadja further explains that the “search server 151 includes a search engine application 163 shown ... as being in memory 167,” and that the search engine “includes aspects of the present invention, that is, a *set of instructions implementing an embodiment of the invention*,” indicating that executable program instructions are stored in memory and executed by the processor. EX1005, [0087]. Smadja additionally discloses other server-side software components, including programs for “Link collection management” and “Link collection authoring,” which likewise reflect executable software stored in memory and operated by the server processor. EX1005, [0087]. Accordingly, Smadja expressly teaches the arrangement of a server comprising “*a processor; and memory coupled to the processor storing instructions that are executed by the processor.*”



EX1005, Figure 1.

- i. [7B] provide a first user interface to a first client computer and display 3rd party content on the first client computer, wherein the first user interface is separate from a main window of a web browser, and

[7C] wherein the first user interface automatically selects a portion of the 3rd party content and displays the portion of the 3rd party content within the first user interface based on settings received from the user via the user interface to display selected portions of the 3rd party content;

[7D] receive a submission associated with the 3rd party content from the first user via the first user interface;

[7E] index the 3rd party content based on the submission from the first user;

[7F] rank the 3rd party content based on a rating of the 3rd party content submitted from the first user;

[7G] receive a search query from a second client computer operated by a second user;

[7H] in response to receiving the search query, select based on the indexing and ranking of the 3rd party content, a set of search results that include an identification of the 3rd party content; and

[7I] transmit the set of search results to the second client computer.

180. The Malla-Smadja Combination teaches [7B]–[7I] for the same reasons I already discussed in Paragraphs 68–117 [1A–1H].

3. Claim 8

i. [8] The computing device of claim 7, wherein the 3rd party content comprises of web content.

181. In my opinion, Malla-Smadja Combination discloses the additional limitation of claim 8 for the reasons I discussed in Paragraphs 118–119.

4. Claim 9

- i. [9A] The computing device of claim 8, further comprising: ranking the 3rd party content based on a rating of the 3rd party content submitted from the first user; and**

[9B] selecting of the set of search results is further based on the ranking of the 3rd party content.

182. In my opinion, Malla-Smadja Combination discloses the additional limitation of [9A] and [9B] for the reasons I discussed in Paragraphs 99–106 and 110–115.

5. Claim 10

- i. [10] The computing device of claim 9, wherein ranking the 3rd party content is further based on ratings of the content from other users.**

183. In my opinion, Malla-Smadja Combination discloses the additional limitation of claim 10 for the reasons I discussed in Paragraphs 120–123.

6. Claim 14

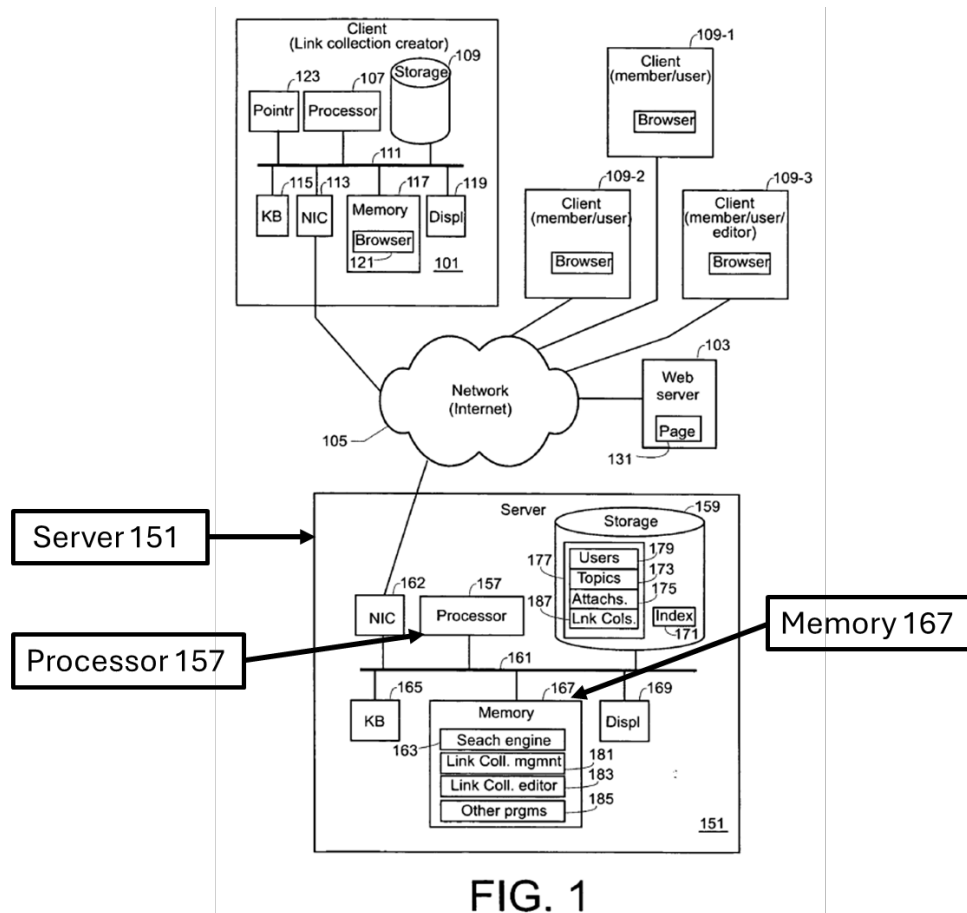
- i. [14Pre] A non-transitory computer readable storage medium storing instructions that, when executed by a server computer, cause the server computer to:**

184. I understand that the preamble may not limit the claims. Regardless, in my opinion, Malla-Smadja Combination discloses [14Pre].

185. As I already explained in Paragraphs 178–179, Malla discloses a server computer in a networked client–server configuration. EX1003, 10:22-23; 11:24-27;

Figures 5B and 6; EX1004, [0056]. Nevertheless, Malla does not expressly enumerate the underlying hardware and software components of that server.

186. Smadja, in contrast, describes the conventional server architecture and software implementation supporting such server-side functionality. Smadja discloses a search server 151 that includes “a processing system of at least one processor 157, [and] a memory subsystem 167.” EX1005, [0082]; Figure 1. Smadja further explains that “search server 151 includes a search engine application 163 shown in FIG. 1 as being in memory 167,” and that this application comprises “a set of instructions implementing an embodiment of the invention.” EX1005, [0087]; Figure 1. Thus, Smadja teaches a memory subsystem 167, which constitutes a non-transitory computer-readable storage medium, storing executable program instructions (search engine application 163) that, when executed by processor 157 of the server computer, cause the server to perform the disclosed search and link-management operations. EX1005, [0082], [0087].



EX1005, Figure 1.

ii. [14A]-[14H]

187. Limitations [14A]-[14H] correspond directly to limitations [7B]-[7I]. Thus, the Malla-Smadja Combination teaches limitations [14A]-[14H] for the same reasons I already discussed in Paragraph 180.

D. Ground V: Malla in view of Walther and Smadja Renders Obvious Claims 7-14.

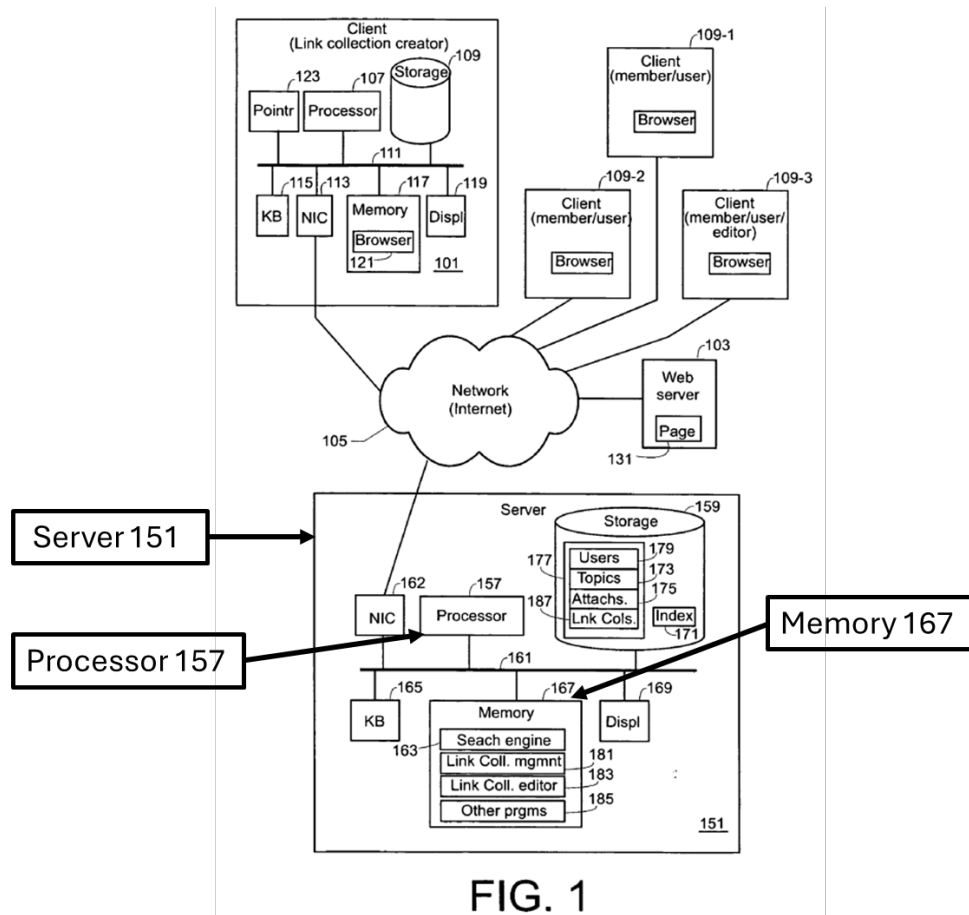
188. As I will further explain below, Ground V builds upon the disclosures and combinations addressed in Ground III.

**1. Malla-Walther Combination, Further In View of Smadja
("Malla-Walther-Smadja Combination")**

**i. Malla-Walther Combination, Further In View Of
Smadja's Server Components**

189. As I already explained in Paragraphs 127–135, the Malla–Walther combination discloses a client–server architecture that includes a remote “server 56.” EX1003, 10:22-23; 11:24-27. However, the Malla–Walther combination does not expressly enumerate the internal hardware and software components of that server, such as a processor and memory.

190. As I already explained in Paragraphs 170–175, it was well understood in the art that an Internet-connected server responsible for maintaining a remote database and providing online bookmark access and management functionality operates as a computing platform comprising at least one processor and associated memory storing executable program code, consistent with the explicit server architecture described by Smadja.



EX1005, Figure 1.

191. In my opinion, a POSITA would have found it obvious to combine the Malla–Walther system with Smadja to implement the server in the Malla–Walther combination using the conventional server architecture expressly described by Smadja—namely, a computing device including at least one processor and memory storing executable program instructions—for the reasons I discussed in Paragraphs 170–175.

192. Walther independently reinforces this conclusion because Walther likewise discloses a network-based information retrieval system that includes one or

more server systems. EX1004, [0056] (“FIG. 2 illustrates another information retrieval and communication network 110 for communicating media content... network 110 includes client system 120, one or more content server systems 150, and a search server system 160.”). Thus, both Malla and Walther contemplate server-side components responsible for storing and retrieving web-related information in response to client requests.

193. In my opinion, a POSITA therefore would have been motivated to implement the server components in the Malla–Walther system using the conventional processor-and-memory architecture explicitly described by Smadja, because all three references address network-accessible services for managing and retrieving collections of web-related content. EX1003, 10:22–23; 11:24–27; EX1004, [0056]; EX1005, [0082], [0087]. Smadja provides the detailed description of standard server hardware and software organization that Malla and Walther implicitly rely upon but do not expressly enumerate—specifically, a server computing device including a processor coupled to memory that stores instructions implementing the disclosed server-side functionality. EX1005, [0082], [0087]. Therefore, a POSITA would have been motivated to incorporate Smadja’s disclosed server implementation details into the Malla–Walther framework for the reasons I already discussed in Paragraphs 170–175.

2. Claim 7

i. [7Pre] A computing device comprising:

194. I understand that the preamble may not limit the claims. Regardless, in my opinion, the Malla-Walther-Smadja Combination teaches [7Pre] for the same reasons I discussed in Paragraphs 176-177.

ii. [7A] a processor; and memory coupled to the processor and storing instructions that, when executed by the processor, cause the computing device to:

195. In my opinion, the Malla-Walther-Smadja Combination teaches [7A] for the reasons I discussed in Paragraphs 178-179.

iii. [7B]-[7I]

196. In my opinion, the Malla-Walther-Smadja Combination teaches [7B]-[7I] for the reasons discussed I already discussed in Paragraphs 68–117 in connection with limitations [1A]–[1H].

3. Claim 8

i. [8] The computing device of claim 7, wherein the 3rd party content comprises of web content.

197. In my opinion Malla-Walther-Smadja Combination discloses the additional limitation of claim 8 for the same reasons I already discussed in Paragraphs 118–119, and 156 in connection with claim 2.

4. Claim 9

- i. [9A] The computing device of claim 8, further comprising: ranking the 3rd party content based on a rating of the 3rd party content submitted from the first user; and**

[9B] selecting of the set of search results is further based on the ranking of the 3rd party content.

198. In my opinion Malla-Walther-Smadja Combination discloses the additional limitations of [9A] and [9B] for the same reasons I already discussed in Paragraphs 99–106 and 110–115 in connection with limitations [1E] and [1G], respectively.

5. Claim 10

- i. [10] The computing device of claim 9, wherein ranking the 3rd party content is further based on ratings of the content from other users.**

199. In my opinion, Malla-Walther-Smadja Combination discloses the additional limitation of claim 10 for the same reasons I already discussed in Paragraphs 120–123 in connection with claim 3.

6. Claim 11

- i. [11] The computing device of claim 10, wherein the rating associated with the content is selected from a group of rating types consisting of like, dislike, and neutral.**

200. In my opinion Malla-Walther-Smadja Combination discloses the additional limitation of claim 11 for the same reasons I already discussed in Paragraphs 159–162 in connection with claim 4.

7. Claim 12

- i. [12] The computing device of claim 11, wherein indexing the content comprises indexing the content based on keywords associated with the content in the submission from the first user.**

201. In my opinion Malla-Walther-Smadja Combination discloses the additional limitation of claim 12 for the same reasons I already discussed in Paragraphs 163–166 in connection with claim 5.

8. Claim 13

- i. [13] The computing device of claim 12, wherein the submission from the first user further comprises a user comment on the content.**

202. In my opinion Malla-Walther-Smadja Combination discloses the additional limitation of claim 13 for the same reasons I already discussed in Paragraphs 167–168 in connection with claim 6.

9. Claim 14

- i. [14Pre] A non-transitory computer readable storage medium storing instructions that, when executed by a server computer, cause the server computer to:**

203. I understand that the preamble may not limit the claims. Regardless, in my opinion, Malla-Walther-Smadja Combination discloses [14Pre] for the reasons I already provided in Paragraphs 184–186.

- ii. [14A]-[14H]**

204. Limitations [14A]-[14H] correspond directly to limitations [7B]-[7I]. Thus, the Malla-Walther-Smadja Combination teaches limitations [14A]-[14H] for the same reasons I already discussed in Paragraph 196.

VIII. Availability for Cross-Examination

205. In signing this declaration, I recognize that the declaration will be filed as evidence in a case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross examination within the United States during the time allotted for cross examination.

IX. Right to Supplement

206. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner may raise and to take into account new information as it becomes available to me.

X. Jurat

207. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

February 17, 2026

Date



Dr. Loren G. Terveen

Appendix A

Loren G. Terveen

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University of Minnesota

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Address Department of Computer Science and Engineering
University of Minnesota
Minneapolis, MN 55455

Education

Ph.D. in Computer Sciences	University of Texas	1991
M.S. in Computer Sciences	University of Texas	1988
B.A. in Computer Science, Mathematics, History	University of South Dakota	1984

Affiliations Member of ACM, ACM/SIGCHI

Research Interests Human-Computer Interaction, Social Computing, Artificial Intelligence

Professional Experience

Department Head	Computer Science & Engineering	2025 –
Associate Department Head	Computer Science & Engineering	2019–2025
Professor	University of Minnesota	2002 –
Distinguished McKnight University Professor		2017 –
Principal Member of Technical Staff	AT&T Labs - Research	1996–2002
Member of Technical Staff	AT&T Bell Labs	1991–1996
Graduate Research Intern	Microelectronics and Computer Corporation	1986–1999
Teaching Assistant	University of Texas at Austin	1985

AWARDS AND MAJOR ROLES

ACM Distinguished Scientist (awarded 2009)

ACM SIGCHI Academy (2019)

ACM SIGCHI Lifetime Service Award (2023)

ACM SIGCHI President (2015-2018)

ACM Council, SIG Governing Board Representative (2016 – 2018)

RESEARCH

External Funding

Google: “High Reliability Group Work in a Human-AI Organization: A Case Study of Wikipedia” (**Co-PI**, with Harmanpreet Kaur PI), \$100,000.

NSF:EAGER: Revolutionizing Wikipedia’s Relationship with New and Emerging Knowledge (**Co-PI**, with Stevie Chancellor PI), **\$300,000** for 09/01/2023 to 08/31/2025.

Cisco: Detecting and Reducing Bias in Collaborative Virtual Meetings: Field Deployment (**Co-PI**, with Stevie Chancellor PI). **\$141,714** for 8/1/2023 to 7/31/2024.

Northwestern University: Safe and Compassionate ML Recommendations For People With Mental Illnesses (**Co-PI**, with Stevie Chancellor PI). **\$275,000** for 02/2023 to 01/2025

NSF:CISE: Community-Engaged Design and Implementation of a Framework for Ethical Online Communities Research (**Co-PI**, with Svetlana Yarosh PI, Stevie Chancellor Co-PI, Joseph Konstan Co-PI, Kangjie Lu Co-PI), \$400,000 for 01/01/2023 to 12/31/2025.

Cisco: Detecting and Reducing Bias in Collaborative Virtual Meetings (**Co-PI**, with Stevie Chancellor PI). **\$177,915** for 9/1/2021 to 12/31/2022.

NSF:CHS:Small: Incorporating and Balancing Stakeholder Values in Algorithm Design (UMN **PI**), Award Total \$500,000, UMN Share \$243,941 for 8/1/2019 to 7/31/2022.

NSF: EAGER: AI-DCL: Capture, Explain and Negotiate the Inherent Trade-offs in Machine Learning Algorithms (UMN **co-PI**), Award Total \$295,713, UMN Share \$103,267 for 10/1/2019 to 9/30/2022.

NSF:CHS: Small: Collaborative Research: Structured Data Peer Production: Addressing Challenges and Leveraging Opportunities (**PI**), \$249,738 for 9/1/2018 - 8/31/2021.

National Cancer Institute (NCI): Restore: Improving sexual outcomes of gay and bisexual prostate cancer survivors (R. Simon Rosser **PI**; my role: **Co-PI**); \$2,039,220 (directs) \$3,039,541 (total), 2017-2022.

NSF: “PFI:BIC: Smart Human-Centered Collision Warning System: sensors, intelligent algorithms and human-computer interfaces for safe and minimally intrusive car-bicycle interactions” (Co-PI, with Rajesh Rajamani (PI), Max Donath, and Nichole Morris), \$999,773 for September 1, 2016 to August 31, 2019.

NSF: “Computer-Supported Cooperative Work Doctoral Colloquium” (**PI**), \$25,000 for 03/01/2016 to 02/28/2017.

National Institute on Drug Abuse: “A Technology-Delivered Peer-to-Peer Support ARB Adherence Intervention for HIV+ Adults”, (Co-PI, with Keith Horvath (PI) and Darin Erickson), \$3,302,62 for 07/01-2015 to 05/31/2020.

NSF: “HCC: Tools and Mechanisms to Support Social Participation Efforts”, (PI), \$499,399 for 10/01/2012 to 09/30/2015.

NSF: “SoCS: Collaborative Research: Novel Algorithms and Interaction Mechanisms to Enhance Social Production”, (PI), \$527,140, for 7/01/2012 to 06/30/2015.

NSF: “Collaborative Research: Supporting Newcomer Socialization in Online Production Communities”, (PI), \$301,135.00 for 08/2011 to 08/31/2015.

Minnesota Department of Transportation: “Statewide Cycloplan: A Bicycle Planning Tool with Participatory GIS”, (PI), \$130,000, for 10/01/2011 to 06/30/2013.

Metropolitan Council: “Cycloplan II”, (PI), \$71,350, for 08/15/2011 to 05/31/2012.

NSF: “Wikisym Doctoral Consortium”, (PI), \$13,163, for 05/01/2011 to 04/30/2012.

IBM: “Mobile Crowdsensing”, (PI), \$100,000 awarded 04/01/2011

NSF: “Social-Computational Systems (SoCS) Community Meeting” (PI), \$48,801 for 09/01/2010 to 08/31/2011

NSF: “SoCS: Collaborative Research: Information Framing: Intelligent Interfaces for an Online Production Community”, (PI), \$375,000 for 09/15/2010 to 08/31/2015.

NSF: “Collaborative Research: Guiding Folksonomy Development to Enable Novel Tagging Applications” (PI, with J. Riedl and S. Sen (Macalester College)). \$949, 788 for 04/1/2010 to 03/31/2014 (UMN Share).

Minnesota Department of Transportation: Bike, Bus, and Beyond: Extending Cyclopath to Enable MultiModal Routing (PI), \$60,627, for 07/08/2010 to 01/31/2012

NIH: An Interactive Website to Promote Communication about Sexual Health and Dating Relationships between Parents and Teens (Co-PI, with Sonya Brady (PI), Simon Rosser, and Renee Sieving), \$679,500 for 09/30/2009 to 08/31/2011.

Metropolitan Council: “Cycloplan” (PI), \$185,000, October 2009 – March 2011.

NSF “Collaborative Research: Understanding Online Volunteer Communities: Toward Theory-Based Design” (co-PI, with J. Riedl, J. Konstan, M. Snyder, & Y. Ren; R. Kraut (CMU)) \$2,400,000 for 08/01/2008 to 07/31/2013.

NSF: “Recommender Systems Doctoral Consortium” (**PI**) \$15,415, 2007-2008.

NSF: “Mining Spatiotemporal Data: From Personal Use to Community Knowledge” (**PI**) \$449,570 for 12/1/2005 to 11/30/2009.

NSF: “Collaborative Research: Mark This! - Operationalizing the notion of “place” for interactive community systems” (**PI**, with Q. Jones (NJIT) and S. Whittaker (Univ. of Sheffield)). \$173,411 for 6/1/2003 to 5/31/2007 (UMN share).

NSF: “Being There: Mobile Devices for Community and Commerce” (**PI**, with J. Konstan, J. Riedl, and S. Shekhar). \$120,000 for 9/1/2002 to 8/31/2005.

NSF: “ITR: Collaborative Research: Designing On-Line Communities to Enhance Participation” (**co-PI**, with J. Konstan & J. Riedl, R. Kraut & S. Kiesler (CMU), P. Resnick and Y. Chen (Univ. of Michigan)). \$1,246,017 for 9/1/2003 to 8/31/2009 (UMN share).

AT&T: “VURI: Collaborative Filtering and Intelligent Interface Design for Enhanced TV Applications” (**PI**). \$35,000 for November 1, 2008 to October 31, 2009.

AT&T: “VURI: Collaborative Filtering and Intelligent Interface Design for Enhanced TV Applications” (**PI**). \$35,000 for June 1, 2007 to May 31, 2008.

Internal Funding

Minnesota/China Collaborative Research Grant: “Expertise Oriented Mining for Web Community”. \$10,000 for July 1, 2007 to June 30, 2008 (PI, with Jie Tang, Tsinghua University, Beijing China).

University of Minnesota TEL grant: “The Next Generation Online Learning Environment: Designing for Community and Collaboration”. \$10,000 for September 2006 to May 2007. (co-PI, with Joan Hughes, David Ernst, and Ann Ooms, College of Education and Human Development).

University of Minnesota Digital Technology Center: “Indoor Navigation Aids for Visually Impaired People”. \$25,67 for June 2005 to December 2006. (co-PI, with S. Shekhar and G. Legge).

University of Minnesota Digital Technology Center: “Eye-Tracking Research on Community Websites: Photo Directories and Building Social Networks”. \$19,300 for June 2004 to June 2005. (co-PI, with J. Konstan).

University of Minnesota Grant-In-Aid: “Facilitating Participation in Online Communities”. \$20,397 for 1/1/2003 to 6/30/2004.

Publications

Books

1. Bickhard, M.H. and Terveen, L.G. Foundational Issues in Artificial Intelligence and Cognitive Science: Impasse and Solution, (1995), Elsevier Science.

Refereed Journal Papers

2. Zent, M., Yong, S., Balasubramanian, D., Chancellor, S., Konstan, J., Terveen, L., and Yarosh, L. “Beyond the Individual: A Community-Engaged Framework for Ethical Online Community Research”. *PACM Human-Computer Interaction CSCW* (2025). **Best Paper.**
3. Levonian, Z., Zent, M., Nguyen, N., McNamara, M.R., Terveen, L. and Yarosh, L. “Peer recommendation interventions for health-related social support: a feasibility assessment”. *PACM Human-Computer Interaction CSCW* (2025). **Best Paper.**
2. Mo Houtti, Moyan Zhou, Loren Terveen, and Stevie Chancellor. “All of the White People Went First”: How Video Conferencing Consolidates Control and Exacerbates Workplace Bias. **Honorable Mention** at CSCW 2023. *PACM Human-Computer Interaction 7, CSCW 1* (2023).
3. Mo Houtti, Isaac Johnson, Joel Cepeda, Soumya Khandelwal, Aviral Bhatnagar, and Loren Terveen. 2022. “We Need a Woman in Music”: Exploring Wikipedia’s Values on Article Priority. *PACM Human-Computer Interaction 6, CSCW 2* (2022).
4. Charles Chunkai Zhang*, Mo Houtti*, C, Estelle Smith, Ruoyan Kong, and Loren Terveen. Working for Invisible Machines or Pumping Information into an Empty Void? An Exploration of Wikidata Contributors’ Motivations. In *Proceedings of the ACM on Human-Computer Interaction, 6, CSCW 1* (2022). (* co-first authors)
5. C. Estelle Smith, William Lane, Hannah Miller Hillberg, Daniel Kluver, Loren Terveen, and Svetlana Yarosh. Effective Strategies for Crowd-Powered Cognitive Reappraisal Systems: A Field Deployment of the Flip*Dubt Web Application for Mental Health. In *Proceedings of the ACM on Human-Computer Interaction, 5, CSCW 2* (2021). **Best Paper Honorable Mention.**
6. C. Estelle Smith, Avleen Kaur, Katie Z. Gach, Loren Terveen, Mary Jo Kreitzer, and Susan O’Conner-Von. What is Spiritual Support and How Might It Impact the Design of Online Health Communities? In *Proceedings of the ACM on Human-Computer Interaction, 5, CSCW 1* (2021).
7. Levonian, Z., Dow, M., Erickson, D.R., Ghosh, S., Miller Hillberg, H., Narayanan, S., Terveen, L. and Yarosh, L. Patterns of Patient and Caregiver Mutual Support Connections in an Online Health Community. In *Proceedings of the ACM on Human-Computer Interaction, 4, CSCW 3* (2020).
8. Zhu, H., Yu, B., Halfaker, A., and Terveen, L. Value-Sensitive Algorithm Design: Method, Case Study, and Lessons. In *Proceedings of the ACM on Human-Computer Interaction, Vol. 2, No. 2* (2018).
9. Miller Hillberg, H., Levonian, Z., Terveen, L., and Hecht, B. What I See is What You Don’t Get: Effects of Seeing Emoji Rendering Differences Across Platforms. In *Proceedings of the ACM on Human-Computer Interaction, Vol. 2, No. 2* (2018).
10. Hall, A., Terveen, L., and Halfaker, A. Bot Detection in Wikidata Using Behavioral Cues. In *Proceedings of the ACM on Human-Computer Interaction, Vol. 2, No. 2* (2018).

11. Sheppard, S.A., Turner, J., Thebault-Spieker, J., Zhu, H., and Terveen, L. Never Too Old, Cold or Dry to Watch the Sky: A Survival Analysis of Citizen Science Volunteerism. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 1, No. 2 (2017).
12. Thebault-Spieker, J., Kluver, D., Klein, M., Halfaker, A., Hecht, B., Terveen, L., and Konstan, J. Simulation Experiments On (The Absence of) Ratings Bias in Reputation Systems. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 1, No. 2 (2017).
13. Yu, B., Wang, X., Lin, A.Y., Ren, Y., Terveen, L., and Zhu, H. Out With The Old, In With The New? Unpacking Member Turnover in Online Production Groups. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 1, No. 2 (2017).
14. Nguyen, T.T., Harper, F.M., Terveen, L., and Konstan, J. User Personality and User Satisfaction with Recommender Systems. In *Information Systems Frontiers* (2017).
15. Filson Moses, J., Dwyer, P.C., Fugelstad, P.T., Kim, J.S., Maki, A., Synder, M., and Terveen, L. Encouraging Online Engagement: The Role of Interdependent Self-Construal and Social Motives in Fostering Online Participation. In *Personality and Individual Differences* (2017).
16. Thebault-Spieker, J., Terveen, L., and Hecht, B. Towards a Geographic Understanding of the Sharing economy: Systemic Biases in UberX and TaskRabbit. In *ACM Transactions on Computer-Human Interaction* (2017).
17. Brady, S.S., Sieving, R.E., Terveen, L.G., Rosser, R. S., Kodet, A.J., and Rothberg, V.D. An Interactive Website to Reduce Sexual Risk Behavior: Process Evaluation of TeensTalkHealth, JMIR Research Protocols (2015).
18. Ren, Y., Harper, F.M., Drenner, S., Terveen, L., Kiesler, S., Riedl, J., and Kraut, R.E. (2012). Building Member Attachment in Online Communities: Applying Theories of Group Identity and Interpersonal Bonds. *Management Information Systems Quarterly*.
19. Jones, Q., Grandhi, S., Karam, S., Whittaker, S., Zhou, C., and Terveen, L. Geographic ‘Place’ and Community Information Preferences, in *Computer-Supported Cooperative Work*.
20. Zhou, C., Frankowski, D., Ludford, P., Shekhar, S., Terveen, L., Discovering Personally Meaningful Places from Location Data: An Interactive Clustering Approach. *ACM Transactions on Information System*, 25, 3 (July 2007).
21. Ling, K., Beenen, G., Ludford, P.J., Wang, X., Chang, K., Li, X., Cosley, D., Frankowski, D., Terveen, L., Rashid, A.M., Resnick, P., and Kraut, R.E. Using Psychology to Motivate Contributions to Online Communities. *Journal of Computer-Mediated Communication*, 10, 4 (June 2005).
22. Terveen, L. and McDonald, D. Social Matching: A Framework and Research Agenda. *ACM Transactions on Computer-Human Interaction*, 12, 3 (2005), 401-434.
23. Whittaker, S., Jones, Q., Nardi, B., Creech, M., Terveen, L., Isaacs, E., and Hainsworth, J. ContactMap: organizing communication in a social desktop, in *ACM Transactions on Computer-Human Interaction*, 11, 4 (December 2004), 445-471.
24. Jones, Q., Grandhi, S., Terveen, L., and Whittaker, S. People-To-People-to-Geographical-Places: The P3 Framework for Location-Based Community Systems. in *Computer-Supported Cooperative Work*, 13, 3-4 (August 2004), 249-282.
25. Herlocker, J.L., Konstan, J.A., Terveen, L.G., and Riedl, J.T. Evaluating Collaborative Filtering Recommender Systems, *ACM Transactions on Information Systems* (2004).
26. Amento, B., Terveen, L., Hill, W., Hix, D., and Schulman, R. Experiments in Social Data Mining: The TopicShop System, in *ACM Transactions on Computer-Human Interaction*, 10, 1 (March 2003), 54-85.

27. Whittaker, S., Terveen, L.G, and Nardi, B.A. Let's stop pushing the envelope and start addressing it, in *Human-Computer Interaction*, 15, 2-3 (Sep 2000), 75-106.
28. Terveen, L.G., Hill, W.C., and Amento, B. Constructing, Organizing, and Visualizing Collections of Topically Related Web Resources, in *ACM Transactions on Computer-Human Interaction*, 6, 1 (Mar. 1999), 67-94.
29. Selfridge, P.G. and Terveen, L.G. Knowledge Management Tools for Business Process Support and Reengineering, in *Journal of Intelligent Systems in Accounting, Finance, and Management* (Jan. 1996).
30. Terveen, L.G. An Overview of Human-Computer Collaboration, in *Knowledge-Based Systems*, 8, 2-3 (1995), 67-81.
31. Terveen, L.G., Selfridge, P.G., and Long, M.D. Living Design Memory: Framework, System, and Lessons Learned, in *Human-Computer Interaction*, 10, 1 (1995), 1-37.
32. Terveen, L.G. Intelligent Systems as Cooperative Systems, in *International Journal of Intelligent Systems*, 3, 2-4 (1993), 217-250.
33. Brachman, R.J., Selfridge, P.G., Terveen, L.G., Altman, B., Borgida, A., Halper, F., Kirk, T., Lazar, A., McGuinness, D.L., and Resnick, L.A. Integrated Support for Data Archaeology, in *International Journal of Intelligent and Cooperative Information Systems*, 2, 2 (1993), 159-185.

Refereed Conference Papers

34. Mo Houtti, Moyan Zhou, Loren Terveen, and Stevie Chancellor. Observe, Ask, Intervene: Designing AI Agents for More Inclusive Meetings. In *Proceedings of CHI 2025, the ACM Conference on Human Factors in Computing Systems*.
35. Houtti, M., Johnson, I., and Terveen, L. Leveraging Recommender Systems to Reduce Content Gaps on Peer Production Platforms. In *Proceedings of ICWSM 2024*, the International AAAI Conference on Web and Social Media.
36. Zhang, C and Terveen, L. Quantifying the Gap: A Case Study of Wikidata Gender Disparities. In *Proceedings of OpenSym 2021*, the 17th International Symposium on Open Collaboration
37. Yu, B., Ye, Y., Terveen, L., Wu, Z.S., Forlizzi, J., and Zhu, H. Keeping Designers in the Loop: Communicating Inherent Algorithmic Trade-offs Across Multiple Objectives. In *Proceedings of DIS 2020*, the ACM Conference on Designing Interactive Systems.
38. Smith, C.E., Yu, B., Srivastava, A., Halfaker, A., Terveen, L., and Zhu, H. Keeping Community in the Loop: Understanding Wikipedia Stakeholder Values for Machine Learning-Based Systems. In *Proceedings of CHI 2020, the ACM Conference on Human Factors in Computing Systems*. **Best Paper Honorable Mention.**
39. Levonian, Z., Erikson, D., Luo, W., Narayanan, S., Rubya, S., Vachher, P., Terveen, L. and Yarosh, S. Bridging Qualitative and Quantitative Methods for User Modeling: Tracing Cancer Patient Behavior in an Online Health Community. In *Proceedings of ICWSM 2020, AAAI Conference on the Web and Social Media*.
40. Cheng, H.F., Yu, B., Fu, S., Zhao, J., Hecht, B., Konstan, J., Terveen, L., Yarosh, S., and Zhu, H. Teaching UI Design at Global Scales: A Case Study of Designing Collaborative Capstone Projects for MOOC Students, in *Proceedings of ACM Learning at Scale 2019*.
41. Hall, A., Thebault-Spieker, J., Sen, S., Hecht, B., and Terveen, L. Exploring the Relationship Between “Informal Standards” and Contributor Practice in OpenStreetMap. In *Proceedings of OpenSym 2018*.

42. Thebault-Spieker, J., Halfaker, A., Terveen, L., and Hecht, B.
Distance and Attraction: Gravity Models for Geographic Content Production. In *Proceedings of CHI 2018, the ACM Conference on Human Factors in Computing Systems*.
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44. Kang, J., Condiff, K., Chang, S., Terveen, L., Konstan, J., and Harper, F.M.
Understanding How People Use Natural Language to Ask for Recommendations, in *RecSys 2017*.
45. Miller, H., Kluver, D., Thebault-Spieker, J., Terveen, L., and Hecht, B. Understanding Emoji Ambiguity in Context: The Role of Text in Emoji-Related Miscommunication. In *Proceedings of ICWSM 2017, AAAI Conference on the Web and Social Media*.
46. Hall, A., McRoberts, S., Thebault-Spieker, J., Lin, A.Y., Sen, S., Hecht, B., and Terveen, L.
Freedom versus Standardization: Structured Data Generation in a Peer Production Community. In *Proceedings of CHI 2017, the ACM Conference on Human Factors in Computing Systems (CHI 2017)*.
47. Yu, B., Ren, Y., Terveen, L., and Zhu, H. Predicting Member Productivity and Withdrawal from Pre-Joining Attachments in Online Production Groups. In *Proceedings of CSCW 2017, The ACM Conference on Computer-Supported Cooperative Work and Social Computing*.
48. Chang, S., Harper, M., and Terveen, L. Crowd-Based Personalized Natural Language Explanations for Recommendations In *Proceedings of RecSys 2016, The ACM Conference on Recommender Systems*.
49. Chang, S., Harper, M., He, L., and Terveen, L. CrowdLens: Experimenting with Crowd-Powered Recommendation and Explanation. In *Proceedings of ICWSM 2016, AAAI Conference on the Web and Social Media*.
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“Blissfully happy” or “ready to fight”: Varying Interpretations of Emoji. In *Proceedings of ICWSM 2016, AAAI Conference Web and Social Media*.
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 58. Warncke-Wang, M., Hecht, B., and Terveen, L. The Success and Failure of Quality Improvement Projects in Peer Production Communities. In *Proceedings of the 18th ACM conference on Computer supported cooperative work & social computing (CSCW '15).* ACM, New York, NY, USA.
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 61. Nguyen, T., Hui, P., Harper, F.M., Terveen, L., and Konstan, J. Exploring the Filter Bubble: The Effect of Using Recommender Systems on Content Diversity, in *Proceedings of WWW 2014.*
 62. Halfaker, A., Geiger, S., and Terveen, L. Snuggle: Designing for Efficient Socialization and Ideological Critique, in *Proceedings of CHI 2014.*
 63. Chang, S., Kumar, V., Gilbert, E., and Terveen, L. Specialization, Homophily, and Gender in a Social Curation Site Findings from Pinterest, in *Proceedings of CSCW 2014.*
 64. Grevet, C., Terveen, L., and Gilbert, E. Managing Political Differences in Social Media, in *Proceedings of CSCW 2014.*
 65. Masli, M., and Terveen, L. Leveraging the Contributory Potential of User Feedback, in *Proceedings of CSCW 2014.*
 66. Sheppard, S.A., Wiggins, A., and Terveen, L. Capturing Quality: Retaining Provenance for Curated Volunteer Monitoring Data, in *Proceedings of CSCW 2014.*
 67. DeLong, C., Terveen, L., and Srivastava, J. (2013). TeamSkill and the NBA: Applying Lessons from the Virtual World to the Real World, in *Proceedings of ASONAM 2013.*
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 69. Gilbert, E., Bakshi, S, Chang, S., and Terveen, L. (2013). “I Need to Try This!”: A Statistical Overview of Pinterest, in *Proceedings of CHI 2013.*
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 72. Dong, Z., Shi, C., Sen, S., Terveen, L., and Riedl, J. (2012). War Versus Inspirational in Forrest Gump: Cultural Effects in Tagging Communities, in *ICWSM 2012.*
 73. Masli, M. and Terveen, L. (2012) Evaluating Compliance-Without-Pressure Techniques for Increasing Participation in Online Communities, in *CHI 2012.*

74. Fuglestad P.T., Dwyer, P.C., Filson Moses, J., Kim, J.S., Mannino, C.A., Terveen, L., and Snyder, M. (2012) What Makes Users Rate (Share, Tag, Edit...)? Predicting Patterns of Participation in Online Communities, in CSCW 2012.
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76. Priedhorsky, R., Pitchford, D., Sen, S., and Terveen, L. (2012), Recommending Routes in the Context of Bicycling: Algorithms, Evaluation, and the Value of Personalization, in CSCW 2012.
77. Lam, S.K., Uduwage, A., Dong, Z., Sen, S., Musicant, D.R., Terveen, L., and Riedl, J. (2011). WP:Clubhouse? An Exploration of Wikipedia's Gender Imbalance, in Wikisym 2011. **Best Paper Winner.**
78. Panciera, K., Masli, M., and Terveen, L.G. (2011). "How Should I Go from __ to __ without Getting Killed? Motivations and Benefits in Open Collaboration", in Wikisym 2011.
79. Priedhorsky, R., and Terveen, L.G. (2011). Wiki Grows Up: Arbitrary Data Models, Access Control, and Beyond, in Wikisym 2011.
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86. Reily, K., Ludford Finnerty, P., and Terveen, L. Two Peers are Better than One: Aggregating Peer Reviews for Computing Assignments is Surprisingly Accurate, in GROUP 2009. *36% Acceptance Rate.*
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100. Cosley, D., Frankowski, D., Terveen, L., and Riedl, J., Using Intelligent Task Routing and Contribution Review to Help Communities Build Artifacts of Lasting Value, in *Proceedings of CHI 2006*. *23% acceptance rate.*
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106. Ludford, P., Cosley, D., Frankowski, D., and Terveen, L.G. Think Different: Increasing Online Community Participation Using Uniqueness and Group Dissimilarity, in *Proceedings of CHI 2004*. *16% acceptance rate.*
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109. Whittaker, S., Jones, Q., and Terveen, L.G. Contact Management: Identifying Contacts to Support Long-Term Communication, *Proceedings of CSCW 2002*, 216-225. *20% acceptance rate.*
110. Terveen, L.G., McMackin, J., Amento, B., and Hill, W. Specifying Preferences Based On User History, *Proceedings of CHI 2002*, 315-322. *15% acceptance rate.*

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117. Terveen, L.G and Hill, W.C. Finding and Visualizing Inter-site Clan Graphs, *Proceedings of CHI 1998*, 448-455. 23% acceptance rate.
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120. Hill, W.C. and Terveen, L.G Using Frequency-of-Mention in Public Conversations for Social Filtering, *Proceedings of CSCW 1996*, 106-112.
121. Terveen, L.G. and Murray, L. Helping Users Program Their Personal Agents, *Proceedings of CHI 1996*, 355-361. 23% acceptance rate.
122. Terveen, L.G. and Tuomenoksa, M.L. DynaDesigner: A Tool for Rapid Creation of Device-Independent, *Proceedings of INTERACT 1995*, 386-389.
123. Terveen, L.G. and Selfridge, P.G. Intelligent Assistance for Software Construction: A Case Study, *Proceedings of Knowledge-Based Software Engineering 1994*, 14-21.
124. Terveen, L.G., Selfridge, P.G., and Long, M.D. From 'Folklore' to 'Living Design Memory', in *Proceedings of INTERCHI 1993*, 15-22. 19% Acceptance Rate.
125. Terveen, L.G. Interface Support for Data Archaeology, *ISMM International Conference on Information and Knowledge Management (CIKM'93)*. (acceptance rate for 1992 unknown; average is 24%).
126. Brachman, R. J., Selfridge, P.G., Terveen, L.G., Altman, B., Borgida, A., Helper, F., Kirk, T., Lazar, A., McGuinness, D.L., and Resnick, L. A., Knowledge Representation Support for Data Archaeology, *ISMM International Conference on Information and Knowledge Management (CIKM'92)*. (acceptance rate for 1992 unknown; average is 24%).
127. Selfridge, P.G., Terveen, L.G., and Long, M.D. Managing Design Knowledge to Provide Assistance to Large-Scale Software Development, *Proceedings of Knowledge-Based Software Engineering 1992*, 154-162.
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130. Terveen, L.G. and Wroblewski, D.A. A Collaborative Interface for Browsing and Editing Large Knowledge Bases, *Proceedings of AAAI 1990*, 491-496. 18% acceptance rate.

Book Chapters

133. Terveen, L., Riedl, J., Konstan, J., and Lampe, C. (2014) “Study, Build, Repeat: Using Online Communities as a Research Platform”, in *Human Computer Interaction Ways of Knowing*, edited by Judith S. Olson and Wendy Kellogg, New York: Springer.
134. Amento, B., Harrison, C., Nathan, M., and Terveen, L. (2009), Asynchronous Communication – Fostering Social Interaction with CollaboraTV, in Cesar, P., Geerts, D., and Chorianopoulos, K. (ed.), *Social Interactive Television: Immersive Shared Experiences and Perspectives* (2009), Information Science Reference.
135. Amento, B., Terveen, L.G and Hill, W. From PHOAKS to TopicShop: Experiments in Social Data Mining, in Lueg, C. and Fisher, D. (ed.), *From Usenet to CoWebs: Interacting with Social Information Spaces* (2002), Springer.
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137. Terveen, L.G and Hill, W. Beyond Recommender Systems: Helping People Help Each Other, in Carroll, J. (ed.), *HCI in the New Millennium* (2001), Addison Wesley.
138. Terveen, L.G. Computer-Mediated Collaboration, in *More than Screen Deep: Toward Every-Citizen Interfaces to the Nation's Information Infrastructure* (1997), National Academy Press.

Other Publications

139. Ajmani, Leah Hope, Ava Bartolome, Isaac Johnson, Stevie Chancellor, and Loren Terveen. Personal or Policy? How Policy is Wielded in Mental Health Discussions. Wiki Workshop 2024
140. Levonian, Zach and Loren Terveen. ORES-Inspect: A technology probe for machine learning audits on enwiki. Wiki Workshop 2024.
141. Zhou, Moyan, Leah Hope Ajmani, Stevie Chancellor, and Loren Terveen. Bringing Talk Pages to The Front: An Interface Design. Wiki Workshop 202
142. Zhou, Moyan, Ruixuan Sun, and Loren Terveen. Investigating Social Interaction Factors for Newcomer Retention in Wikipedia, Wiki Workshop 2024.
143. Chancellor, Stevie, Joseph A. Konstan, Loren Terveen, and Svetlana Yarosh, “Do Know Harm: Considering the Ethics of Online Community Research”. *Communications of the ACM*, May 2024.
144. Bartolome, Ava, Stevie Chancellor, and Loren Terveen. "Policy Deliberations in Wikipedia Talk Pages: How Editors Construct Knowledge About Mental Health." Wiki Workshop 2023.
145. Konstan, J.A., and Terveen, L.G. Human-centered recommender systems: Origins, advances, challenges, and opportunities. *AI Magazine*, 2021.
146. Terveen, L. “Autonomous” agents? What should we worry about? What should we do? *Human-Computer Interaction*.

147. Kaur, A., Smith, C. E., and Terveen, L. Sway Together, Stay Together: Visualizing Spiritual Support Networks Through the SoulGarden Prototype. In *Extended Abstracts of CSCW 2021*.
148. Kaur, H., Johnson, I., Miller, H., Terveen, L., Lampe, C., Hecht, b., and Lasecki, W. Oh The Places You'll Share: An Affordances-Based Model of Social Media Posting Behaviors. In *Extended Abstracts of CHI 2017* (ACM Conference on Human Factors in Computing Systems). 40% acceptance rate.
149. Masli, M. and Terveen, L. Geographical Social Production: Lessons from Cyclopath, in CHI 2013 GeoHCI Workshop.
150. Masli, M., Bouman, L., Owen, A., and Terveen, L. Geowiki + route analysis = improved transportation planning, CSCW 2013 Interactive Poster.
151. Brady, S. S., Sieving, R. E., Terveen, L. G., Rosser, B. R. S., Kodet, A. J., & Rothberg, V. D. (2012, October). *TeensTalkHealth: An interactive website to promote healthy relationships and prevent STIs*. Paper presented at the annual meeting of the American Public Health Association, San Francisco, CA.
152. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "The role of community orientation in promoting online participation" (with J. S. Kim, P. C. Dwyer, J. Filson Moses, P. T. Fuglestad, C. A. Mannino, R Davies, & M. Snyder)
153. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "Applying a functional approach to participation in online groups" (with P. T. Fuglestad, P. C. Dwyer, J. Filson Moses, J. S. Kim, C. A. Mannino, R Davies, & M. Snyder)
154. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "Past volunteerism predicts amount of content contributed in an online community" (with P. C. Dwyer, J. Filson Moses, P. T. Fuglestad, J. S. Kim, C. A. Mannino, R Davies, & M. Snyder)
155. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "Social motives and personality as predictors of online participation" (with J. Filson Moses, P. C. Dwyer, P. T. Fuglestad, J. S. Kim, C. A. Mannino, R Davies, & M. Snyder)
156. Kapoor, N., Frankowski, D., Konstan, J., and Terveen, L. Lessons Learned in Implementing the CHIplace Online Community, in *Proceedings of Human-Computer Interaction International 2005*.
157. Zhou, C., Ludford, P., Frankowski, D., and Terveen, L. An Experiment in Exploring How People Describe Places, Short Paper in *Proceedings of Pervasive 2005*.
158. Zhou, C., Ludford, P., Frankowski, D., and Terveen, L. An Experiment in Discovering Personally Meaningful Places from Location Data, Short Paper in *Proceedings of CHI 2005*.
159. Kapoor, N., Konstan, J., and Terveen, L. How Peer Photos Influence Member Participation in Online Communities, Short Paper in *Proceedings of CHI 2005*.
160. Amento, B., Hill, W., and Terveen, L. The Sound of One Hand: A Wrist-mounted Bio-acoustic Fingertip Gesture Interface, Short Paper in *Proceedings of CHI 2002*, 724-725. 33% acceptance rate.
161. Terveen, L., Hill, W., and Amento, B. Collaborative Filtering to Locate, Comprehend, and Organize Collections of Websites, in SIGART Bulletin, 9, 3&4 (1998), 10-17.
162. Terveen, L., Hill, W., Amento, B., McDonald, D., and Creter, J. 1997. PHOAKS: a system for sharing recommendations. *Commun. ACM* 40, 3 (Mar. 1997), 59-62.
163. Terveen, L.G., Stolze, M., and Hill, W. From 'Model World' to 'Magic World', in *SIGCHI Bulletin*, 27, 4 (1995), 31-34.

164. Terveen, L.G., Papavero, E., and Tuomenoksa, M. DynaDesigner: A Tool for Rapid Design and Deployment of Device-Independent Interactive Services, Refereed Formal Demonstration in *Adjunct Proceedings of CHI'95*, 29-30.
165. Terveen, L.G. Person-Computer Cooperation through Collaborative Manipulation. Ph.D. Thesis, University of Texas Department of Computer Sciences, 1991.

Invited Presentations

Carnegie Mellon University
Northwestern University
The University of California Irvine
Carleton College
Twin Cities MetroGIS Policy Board
Hennepin County Bicycle Advisory Committee
University of Minnesota Digital Humanities Collaborative
University of Minnesota Advanced Transportation Technologies Seminar Series
Georgia Tech
University of Minnesota Urban Ecosystems Symposium
University of Minnesota New Media
IBM T.J. Watson Research
University of Illinois
University of Maryland
University of Washington
Carnegie-Mellon University
Swedish Institute of Computer Science / Royal Institute of Technology
Uppsala University, Sweden
New Jersey Institute of Technology
Microsoft Research
Vassar University
Rensselaer Polytechnic Institute
University of Colorado
Virginia Tech
University of Nebraska

Conference Presentations

- ACM Conference on Computer-Supported Cooperative Work (CSCW), 2014.
- ACM Conference on Computer-Supported Cooperative Work (CSCW), 2012.
- ACM Conference on Computer-Supported Cooperative Work (CSCW), 2002.
- ACM Conference on Computer-Supported Cooperative Work (CSCW), 1998.

- ACM Conference on Human Factors in Computing Systems (CHI), 1998.
- ACM Conference on Design of Interactive Systems, 1997.
- ACM Conference on Human Factors in Computing Systems (CHI), 1997.
- ACM Conference on Human Factors in Computing Systems (CHI), 1996.
- IFIP TC13 International Conference on Human-Computer Interaction (INTERACT), 1995.
- IEEE Conference on Knowledge-Based Software Engineering, 1994.
- ACM Conference on Human Factors in Computing Systems (CHI), 1993.
- Conference on Information and Knowledge Management, 1993.
- Conference on Information and Knowledge Management, 1992.
- National Conference on Artificial Intelligence (AAAI), 1991.
- International Joint Conference on Artificial Intelligence (IJCAI), 1991.
- National Conference on Artificial Intelligence (AAAI), 1990.

Workshop Presentations

- CHI 2013 GeoHCI Workshop
 - “Geographical Social Production: Lessons from Cyclopath”
- CSCW 2002 Workshop on “The Role of Place in Shaping Virtual Communities”:
 - “Place-Based Community Information Systems”.
- CHI 99 Workshop on “Interacting with Recommender Systems”:
 - “Visualization Interfaces for Recommender Systems”.
- 1999 Human-Computer Interaction Consortium Workshop:
 - “A Reference Task Agenda for Human-Computer Interaction”.
- 1998 AAI Workshop on “Recommender Systems”:
 - “The PHOAKS Recommender System”.
- 1997 Human-Computer Interaction Consortium Workshop:
 - “The PHOAKS Recommender System”.
- 1995 Lifelike Computer Characters Workshop:
 - “Hidden Hands, not Talking Heads: The Magic World Interaction Paradigm”.
- 1995 Lifelike Computer Characters Workshop:
 - “Moving Agent-User Voice Dialogue towards Natural Conversation”.
- CHI 95 Workshop on “‘Model World’ to ‘Magic World’: Making Visual Objects the Medium for Intelligent Design Assistance”:
 - “The ‘Magic World’ Approach to Human-Computer Collaboration”.
- 1993 AAAI Fall Symposium: “Human-Computer Collaboration: Reconciling Theory, Synthesizing Practice”:
 - “A Framework for Human-Computer Collaboration”

- 1993 AI-ED Workshop on “Collaborative Problem Solving: Theoretical Frameworks and Innovative Systems”:
 - “Collaborative Problem Solving in Interactive Systems”.
- 1992 CAIA Workshop on “Applying AI To Software Problems: Assessing Promises and Pitfalls”:
 - “Representing and Disseminating Software Design Knowledge”.
- 1992 AAAI Spring Symposium on “Cognitive Aspects of Knowledge Acquisition”:
 - “In The Footprints of The Masters: Embedding Knowledge Acquisition in Organizational Activity”.
- AAAI 90 Workshop on “Complex Systems, Ethnomethodology, and Interaction Analysis”:
 - “Resources for Person-Computer Collaboration”.
- 1990 AAAI Spring Symposium on “Knowledge-Based Human-Computer Communication”:
 - “Tools for Human-Computer Collaboration”.

Patents

U.S. Patent # 5,388,188. Apparatus and methods for providing design advice. (with P. Selfridge). Issued February 7, 1995.

U.S. Patent #5,659,724. Interactive data analysis apparatus employing a knowledge base. (with A. Borgida, R.J. Brachman, T. Kirk, and P. Selfridge). Issued August 19, 1997.

U.S. Patent #5,680,530. Graphical environment for interactively specifying a target system (with P. Selfridge). Issued October 21, 1997.

U.S. Patent #5,806,060. Interactive data analysis employing a knowledge base. (with A. Borgida, R.J. Brachman, T. Kirk, and P. Selfridge). Issued September 8, 1998.

U.S. Patent # 5,809,492. Apparatus and method for defining rules for personal agents. (with L. Murray). Issued September 15, 1998.

U.S. Patent # 5,953,393. Personal Telephone Agent. (With P. Culbreth, P. Danielsen, R.J. Hall, E. Papavero, and M. Tuomenoksa). Issued September 14, 1999.

U.S. Patent #6,029,192. System and method for locating resources on a network using resource evaluations derived from electronic messages. (with W.C. Hill). Issued February 22, 2000.

U.S. Patent #6,244,873. Wireless myoelectric control apparatus and methods. (with W.C. Hill, F.C. Pereira, and Y. Singer). Issued June 12, 2001.

U.S. Patent #6,256,648. System and method for selecting and displaying hyperlinked information resources. (with W.C. Hill). Issued July 3, 2001.

U.S. Patent #9,430,043. Bioacoustic Control System, Method, and Apparatus. (with B. Amento and W.C. Hill). Issued August 30, 2016.

CONSULTING

I provide an overview of my consulting record, including all matters in which I testified. I have received compensation for the patent litigation cases listed below. I provide details for my role in cases unless the client requested that I do not do so; in that case I provide general descriptions.

- (2025) Retained on behalf of a consumer electronics company. General technology area: graphical user interfaces.
- (2025) Retained on behalf of an e-commerce company. General technology area: graphical user interfaces. World Wide Web information and interface systems.
- (2025) Retained on behalf of a consumer electronics company. General technology area: graphical user interfaces.
- (2025) Retained to offer opinions regarding patent validity. General technology area: multi-user graphical interfaces.
- (2024) Retained to offer opinions regarding patent validity. General technology area: user interfaces for e-commerce applications. Wrote declaration.
- (2024) Retained on behalf of a software company. General technology area: user interfaces for network-based applications. Wrote expert declaration. **Deposed.**
- (2024) Retained on behalf of a software, hardware, and consumer electronics company. General technology area: graphical and touch-based user interfaces. Wrote expert declaration.
- (2024) Retained on behalf of a computer software, hardware, and consumer electronics company. General technology area: graphical and mobile user interfaces. Wrote expert declaration.
- (2024) Retained on behalf of a computer software and hardware company. General technology area: information search. Wrote expert declaration.
- (2024) Retained on behalf of a computer software, hardware, and consumer electronics company. General technology area: email messaging systems. Wrote expert declaration.
- (2024) *Multimedia Technologies Pte. Ltd vs. LG Electronics Inc. and LG Electronics U.S.A., Inc.*, Case No2:22-CV-00494-JRG-RSP. Retained on behalf of defendant LGE. Wrote expert reports. **Deposed. Testified at trial.** All patents were found not infringing and invalid.
- (2024) Retained on behalf of a computer software, hardware, and consumer electronics company. General technology area: gesture-based graphical user interfaces. Wrote expert declarations. **Deposed multiple times.**
- (2023) Retained on behalf of a computer software, hardware, and consumer electronics company. General technology area: gesture-based graphical user interfaces. Wrote expert reports. **Deposed.**

- (2023) Retained on behalf of e-commerce companies. General technology area: graphical-user interface techniques for the World Wide Web. Wrote expert reports. **Deposed.**
- (2023) Retained by Unified Patents. General technology area: online advertising. Writing declaration in support of *ex parte* reexamination petition.
- (2023) Retained on behalf a consumer and information technology company. General technology area: graphical and touch-based user interfaces. Writing declaration in support of *inter partes* review petitions.
- (2023) Retained on behalf of a computer software, hardware, and consumer electronics company. General technology areas: graphical user interfaces for web information access. Writing declaration in support of *inter partes* review petitions.
- (2022) *Lyft v. AGIS Software Development*, Case No. IPR2022-00514 (PTAB) (retained on behalf of AGIS). Writing declarations in *inter partes* review proceedings involving patents owned by the company.
- (2022) *Unified Patents v. AK Meeting IP LLC*, Case No. IPR2022-01142 (PTAB) (retained by Unified Patents). Writing declaration in support of *inter partes* review petitions.
- (2022) Retained as expert witness on behalf of a consumer electronics company. General technology area: graphical user interfaces. Analyzed possible infringements of the company's patents.
- (2022) Retained as expert witness on behalf of a computer software company. General technology areas: Web-based and mobile user interfaces.
- (2022) Retained as expert witness on behalf of a computer software company. General technology areas: Web-based and mobile user interfaces.
- (2021) *Unified Patents v. Callstat Solutions LLC*, Case No. IPR2022-00287 (PTAB) (retained by Unified Patents). Wrote declaration in support of *inter partes* review petitions.
- (2021) *Apple Inc. v. Memory, Web LLC*, Case Nos. IPR2022-00111, PGR2022-00006, IPR2022-00032, IPR2022-00033, IPR2022-00031 (PTAB) (retained on behalf of Apple Inc.) Wrote declaration in support of *inter partes* review petitions. **Deposed.**
- (2021) *Microsoft Corp. v. Parus Holdings, Inc.* Case No. IPR2022-00137 (PTAB) (retained on behalf of Microsoft Corp.). Wrote declaration in support of *inter partes* review petitions.

- (2021) *Phoji, Inc. v. Atlassian, Inc.*, Case No. 6-21-cv-00888 (Western District of Texas) & *Atlassian, Inc. v. PHOJI, LLC*, Case No. IPR2022-00210 (PTAB) (retained on behalf of PHOJI, LLC). Analyzed potential infringement of company's patents and submitted declaration in opposition to inter partes review petitions.
- (2021) *Ex Parte* Reexamination involving Patent of AGIS Software Development (retained on behalf of AGIS Software Development). Wrote declarations in support of patent holder's position in *ex parte* reexaminations.
- (2020) *Apple Inc. v. Blix Inc.*, Case No. IPR2022-01635 (PTAB) (retained on behalf of Apple Inc.) Wrote declaration in support of *inter partes* review petition.
- (2020) *Apple Inc. v. Sentius International, LLC*, Case No. IPR2020-01646 (PTAB) (retained on behalf of Apple Inc.). Wrote declaration in support of *inter partes* review petition.
- (2020) Retained by on behalf of a consumer electronics company. General technology area: graphical user interfaces. Analyzed possible infringements of the company's patents.
- (2020) *Apple Inc. v. Parus Holdings, Inc.*, Case No. IPR202-00686, (retained on behalf of Apple Inc.). Wrote declaration in support of *inter partes* review petition. **Deposed.**
- (2019) *WhereverTV, Inc. v. Comcast Cable Communications, LLC*, Case No. 2-18-cv-00529 (M.D. Fla.) (retained on behalf of Comcast Cable Communications, LLC). Wrote expert reports. **Deposed. Testified.** Judgement as a matter of law no infringement.
- (2019) Retained on behalf of a computer and internet software company. General technology area: information search.
- (2019) Retained by O'Melveny & Myers on behalf of Google. (2019)
- (2018) *Unified Patents, LLC v. S.I.SV.EL. Societa Italiana Per Lo Sviluppo Dell'elettronica S.P.A.*, Case No. IPR2019-00471 (PTAB) (retained on behalf of Unified Patents). Wrote declaration in support of *inter partes* review petition. **Deposed.**
- (2017-2019) *Microsoft Corporation (Inventor Plaintiff) vs. Koninklijke Philips N.V., US Philips Corporation*, Case No.: 4:18-cv-01885-HSG & Case No. IPR-2018-00185 (PTAB) & Case No. IPR-2017-00410 (PTAB) & Case No. IPR2018-00023 (PTAB). Wrote reports. Wrote declaration in support of *inter partes* review petition. **Deposed** in IPR and District Court cases.
- (2018) Retained on behalf of a computer hardware and software company to offer opinions regarding the validity of certain patents.

- (2017-2018) Retained on behalf of a professional networking company to offer opinions regarding the validity of certain patents
- (2017) Retained by Perkins-Coie on behalf of Microsoft (vs. Cypress Lake Software). Wrote a declaration.
- (2016) TiVo Inc. v. Samsung Electronics, Case No. 2:15-cv-1503 (E.D. Tex.). Retained on behalf of TiVo by Irell & Manella.
- (2015) *Netflix Inc. v. Rovi*, Case No. 4:11-cv-06591. (Retained on behalf of Netflix) Analyzed validity of patents. Presented **technology tutorial** in court.
- (2013) *Certain Products Containing Interactive Program Guide and Parental Control Technology*, Case No. ITC 337-TA-845 (Retained on behalf of Netflix, LG Electronics, and Roku). **Deposed. Testified.**
- (2011) *Motorola Mobility, Inc. (Plaintiff) vs. Microsoft Corporation (Defendant) and Microsoft Corporation (Counterclaim Plaintiff) vs. Motorola Mobility, Inc. (Counterclaim Defendant)*, Case No. 1:10-CV-24063-MORENO (Retained on behalf of Microsoft). **Deposed.**
- 2010 Microsoft vs. Tivo, Case No. 5:10-cv-00240-RS. Retained on behalf of Microsoft by Perkins Coie.

SELECTED SERVICE

University of Minnesota Committees

- College of Science & Engineering Consultative Committee: 2015-2018
- College of Science & Engineering Honors & Awards Committee, 2017-2020

External Professional Activities

ACM Special Interest Group on Computer Human Interaction

- President: 2015-2018
- Executive Committee: Adjunct Chair for Awards, 2012 – 2015.
- Executive Committee: Vice President for Membership and Communication, 2009 – 2012.

Conference Chair

- CHI 2002: ACM Conference on Human Factors in Computing Systems
- IUI 1998: ACM Conference on Intelligent User Interfaces.

Program Committee Chair

- CSCW 2004: ACM Conference on Computer-Supported Cooperative Work.

- CSCW 2013: ACM Conference on Computer-Supported Cooperative Work.

Computer Supported Cooperative Work (CSCW) Steering Committee

- Chair, 2012-2014 (First elected Chair of the committee that oversees the CSCW Conference and the general CSCW and Social Computing research community.)

Awards Committee Chair

- CSCW 2008: ACM Conference on Computer-Supported Cooperative Work.

Journals Edited

- Special Issue of *Knowledge-Based Systems* on Human-Computer Collaboration, Vol. 8, No. 2-3, 1995.

Proceedings Edited

- Proceedings of the 2002 ACM Conference on Human Factors in Computing Systems (CHI 2002).
- Proceedings of the 1998 ACM Conference on Intelligent User Interfaces (IUI 1998).

Editorial Boards

- Communications of the ACM, 2009-present.
- ACM Transactions on CHI, 2000-2006.
- Knowledge-Based Systems, 1993-2009.
- ACM *intelligence*, 1998-2001.

Program Committees

- ACM Conference on Human Factors in Computing Systems (CHI): 1999-2004, 2006, 2016.
- ACM Conference on Computer-Supported Cooperative Work (CSCW): 2000, 2006, 2008, 2010, 2011, 2012, 2015.
- ACM Conference on Intelligent User Interfaces (IUI): 1997-2000, 2004.
- ACM Recommender Systems Conference: 2007, 2008, 2009, 2010, 2013.
- ACM GROUP Conference: 2007, 2009, 2010.
- ACM SIGIR Conference: 2008.
- AAAI Conference on the Web and Social Media: 2011, 2012, 2016.
- User Modeling, Adaptation, and Personalization: 2011, 2016.
- NordiCHI 2008, 2010.
- Communities and Technology: 2009.
- Computer-Supported Cooperative Learning 2002.
- User Modeling: 2001.

- International Conference on Knowledge Capture 2001.
- Knowledge-Based Software Engineering (KBSE): 1994-1999.
- Intelligent Data Analysis: 1997.
- National Conference on Artificial Intelligence (AAAI): 1996-1997.
- IEEE Conference on Artificial Intelligence for Applications (CAIA): 1994.
- International Workshop on Privacy-Aware Location-based Mobile Services: 2007.
- SIGIR Workshop on Future Challenges in Expertise Retrieval: 2008.

Other conference leadership positions

- ACM Conference on Computer-Supported Cooperative Work Doctoral Consortium Co-Chair, 2016 and 2011.
- The 2nd AAAI Conference on Human Computation and Crowdsourcing (HCOMP 2014) Doctoral Consortium Co-Chair.
- International Symposium on Wikis and Open Collaboration Doctoral Symposium Chair, 2011.
- ACM Conference on Recommender Systems Doctoral Consortium, Co-Chair, 2007.
- International Joint Conference for Artificial Intelligence Doctoral Consortium, Co-Chair, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, Co-Chair, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, Co-Chair, 1996.

Reviewer

Journals

- ACM Computing Surveys.
- IEEE Transactions on Data and Knowledge Engineering.
- IEEE Expert.
- Information Systems.
- International Journal of Human-Computer Studies.
- Journal of Computer-Supported Cooperative Work.

Conferences

- Ninth IFIP International Conference on Human-Computer Interaction (INTERACT): 2003.
- ACM Conference on Human Factors in Computing Systems (CHI): 1995-1998.
- ACM Conference on Computer-Supported Cooperative Work (CSCW): 1998.
- ACM Symposium on User Interface Software and Technology (UIST): 1996.
- ISSM Conference on Information and Knowledge Management: 1993.

National Science Foundations Panels

Served on many panels from 1996 through the present.

Workshops Organized

- ACM Wikis and Open Collaboration Doctoral Symposium, 2011.
- Social Computational Systems Community Workshop, 2011.
- ACM Computer Supported Cooperative Work Doctoral Consortium, 2011.
- International Conference on Ubiquitous Computing (UbiComp): “Multi-device Interfaces for Ubiquitous Peripheral Interaction”, 2003.
- ACM Conference on Human Factors in Computer Systems (CHI): “Interacting with Recommender Systems”, 1999.
- International Joint Conference for Artificial Intelligence Doctoral Consortium, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, 1996.
- ACM Conference on Human Factors in Computer Systems (CHI): “‘Model World’ to ‘Magic World’: Making Visual Objects the Medium for Intelligent Design Assistance”, 1995.
- ACM Conference on Human Factors in Computer Systems (CHI): “New Uses and Abuses of Interaction History”, 1994.
- AAAI Fall Symposium: “Human-Computer Collaboration: Reconciling Theory, Synthesizing Practice”, 1993.
- World Conference on Artificial Intelligence and Education: “Collaborative Problem Solving: Theoretical Frameworks and Innovative Systems”, 1993.
- Conference on AI for Applications: “Applying AI To Software Problems: Assessing Promises and Pitfalls”, 1992.

Other Professional Service

- Member of SIGCHI Publications Board and Conference Management Committee, 2002-2004.
- ACM Special Interest Group on Artificial Intelligence Conference Chair (1995-1999); originated and co-organized Doctoral Consortia held in conjunction with AAAI and IJCAI.

Internal Service

- Associate Department Head, 2019-
- Chair, Department Head Search Committee, 2015.
- Chair, Strategic Planning Committee, 2013-2014.
- Chair, Social Computing Faculty Search Committee, 2013-2014.
- Curriculum Committee, 2012-2013.
- Chair, Strategic Planning Committee / Faculty Recruiting Committee, 2011-2012.

- Director of Graduate Studies: 2007-2010.
- Communications Committee: 2007
- Newsletter/Brochure Committee (chair): 2006-2007
- Research Opportunities Committee: 2005-2007
- Curriculum Committee: 2003-2005.
- Hosted Robert Kraut, Cray Colloquium speaker: October 2003.
- Participated in recruiting and admission activities.
- Information, Technology, and Everyday Life Initiative: Committee Member.

TEACHING AND ADVISING

Ph.D. Students Advised

- Dan Cosley (co-advised with John Riedl): completed PhD July 2006, currently an Associate Professor at Cornell University; on leave as Program Director at NSF.
- Pamela Ludford: completed PhD September 2007, currently an independent consultant.
- Reid Priedhorksy: completed PhD August 2010, currently employed at Los Alamos National Laboratories.
- Colin Delong: completed PhD October 2013 (co-advised with Jaideep Srivastava)
- Mikhil Masli: completed PhD July 2013, currently employed at IBM.
- Aaron Halfaker (co-advised with John Riedl): completed PhD September 2013, currently employed at Microsoft.
- Katie Panciera: completed PhD August 2014; currently Assistant Professor at Milwaukee School of Engineering.
- Fernando Torre: completed PhD September 2014; founder of a startup.
- Shuo (Steven) Chang: completed PhD August 2016; currently employed at Facebook.
- Tien Nguyen (co-advised with Joe Konstan): completed PhD August 2016; currently employed at Facebook.
- Morten Warncke-Wang (co-advised with Brent Hecht): completed PhD December 2016, currently employed at the Wikimedia Foundation.
- Andrew Sheppard: completed PhD December 2017, currently employed at Houston Engineering.
- Jacob Thebault-Spieker (co-advised with Brent Hecht): completed PhD December 2017; currently Assistant Professor at The University of Wisconsin.
- Hannah Miller (co-advised with Brent Hecht): completed PhD August 2018; currently Assistant Professor at University of Wisconsin Oshkosh.
- Vikas Kumar (co-advised with Joe Konstan), completed PhD August 2018, currently employed at KenSci.
- Andrew Hall: completed PhD August 2019; currently employed at 3M.

- Bowen Yu (co-advised with Haiyi Zhu), completed PhD December 2018, currently employed at Facebook.
- C. Estelle Smith: completed PhD December 2020; currently Assistant Professor at the Colorado School of Mines.
- Zach Levonian (co-advised with Lana Yarosh): completed PhD July 2022.
- Charles Chuankai Zhang (completed PhD 2024).
- Mohammed (Mo) Houtti (entered program Fall 2019)
- Moyan Zhou (entered program Fall 2021)

M.S. Students Advised

- Tyler Danielsen – received degree in 2016
- Jie Kang – received degree in 2016
- Zahra Eslami – received degree in 2015
- Yanjie Liu – received degree in 2013
- Renji Yu – received degree in 2012
- Carol Drysdale – received degree in 2011
- Jingwen Zhang – received degree in 2011
- Jisu Oh – received degree in 2010
- Sara Drenner – received degree in 2008
- Anna Rouben – received degree in 2006
- Arjun Sundararajan – received degree in 2006
- Pamela Ludford – received degree in 2005
- Rahul Akolkar – graduated May 2004

Undergraduate Honors / Senior Thesis Students Advised

- Rijul Mahajan 2023
- Moyan Zhou 2021
- Avleen Kaur 2020
- Harmanpreet Kaur, 2016
- Arlo Siemsen, 2014
- Johnathan Frenz, 2013
- David Pitchford - 2012
- Michael Ludwig - 2010
- Jordan Focht – 2010
- Kurt Wilms - 2005

- John Murphy – 2004

Other Committees

- Logan Stapleton, PhD: Member of final examination committee.
- Hanlin Li, PhD: Member of final examination committee (Northwestern University).
- Matheus Araújo, PhD: Member of preliminary and final examination committees
- Hao-Fei Cheng, PhD: Member of preliminary and final examination committees
- Catherine Grevet, PhD: member of preliminary and final examination committees (Georgia Tech).
- Loxley Wang, PhD: member of preliminary and final examination committees.
- Abigail Bakke, PhD: member of preliminary and final examination committees
- Tahir Sousa, MS: member of final examination committee
- Tony Lam, PhD: member of preliminary examination committee.
- Michael Janseen, PhD: member of preliminary examination committee.
- Haleh Hagh Shenass, PhD: member of preliminary & final examination committees.
- Julie Beilfuss, MS: member of final examination committee.
- Liv Knatterud, MS: member of final examination committee.
- Sean McNee, MS: member of final examination committee.
- Shankar Subrahmanian, MS: member of final examination committee.
- Vamsee Venuturumilli, MS: member of final examination committee.
- Eric Gilbert, Ph.D. Preliminary and Final Examination Committees (UIUC, 2009/2010): member of thesis committee.
- Yi (Jenny) Zhang, Ph.D. (New Jersey Institute of Technology, 2004): member of thesis committee.
- Brian Amento, Ph.D. (Virginia Tech, 2001): member of thesis committee.
- David McDonald, Ph.D. (UC Irvine, 2000): member of thesis committee.

Courses taught

A list of all the classes I have taught, in most cases multiple times.

- CSCI 8115: Human-Computer Interaction and UI Technology
- CSCI 5125: Collaborative and Social Computing
- CSCI 5116: GUI Toolkits and Their Implementation
- CSCI 5115: User Interface Design, Implementation, and Evaluation
- HSEM 2519H: Honors Seminar on Crowdsourcing
- CSCI 1902: Structure of Computer Programming II

- CSCI 1901H: Introduction to Computer Science (Honors)

Tutorials

“Intelligent User Interfaces: Issues, Approaches, Evaluation”, offered at 1993 Conference on Artificial Intelligence for Applications.