

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

METARAIL, INC.,
Patent Owner.

Case IPR2024-01270
U.S. Patent No. 9,633,378

**DECLARATION OF DR. SAM MALEK IN SUPPORT OF PATENT
OWNER'S PRELIMINARY RESPONSE**

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I, Dr. Sam Malek, declare under penalty of perjury as follows:

I. INTRODUCTION AND BACKGROUND

1. I have been retained as an expert witness on behalf of Metarail, Inc. (“Metarail”) to provide information and assistance regarding U.S. Patent No. 9,633,378 (“the ’378 patent”). Specifically, I have been asked to consider the Petition for Inter Partes Review numbered IPR2024-01270 (“the Petition”) regarding the ’378 patent, and specifically the Declaration of Dr. Edward A. Fox (EX1003) that accompanies the Petition.

2. In this declaration I provide my independent analysis of the ’378 patent in light of the materials cited below and discussed herein and my knowledge and experience in this field during the relevant time frame. I have been asked to consider what one of ordinary skill in the art at the time of the invention of the ’378 patent (a “POSITA,” see Section V below) would have understood from the specification, including scientific and technical knowledge related to the patent. I have also been asked to consider whether certain references would have rendered obvious the inventions described in the claims of the ’378 patent.

3. My findings, as explained below, are based on my study, experience, and background in the fields discussed below, informed by my education and my extensive experience in the field of ecommerce systems. I have also relied on my review and analysis of the references identified by Dr. Fox, information provided to

me, and information that I have independently reviewed. I have personal knowledge of the facts and opinions set forth in this declaration, and, if called upon to do so, I would testify competently thereto.

4. I am being compensated for my independent analysis as an expert with respect to this inter partes review proceeding. My work on this matter is being billed at a rate of \$700.00 per hour. My compensation is not contingent in any way on the content of my analysis, the opinions that I offer, or the outcome of this proceeding. I have no financial interest in either Petitioner (Google) or Patent Owner (Metarail), and I have no financial interest in the '378 patent.

II. QUALIFICATIONS

5. My qualifications for forming the opinions given in this declaration are summarized here and are addressed more fully in my curriculum vitae, which is submitted as EX2002. That exhibit also includes a list of my publications.

6. I have over 25 years of experience in the general area of computer and software technology in a variety of roles, including as a software engineer, software architect, and programmer at a variety of companies, as well as a researcher and professor at several universities.

7. I am currently a Full Professor of Software Engineering with tenure in the Informatics Department within the School of Information and Computer Sciences at the University of California, Irvine. I am also the Director of the

Software Engineering and Analysis Laboratory (“SEAL”). My general research interests are in the field of software engineering, and to date my focus has spanned the areas of software analysis and testing, mobile computing, architecture and design, and software dependability and security. The underlying theme of my research has been to devise techniques and tools that aid with the construction, analysis, and maintenance of largescale software systems.

8. I received my Ph.D. and M.S. degrees in Computer Science from the University of Southern California and my B.S. degree in Information and Computer Science from the University of California, Irvine. I have received numerous awards for my research contributions, including the Test of Time Award from the Association for Computing Machinery Special Interest Group on Software Engineering (2020), National Science Foundation CAREER award (2013), GMU Emerging Researcher/Scholar/Creator award (2013), and the GMU Computer Science Department Outstanding Faculty Research Award (2011).

9. I have authored over 130 peer-reviewed research publications. These publications have been highly cited (more than 11,000 times according to scholar.google.com). Many of my publications have dealt with the topics that are related to this proceeding, including ecommerce systems, distributed software systems, client-server architecture, information retrieval, advertisement technology, and database architecture. I provide a few examples here.

10. My Ph.D. dissertation resulted in novel algorithms for optimizing the deployment architecture of a distributed software system. The deployment architecture of a distributed software system is the allocation of its software components to its hardware devices. There are many deployments of a software system possible, but some may be superior to others with respect to certain quality of service objectives (e.g., latency, availability, security).

11. I have received numerous research grants from a variety of organizations, including the National Science Foundation (NSF), Federal Bureau of Investigation (FBI), Air Force Office of Scientific Research, Department of Homeland Security (DHS), National Security Agency (NSA), Defense Advanced Research Projects Agency (DARPA), Office of the Director of National Intelligence, and Army Research Office among others. Software systems and results produced in my research lab have been adopted for use by various organizations in both private (e.g., Boeing, Bosch) and public (e.g., NASA, DHS, FBI) organizations. Many of the above-mentioned projects and software systems involved the development of distributed software systems.

12. I also have several years of experience as a software engineer, software architect, and programmer at a variety of companies, namely the Boeing Company, PricewaterhouseCoopers Consulting (later acquired by International Business Machines (“IBM”) Corporation), FieldCentrix, and Neural Computing Systems Lab.

During my tenure in the industry, I gained professional experience in the design, development, and management of largescale software engineering efforts. Among the software systems that I designed and developed were commercial ecommerce and enterprise software systems.

13. I have extensive prior knowledge and experience in the subject matter of the technology at issue in this case. Among others, at PricewaterhouseCoopers Consulting, I worked as a software engineer on several software development projects involving the development of web-based applications using HTML, JavaScript, Java Applet, Java Servlet, and several other related technologies. I also developed enterprise Java-based applications on top of web application servers and containers.

14. In addition to my professional experience in the industry, I have conducted research and published heavily in the subject matter of the patented technology. For example, I was one of the principal investigators in a research project sponsored by the National Science Foundation, entitled “SASSY:Self-Architecting Software Systems,” which aimed to develop a solution for dynamically composing a software system through automated discovery and coordination of web services. This work involved development of new modeling languages and runtime environments for enabling web services to interoperate, communicate, and coordinate their activities. As another example, I developed techniques for self-

protection of web-based applications from security attacks and published its details in a paper that appeared in the International Conference on Quality of Software Architectures in 2013. I have also studied the impact of advertisement technology on disabled users (e.g., blind users) when interacting with software through various forms of assistive technology (e.g., screen readers). I published the results of this work at the International Conference on Software Engineering in 2024. I have also published on techniques for testing and improving the accessibility of web applications, including a paper that appeared in the International Symposium on Software Testing and Analysis in 2024.

15. I have taught software engineering and computer science courses on a regular basis at the B.S., M.S., and Ph.D. levels at the universities where I have been employed. I cover concepts related to commerce systems, web applications, distributed software, client-server architecture, database programming, information retrieval, and search techniques in many of the courses that I teach at the university. Notably, I have regularly taught distributed software engineering courses at UC Irvine and previously at George Mason University (GMU). I have taught a course titled *Internet Applications Engineering* at UC Irvine, which explores a wide range of web technologies and requires students to develop a fully functional e-commerce application as their final project.

16. I have been a frequent speaker at scientific conferences, symposia, workshops, and gatherings of software engineering academics and professionals. I have served as chair, committee member, and reviewer for numerous software engineering journals, magazines, and conferences. I have served on the editorial board of the ACM Transactions on Software Engineering and Methodology, IEEE Transactions on Software Engineering, the ACM Transactions on Autonomous and Adaptive Systems, the Springer Journal of Automated Software Engineering, and the Springer Journal of Computing. I am a member of the Association for Computing Machinery (ACM), ACM Special Interest Group on Software Engineering (SIGSOFT), and the Institute of Electrical and Electronics Engineers (IEEE). I have testified at trial and deposition as an expert witness in numerous cases in the past five years.

III. MATERIALS CONSIDERED

17. In preparing this declaration and forming my opinions, I have considered: the claims, specification, and prosecution history of the '378 patent; the Petition and declaration by Dr. Fox (including all materials cited in each); and all materials cited and discussed in this declaration. In addition, I have considered the relevant legal standards, as they have been explained to me by counsel and as I understand them. I have also considered the knowledge and understanding of a person of ordinary skill at the time of the invention of the '378 patent, of which I am

familiar. As part of my analysis for this matter, I have also considered my own knowledge and experience, including my work and experience with cloud-based processing systems.

IV. LEGAL PRINCIPLES

18. In forming my opinions here, I have applied the following understanding of certain legal concepts related to anticipation, obviousness, combinations of references, and knowledge of one of ordinary skill in the art. Counsel for Patent Owner has informed me of legal principles that apply in this proceeding.

19. It is my understanding that assessing the validity / patentability of a U.S. patent claim based on a prior art analysis requires two essential steps. First, one must analyze the terms of the patent claims to understand what meaning one of ordinary skill in the art would give the terms. Second, one may then assess validity by comparing a patent claim to the “prior art.” I understand that the teaching of the prior art is viewed through the eyes of a person of ordinary skill in the art at the time the invention was made. My opinion as to what constitutes a relevant person of ordinary skill in the art is set forth below.

20. I have been informed that in order for a patent claim to be invalid as anticipated by a prior art reference under 35 U.S.C. § 102, each and every element of that patent claim must be found disclosed in that reference, explicitly or

inherently, to a person of ordinary skill in the art. Inherent disclosure requires that the claimed element be the only possible option given the other disclosures of the reference, and that it would be so recognized by persons of ordinary skill in the art. I also understand that the missing descriptive material cannot merely be probably or possibly present. If any single element of a claim is not disclosed in the reference, the entire claim is not anticipated. I understand that a prior art reference merely capable of being modified so as to operate in the same manner as the patented device or system does not anticipate. I further understand that obviousness is not inherent anticipation, and that it is insufficient that a missing limitation is so similar to a limitation actually disclosed in the reference that one of ordinary skill in the art would see the substitution as obvious. I also understand that, if it is necessary to reach beyond the boundaries of a single reference to provide missing disclosure of the claimed invention, the proper ground for asserting invalidity is not anticipation, but obviousness.

21. I understand that a claim is invalid as obvious under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person having ordinary skill in the art.

22. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and the claimed invention should be viewed.

This reference point prevents one from using his or her own insight or hindsight in deciding whether a claim is obvious.

23. I have been informed that the following factors are used to determine whether or not the claimed subject matter would have been obvious: (i) the scope and content of the prior art; (ii) the differences between the prior art and the claimed invention; (iii) the level of ordinary skill in the field of the invention; and (iv) any relevant objective considerations of non-obviousness, such as commercial success, long-felt but unresolved needs, failure of others, etc.

24. I also understand that in considering the scope and content of the prior art, references must be reasonably related (i.e., analogous) to the claimed invention of that patent. I understand that the test for determining whether a prior art reference constitutes analogous art to the claimed invention is (1) whether the reference is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference is still reasonably pertinent to the particular problem the inventor is trying to solve.

25. I understand that a party asserting obviousness based on a combination of prior art references must demonstrate that one of ordinary skill in the art would have been motivated to combine the teachings of those references to achieve the claimed invention and that the skilled artisan would have had a reasonable expectation of success in doing so. It is my understanding that it is not enough to

show that one skilled in the art could combine elements of multiple references, but instead there must be some reason that would have prompted a person of ordinary skill in the art to combine the elements in the way the claimed invention does. I understand that there must be some reasoned explanation as to why one of ordinary skill in the art would combine the references. The reason cannot come from hindsight.

26. I understand that in considering whether a claimed invention is obvious, one may but is not required to find obviousness if at the time of the claimed invention there was a reason that would have prompted a person having ordinary skill in the field of the invention to combine the known elements in a way the claimed invention does, taking into account such factors as: (1) whether the claimed invention was merely the predictable result of using prior art elements according to their known function(s); (2) whether the claimed invention provides an obvious solution to a known problem in the relevant field; (3) whether the prior art teaches or suggests the desirability of combining elements claimed in the invention; (4) whether the prior art teaches away from combining elements in the claimed invention; (5) whether it would have been obvious to try the combinations of elements, such as when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions; and (6) whether the change resulted more from design incentives or other market forces. To find it rendered the invention obvious,

the prior art must provide a reasonable expectation of success. Obvious to try is not sufficient in unpredictable technologies.

27. I understand that each claim must be evaluated separately for obviousness, and that it is improper to use hindsight. I understand that the disclosures in a patent or a prior art reference are viewed from the perspective of a person of ordinary skill in the art at the time of the invention. The obviousness analysis by a person of ordinary skill in the art must consider only what was known at the time of the invention.

28. It is my further understanding that obviousness cannot be based on a hindsight combination of components selected from one or more prior art references. I also understand that an invention would not have been obvious simply because all of the elements of the invention may have been known separately in the prior art.

29. I understand that a combination of disclosures or references would not have been obvious if the alleged modification(s) to be made to the reference(s) would have been inconsistent with the reference's stated goals or would have rendered the combination inoperable for its intended purpose. I further understand that for something to have been obvious, the party asserting obviousness must explain why a POSITA would have selected components or features for combination in the manner claimed.

30. I have been informed that a prior art reference must be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention.

31. I understand that with respect to claim construction, the proper construction is considered in the context of, and must be consistent with, the specification and that the claim language should be read in light of the specification and file history as it would be interpreted by one of ordinary skill in the art.

V. PERSON OF ORDINARY SKILL IN THE ART (“POSITA”)

32. Counsel for Patent Owner has informed me that a person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. In my opinion, the relevant field of art for the ’378 patent is that of ecommerce systems.

33. For the purpose of this Declaration, and based on my opinions herein, the time of invention for the ’378 patent is December 2010.

34. I have been informed by counsel for Patent Owner that the person of ordinary skill is generally familiar with the type of problems encountered in the field and the prior art solutions to those problems and possesses an ordinary level of creativity.

35. I understand that Petitioner’s expert, Dr. Fox, opined that a person of ordinary skill in the art “would have had a bachelor’s degree in computer science or

a related field, and at least two years of experience with web-programming and search engine systems. More education could substitute for experience, and vice versa.” EX1003, ¶ 32.

36. For purposes of this declaration, I apply Dr. Fox’s definition. However, I note that the opinions I set forth below are applicable under any reasonable definition of a POSITA. I also note that I qualify as a POSITA under Dr. Fox’s proposed definition.

VI. OVERVIEW OF THE ’378 PATENT

37. U.S. Patent No. 9,633,378 (“the ’378 patent”) is titled “Deep-linking system, method and computer program product for online advertisement and e-commerce.” The ’378 patent claims priority to a provisional patent application filed on December 6, 2010, and the patent issued on April 25, 2017.

38. The ’378 patent relates to improved methods and systems for providing “deep-linked” or “parameter-based” advertisements in electronic commerce, such as through websites and apps. As described in the ’378 patent, these types of advertisements involve the user typing in search parameters relating to the product or service that the user is interested in. For example, a user viewing a travel site on the Internet might type in “search parameters, such as where s/he is traveling from, where to, travel dates, how many people in the party, class of travel, etc.” EX1001, 2:43-49. “These search parameters are then passed along with each ad click to the

appropriate advertiser.” *Id.*, 2:49-51. The advertiser then uses this information to: “(a) hyper-target the placement of ads and customize the copy of ads presented on targeted web pages, and (b) automatically activate searches from their home page, thereby landing the web user ‘deep’ into their booking process rather than on their home page as is customary with other forms of ad clicks.” *Id.*, 2:51-57.

39. At the time of the ’378 invention, however, deep-linked ads were limited by the need for advertisers to manually program the code necessary to connect the initial publisher’s site or app with the appropriate locations on the advertiser’s site or app. *Id.*, 2:64-3:10. This problem stemmed from the fact that “each web site uses its own field descriptors and variable names, and the only way to create deep-linked ads has been to manually obtain the names of the respective variables from both publishers and advertisers and then integrate them to each other through manual programming.” *Id.*, 3:10-15.

40. The ’378 patent addresses this problem through the use of a novel “universal variable map” that maps relationships between the fields of one site to the fields of another site. As the ’378 patent explains, this universal variable map provides the benefit that user parameters inputted in fields at a first site can be correlated with and automatically transferred to corresponding fields of a second site:

[T]hrough the universal variable map, forms and fields from one site can be associated with one or more relevant forms and fields from one or more different sites, even if the sites themselves may be in different verticals. Leveraging this unique and comprehensive universal variable map, embodiments can take a web site visitor from an initial stop (e.g., a home page of a first web site) directly and in real-time through a specific deep-link ad to a landing spot on another site (e.g., a checkout page of a second web site), or to a home page on another site with as much data pre-populated as available based on the user's input in the context of the particular E-commerce transaction.

Id., 5:17-29.

41. The '378 patent depicts an exemplary embodiment of a universal variable map as follows:

Web Sites	xxx.com	yyy.net	zzz.org	...	Normalized Variables
Variable 1	Orig	Depart_City	From	...	from
Variable 2	Dest	Arrival_City	To	...	to
Variable 3	...	...	...	...	...
...	...	...	...	...	...

Id., 9:66-10:8. As depicted in this example, the universal variable map links programming variables across multiple websites so that inputs to form fields in one website can be easily transferred to the appropriate form fields in other websites. For example, the field "Orig" in the website xxx.com corresponds to the field

“Depart_City” in the website yyy.net and the field “From” in the website zzz.org.

These fields are related to each other through the normalized variable “from” in the universal variable map.

42. Figure 11A in the '378 patent depicts an example of how the universal variable map is used to transfer user-inputted information in a form on a first site to a form on a second site:

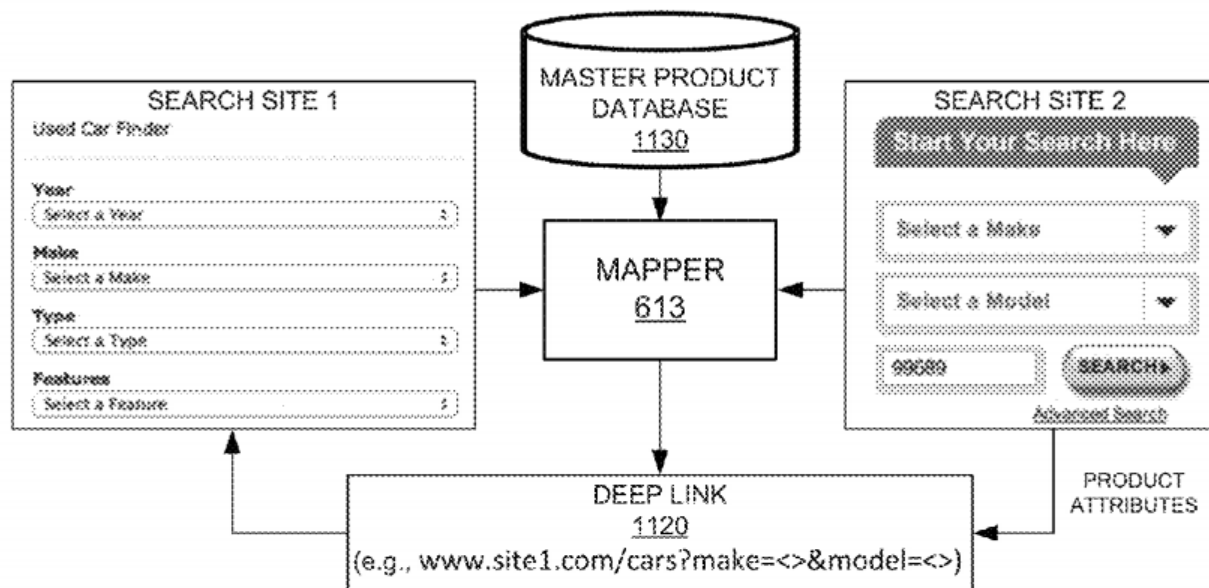


FIG. 11A

EX1001, Fig. 11A. As the '378 patent explains:

In the example of FIG. 11A, Search Site 2 is to provide to its visitors a deep-linked ad for Search Site 1. Mapper 613 may access universal variable map or variable database 530 . . . , cross reference programming variables used by Search Site 2 with those used by Search Site 1, and automatically create a deep-linked ad (deep link 1120 in this example). . . . When a user selects . . . deep link 1120 on Search Site 2,

the user's browser is automatically directed to a network address indicated by deep link 1120 A form at the network address on Search Site 1 may be pre-populated with field identifier values (in this example, product attributes such as "Toyota" and "Prius"), along with any user input provided at Search Site 2.

Id., 13:61-14:11.

43. The universal variable map appears as a limitation in all of the independent claims of the '378 patent, including claim 1, which I have set forth below with the same numbering of elements that Dr. Fox uses in his declaration:

1. A method, comprising: at and by a server computer operating in a network environment and having at least one processor and non-transitory computer memory:

[1A] obtaining, utilizing a set of obtaining rules, a plurality of explicit or implicit computer-readable field identifiers from a plurality of sites or applications on the Internet;

[1B] applying via programming code a set of enhancing rules to enhance results of the obtaining of the plurality of computer-readable field identifiers;

[1C] mapping the plurality of computer-readable field identifiers to one another using a set of normalized variables stored in a normalized variable data database, the normalized variable data database representing a **universal variable map** of searchable classes and attributes of products or services on the Internet, the mapping linking

computer-readable field identifiers of the plurality of sites or applications;

[1D] automatically programmatically generating a deep-linked ad utilizing the **universal variable map**, the deep-linked ad linking one or more of a set of computer-readable field identifiers used by a first site or application with one or more of a set of computer-readable field identifiers used by a second site or application;

[1E] placing the deep-linked ad on a page of the first site or application; and

[1F] in response to user interaction with the deep-linked ad on the page of the first site or application on a user device:

[1G] extracting, from the user interaction with the deep-linked ad on the page of the first site or application, values corresponding to the one or more of the set of computer-readable field identifiers used by the first site or application;

[1H] automatically directing the user device to display a page of the second site or application; and

[1I] passing the values corresponding to the one or more of the set of computer-readable field identifiers used by the first site or application to the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or application such that the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or

application are determined using the **universal variable map** and such that one or more fields on the page of the second set or application are explicitly or implicitly pre-populated with the values extracted from the user interaction with the deep-linked ad on the page of the first site or application without necessitating any pre-existing relationship between the pages.

Id., 22:11-60 (emphasis added).

VII. OVERVIEW OF THE ASSERTED REFERENCES

A. Belanger (EX1008)

44. U.S. Patent Application Publication No. 2005/0144048 to Belanger et al. (“Belanger”) relates to “an improvement to a reservation booking website for rental vehicle reservations.” EX1008, Abstract. Belanger describes that “the on-line rental vehicle reservation process can be thought of as a multi-stage process, wherein each stage corresponds to receipt of a particular type of necessary reservation information from the customer.” *Id.*, [0007].

45. Belanger explains that a problem with then-existing reservation systems is that they require customers to input their information according to a specific order of steps, which can lead to customer frustration with the reservation process. *Id.*, [0008]-[0009]. To address this problem, Belanger teaches an improved reservation website that allows customers greater flexibility regarding the order in which they fill out information on the site. *Id.*, [0013] (“Toward this end, the

inventors herein have developed an on-line reservation transaction system wherein the customer can complete the stages of the reservation transaction via a customer-determined path, and not according to a strictly defined, straight-line architecture.”).

46. One aspect of Belanger’s online reservation system relates to what Belanger refers to as “promotional links.” Belanger describes that “[w]hen a customer selects such a promotional link to initiate a reservation transaction, it is preferable that the user begin the reservation transaction with the reservation data corresponding to promotional conditions set equal to those conditions, to thereby avoid unnecessarily requiring the customer to enter such data himself/herself or creating a situation where the customer may accidentally enter data that violates the conditions of the promotion.” EX1008, [0169]. As an example, Belanger describes that if the promotion is for the rental of a “standard” car, the user’s selection of the link will initiate a reservation where the vehicle type is automatically set to “standard.” *Id.*

47. While Belanger refers to the term “deep-linking,” I note that Belanger’s definition of “deep-linking” is different from the deep-linking described in the ’378 patent. Belanger uses “deep-linking” to refer to the process where, “when a customer selects a promotional link or a particular corporate account, that customer is deep-linked into the reservation booking process” such that the conditions/parameters corresponding to the promotion are already set for the user. *Id.*, [0019]. This is not

the same as the “deep-linking” described in the ’378 patent, where a user enters search parameters into a first website or application and “[t]hese search parameters are then passed along with each ad click to the appropriate advertiser.” EX1001, 2:59-61.

48. In his discussion of Belanger’s “promotional links,” Dr. Fox makes the assertion that “[b]y providing outgoing deep-links that repurpose form data such as the date and location of a car rental, a user could be likewise advanced to a particular ‘stage’ in the booking process of an amusement park, airline, hotel, etc. website.” EX1003, ¶ 49. To the extent Dr. Fox is arguing that Belanger teaches “outgoing deep-links that repurpose form data,” I disagree. There is no teaching in Belanger of any “repurposing” of form data in Belanger’s promotional links. Rather, as I discussed above, Belanger states that the user’s selection of a promotional link results in the initiation of a reservation process where the conditions specific to that particular promotion have already been set for the user. Those conditions would be set by the reservation website based on parameters provided by the advertiser. Thus, as described in Belanger, the promotional links would not include any “repurposed” data entered by the user.

B. Halevy (EX1006)

49. U.S. Patent Application Publication No. 2006/0230033 to Halevy et al. (“Halevy”) relates to a system that allows for keyword searching of websites where

content is “not directly available on web pages, but is instead accessible through queries entered into web-based forms.” EX1006, [0003]. Halevy achieves this through the use of a “form engine” that engages in a web-crawling process to collect information about websites with web-based forms, which is then stored in a “form database.” *Id.*, [0034]-[0035]. When a user subsequently inputs a keyword search query to the system, the form engine uses the data stored in the form database to identify forms that are most relevant to the search query and returns those results to the user along with links to the corresponding forms. *Id.*, [0036], [0136]-[0138]. The user can then click on any of the links to submit a query to the appropriate form. *Id.*

50. Halevy describes that each form in the “form database” is categorized in terms of search ontology classes and properties, which are referred to as “SO-classes” and “SO-properties.” *Id.*, [0038]. The SO-class of a form “specifies the types of objects that can be obtained by querying the form. For example, books, hotels, restaurants.” *Id.*, [0045]. The SO-properties of a form are “output properties” that “specif[y] the type of information we will obtain from answers to a successful form submission.” *Id.*, [0048]. These SO-classes and SO-properties are used to identify forms in the database that are relevant to the user’s keyword search query.

51. Figure 6 in Halevy shows how the SO-classes and SO-properties are used to retrieve relevant results from the form database in response to a user’s query:

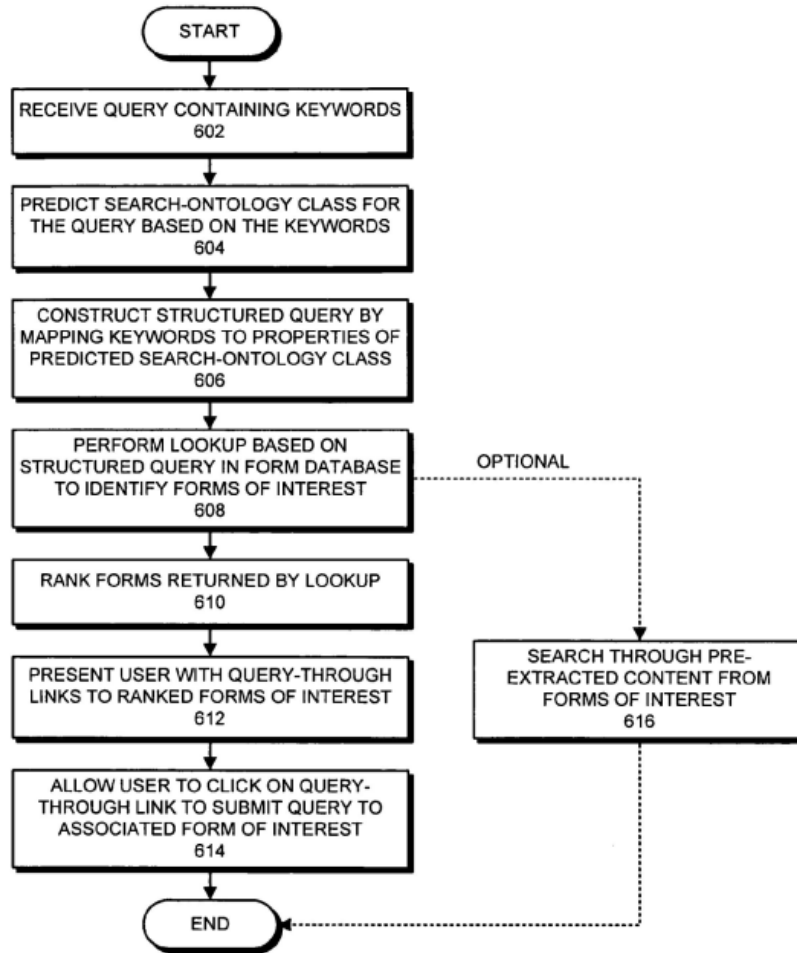


FIG. 6

Id., Fig. 6. As shown in Figure 6, when a user inputs a keyword search query (602), the first step performed by Halevy's system (604) is to predict the SO-class that is most relevant to the user's query. *Id.*, [0136]. Once the SO-class has been identified, the system then constructs a structured query that maps keywords in the query to SO-properties within the identified SO-class (606). *Id.* That structured query is then used to perform a lookup in the form database to identify relevant forms for the user (608). *Id.*, [0137].

52. Halevy describes that the process of translating the user's query into a search of the form database is handled by a "query analyzer." *Id.*, [0089]. The query analyzer receives the keyword query from the user and "predict[s] the SO-class in the ontology that is most relevant to the query." *Id.* Halevy teaches three different ways of performing this prediction process: "(1) word-based prediction; (2) property-based prediction; and (3) feedback-based prediction." *Id.*, [0090]. In word-based prediction, "the predicted class is the one that is most likely to generate the words in the search query," as determined using a set of mathematical calculations to find the "marginal probability estimation" for each word. *Id.*, [0092]-[0094]. In property-based prediction, "property recognizers are employed to identify interesting constants in user queries," and "SO-classes can be predicted based on the properties recognized." *Id.*, [0095]. In feedback-based prediction, the SO-class is predicted based on the number of "the first 20 hits from just a keyword query" that are web forms that have been labeled for a particular SO-class. *Id.*, [0104].

53. Once Halevy's system has predicted a SO-class for a particular user query, "a structured query is constructed by mapping the individual words in the query to properties of the chosen search class." *Id.*, [0112]. This process involves "recognizers" that attempt to identify "a particular word (or sequence of words) in the query with some confidence to be an example value of a particular SO-property (or a set of properties). Using this information, the query description module tries to

match each word in the user query to the most likely search class property.” *Id.* The end result is a structured query that is then used to perform a lookup of relevant forms in the form database. *Id.*, [0112], [0137].

54. Halevy therefore describes adding functionality to a search engine so that the search engine can return, in response to a user’s keyword search query, websites that contain forms that are responsive the user’s query.

C. Haveliwala (EX1019)

55. U.S. Patent No. 7,756,887 to Haveliwala (“Haveliwala”) relates to an improvement in search engine technology that allows for “collecting user feedback with respect to informational items presented in response to a search query and adjusting the relevancy values of the items in accordance with the user feedback, even if there is no click through information about one or more of the informational items.” EX1019, 1:55-60. Haveliwala’s system accomplishes this by monitoring the user’s placement and movement of the pointer in a web browser as the user is viewing search results on a web page. *Id.*, 3:4-11.

VIII. DR. FOX FAILS TO DEMONSTRATE THAT ANY CLAIM OF THE ’378 PATENT WOULD HAVE BEEN OBVIOUS

56. In my opinion, Dr. Fox fails to demonstrate that any challenged claim of the ’378 patent would have been obvious. As I discuss below, it is my opinion that Dr. Fox’s declaration includes numerous distinct failures. It is therefore my

opinion that Dr. Fox fails to demonstrate any reasonable likelihood of success that any challenged claim would have been obvious.

A. Ground 1: Claims 1-6, 9-16, 19-24, and 26 Are Not Obvious Based on the Combination of Belanger and Halevy

57. In my opinion, the combination of Belanger and Halevy as proposed by Dr. Fox would not render obvious any of the challenged claims 1-6, 9-16, 19-24, and 26 of the '378 patent because this proposed combination would not teach or suggest all of the elements of each challenged claim.

- 1. Claims 1, 13, and 23 (element [1C], [13E], [23C]): “mapping the plurality of computer-readable field identifiers to one another using a set of normalized variables stored in a normalized variable data database, the normalized variable data database representing a universal variable map of searchable classes and attributes of products or services on the Internet, the mapping linking computer-readable field identifiers of the plurality of sites or applications”**

58. In my opinion, the combination of Belanger and Halevy does not teach or suggest element [1C] in claim 1, which is identically recited in element [13E] of claim 13 and element [23C] of claim 23. This element recites the step of “mapping the plurality of computer-readable field identifiers to one another using a set of normalized variables stored in a normalized variable data database, the normalized variable data database representing a universal variable map of searchable classes and attributes of products or services on the Internet, the mapping linking computer-

readable field identifiers of the plurality of sites or applications.”¹ Neither Belanger nor Halevy teach or suggest several parts of this element, which I discuss below.

a) **“mapping the plurality of computer-readable field identifiers to one another using a set of normalized variables stored in a normalized variable data database”**

59. The first part of this element recites “mapping the plurality of computer-readable field identifiers to one another using a set of normalized variables stored in a normalized variable data database.” In his analysis of this claim language, Dr. Fox does not appear to argue that Belanger teaches any such “mapping.” *See* EX1003, ¶¶ 104-106. Instead, he relies solely on Halevy as allegedly teaching this limitation. *See id.* Specifically, Dr. Fox argues that the “SO-properties” in Halevy constitute “‘a set of normalized variables’ that are used to ‘map[] the plurality of computer-readable field identifiers to one another.’” *Id.*, ¶ 106. Dr. Fox also asserts that because the SO-properties are stored in Halevy’s form database, the form database is the “normalized variable data database” in which the “set of normalized variables” is stored, as required by the claim language. *Id.* I disagree.

¹ In the Claim Listing at the end of his declaration, Dr. Fox labels this element as [1D], but I refer to this element as [1C], consistent with how Dr. Fox refers to this element in the argument section of his declaration. *See* EX1003, at 55.

60. The term “field identifiers” first appears in an earlier element of the claim – specifically element [1A] in claim 1 (which corresponds to element [13C] in claim 13 and element [23A] in claim 23). Element [1A] refers to obtaining “a plurality of explicit or implicit computer-readable field identifiers from a plurality of sites or applications on the Internet.” Dr. Fox asserts that the “field identifiers” disclosed in Halevy are the “parameter names” for the fields in the forms identified through Halevy’s crawling process through websites. EX1003, ¶¶ 98-99. He also asserts that Halevy teaches “mapping the plurality of computer-readable field identifiers to one another” because “[t]he ‘SO-classes’ are identified for each form and used to map the fields in the form (i.e., ‘the plurality of computer-readable field identifiers’) *to one another using* ‘SO-properties,’ as shown below in annotated Figure 3.” *Id.*, ¶ 104. Dr. Fox’s analysis is incorrect, for several reasons.

61. First, I note that Dr. Fox presents inconsistent positions in his identification of the alleged “field identifiers” in Halevy. With respect to element [1A], he first argues that the “parameter names” of the fields are the “computer-readable field identifiers.” *Id.*, ¶¶ 98-99. But then later, in his discussion of element [1C], he argues that the fields themselves are the “computer-readable field identifiers.” *Id.*, ¶¶ 105-106. Regardless, under either of these positions, Halevy does not teach “mapping the plurality of computer-readable field identifiers to one another” because Halevy’s system does not map parameter names of fields (or fields)

between any forms in Halevy's form database. Dr. Fox has mischaracterized what SO-classes and SO-properties are and how they function in Halevy's system.

62. Halevy discloses a system that allows for keyword searching of websites where content is "not directly available on web pages, but is instead accessible through queries entered into web-based forms." EX1006, [0003]. Halevy's keyword search system relies on a "form database" to store information about websites that include web-based forms, which is used to return results to the user regarding forms of potential interest based on the user's search query. *Id.*, [0136]-[0138]. However, nothing in Halevy's form database links any field identifiers of one form with field identifiers of another form.

63. Figure 3 in Halevy shows an example of the entries stored in Halevy's form database:

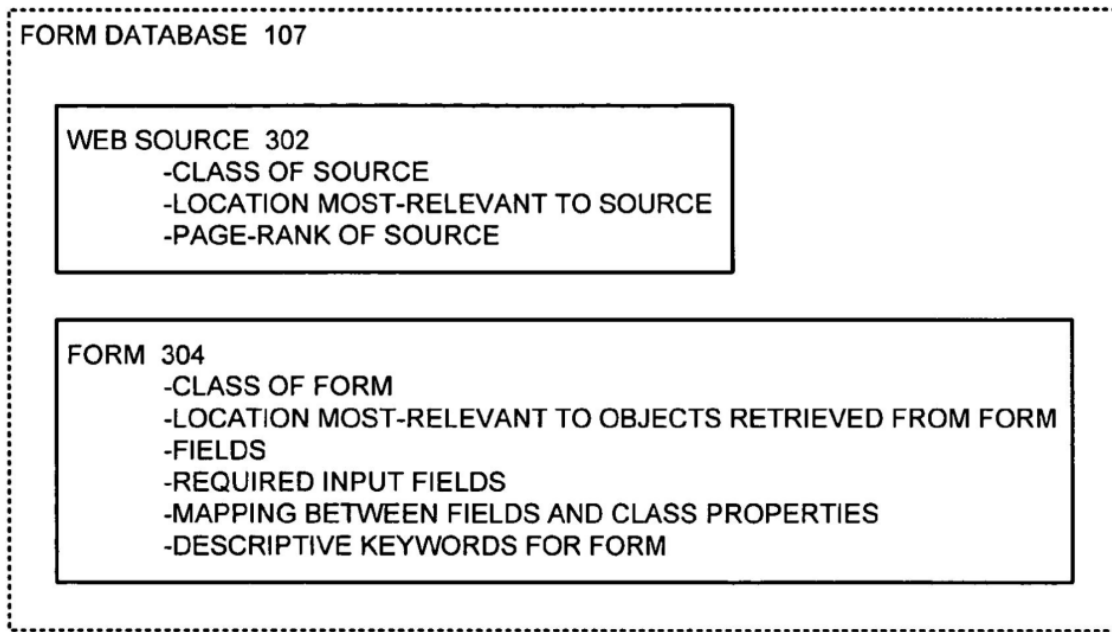


FIG. 3

EX1006, Fig. 3; *see also id.*, [0028]. As depicted in Figure 3, each form (304) in the form database (107) is a separate entry in the database, and has information associated with it such as its class, its fields, and keywords associated with the form.

64. Importantly, Halevy does not contain any discussion about creating any relationships between different forms in the form database. Rather, keyword searches inputted by the user result in the entire database being searched to identify forms that are responsive to the user's query. EX1006, [0137] (“[T]he system performs a lookup based on the structured query in the form database to identify forms of interest (step 608) and ranks these forms (step 610).”).

65. Thus, in Halevy's form database, there is no “mapping” of field identifiers for different websites or applications “to one another,” as required in the

claims, whether one considers Halevy’s fields or parameter names to be the “field identifiers.” Instead, each form entry associated with a website in Halevy’s form database exists independently of other form entries, with no linkages of the fields or parameter names (or any other information) between them.

66. No such linkages are contemplated in Halevy because Halevy’s system is not designed to assess the extent to which forms on different websites might be related to each other. Instead, as Halevy explains, the data collected about forms and stored in Halevy’s form database is simply used to generate a ranked list of forms of interest in response to a user’s search query. EX1006, [0137] (“Next, the system performs a lookup based on the structured query in the form database to identify forms of interest (step 608) and ranks these forms (step 610).”).

67. In addition, element [1C] further recites that the mapping of field identifiers of different sites/applications to each other is achieved “using a set of normalized variables stored in a normalized variable data database.” The ’378 patent provides the following exemplary illustration of how normalized variables are stored in a normalized variable data database of the universal variable map:

Web Sites	xxx.com	yyy.net	zzz.org	...	Normalized Variables
Variable 1	Orig	Depart_City	From	...	from
Variable 2	Dest	Arrival_City	To	...	to
Variable 3	...	...	...	...	...
...	...	...	...	...	...

EX1001, 9:66-10:8. As shown in this example, the normalized variable “from” provides the mapping between the “Orig” field in the xxx.com site, the “Depart_City” field in the yyy.net site, and the “From” field in the zzz.org site. There is no such mapping of form fields from different sites using normalized variables in Halevy.

68. Dr. Fox argues that “[t]he ‘SO-classes’ are identified for each form and used to map the fields in the form (i.e., ‘the plurality of computer-readable field identifiers’) *to one another using ‘SO-properties,’*” and asserts that this is shown in “annotated Figure 3,” reproduced below (the yellow highlighting is Dr. Fox’s annotations):

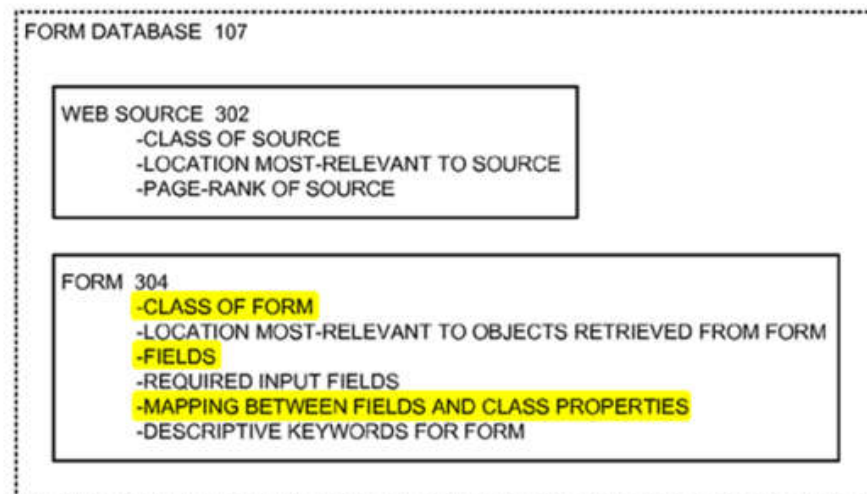


FIG. 3

EX1003, ¶ 104. But Dr. Fox makes several mistakes in his analysis.

69. First, the language highlighted by Dr. Fox in Figure 3 does **not** actually show that “[t]he ‘SO-classes’ are . . . used to map the fields in the form . . . to one

another using ‘SO-properties,’” as he contends. *Id.* Rather, the language in Figure 3 that Dr. Fox has highlighted merely shows that, for any given form, there is “mapping between fields” of *that* form and “class properties.” EX1006, Fig. 3. In other words, fields in a form are mapped to class properties. Figure 3 does not show any mapping of fields *to each other*, as Dr. Fox argues.

70. Recognizing that Halevy does not actually say that there is any mapping between field identifiers, Dr. Fox resorts to arguing that, “[s]ince Halevy’s crawling process maps the fields of various forms to a set of SO-properties associated with the form’s SO-class, POSAs would have recognized the SO-properties to be ‘a set of normalized variables’ that are used to ‘map[] the plurality of computer-readable field identifiers to one another.’” EX1003, ¶ 106. This is incorrect. The SO-properties in Halevy are not “a set of normalized variables.” Instead, they are simply search filters that assist Halevy’s search engine in determining a form’s degree of relevancy to the user’s keyword search query.

71. The mere fact that fields in forms for different websites might have the same SO-properties does not mean that the SO-properties are performing any “mapping” between field identifiers of different websites or applications. To the contrary, Halevy does not teach that the SO-properties establish any relationship between different websites or applications. Rather, the SO-properties are simply

used by Halevy’s search engine to identify forms relevant to the user’s keyword search, as shown in the highlighted boxes in Figure 6 of Halevy:

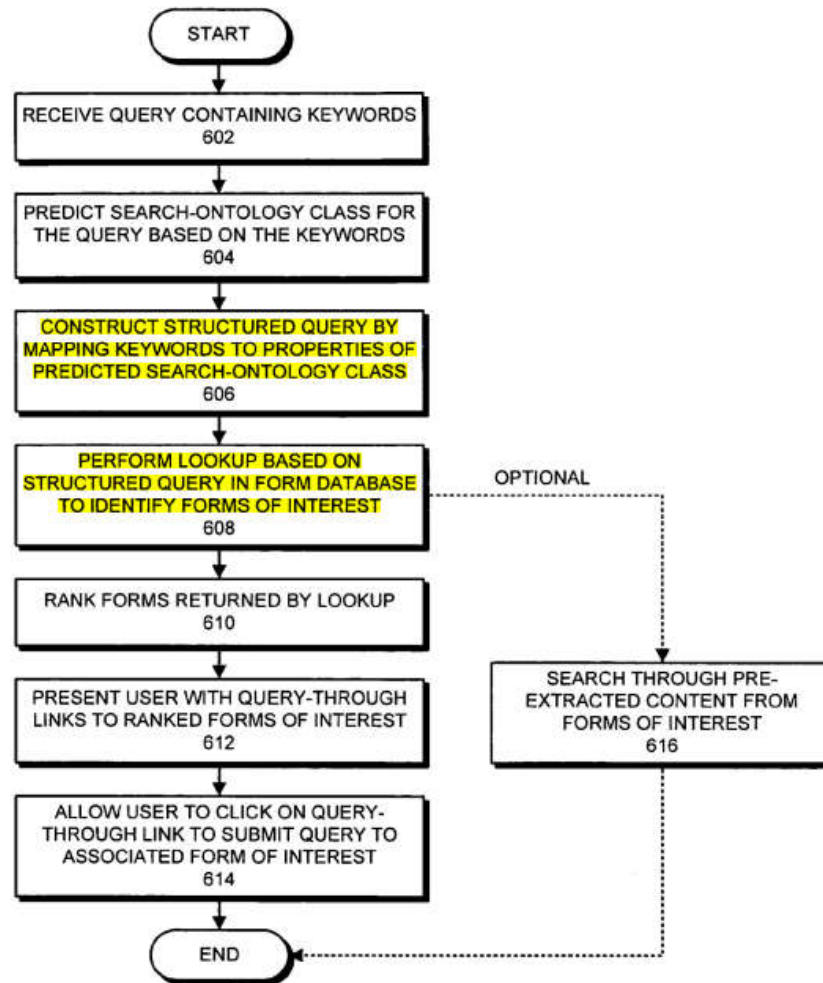


FIG. 6

EX1006, Fig. 6 (annotated). *See also id.*, [0136]-[0137]. Thus, Halevy’s SO-properties do not provide the functionality of “mapping the plurality of computer-readable field identifiers to one another using a set of normalized variables” as required by the claim language. Nor would a POSITA understand SO-properties to have such functionality. Indeed, I note that Dr. Fox does not offer any reasoned

explanation for why a POSITA would think that the SO-properties described in Halevy perform the mapping functionality recited in the claims.

72. As described in Halevy, SO-properties are specific to particular SO-classes. *Id.*, [0038] (“SO-properties have domains (the classes in the ontology they refer to)”). The SO-properties in Halevy are therefore very different from the normalized variables described in the ’378 patent that are used to relate programming variables across sites in the universal variable map. *See* EX1001, 9:66-10:8.

73. Indeed, as I discussed earlier, Halevy describes the use of a “query analyzer” to predict which SO-classes and SO-properties might be relevant to a user’s query, using one or more complex prediction algorithms. This prediction process is necessary to transform the user query into a structured query that can be used to run a search through Halevy’s form database. The fact that Halevy’s system requires a set of algorithms to predict relevant SO-classes and SO-properties, before any lookup has occurred in the form database, further shows that Halevy’s form database does not provide the predetermined linking between sites or applications in a universal variable map as contemplated in the ’378 patent. *See* EX1001, 5:17-29 (“Leveraging this unique and comprehensive universal variable map, embodiments can take a web site visitor from an initial stop (e.g., a home page of a first web site) directly and in real-time through a specific deep-link ad to a landing spot on another

site (e.g., a checkout page of a second web site), or to a home page on another site with as much data pre-populated as available based on the user's input in the context of the particular E-commerce transaction.”).

b) “the normalized variable data database representing a universal variable map . . . the mapping linking computer-readable field identifiers of the plurality of sites or applications;

74. The “mapping” element [1C], [13E], and [23C] also recites “the normalized variable data database representing a universal variable map . . . the mapping linking computer-readable field identifiers of the plurality of sites or applications.” This language further reinforces that the required mapping in the normalized variable data database must provide “linking” between field identifiers of a “plurality of sites or applications.” As I already discussed, Halevy does not teach any such linking between the alleged multiple websites or applications, the forms of the form database.

75. Dr. Fox argues that Halevy's form database is a “universal variable map” that provides the necessary linking “because form fields (including parameter names) from multiple different websites are linked to each other in the form database by being mapped to the same SO-properties associated with an SO-class.” EX1003, ¶ 108. Once again, Dr. Fox makes the same flawed argument that there is linking between websites in Halevy's form database because multiple websites can have forms that have the same SO-properties. But as I already discussed, the mere fact

that forms on different websites might be categorized in Halevy's database using the same SO-properties does not mean that there is any "linking" between the websites. Because Halevy's form database does not provide the required linking between field identifiers of different websites or applications, it does not teach the "universal variable map" recited in the claims.

76. In addition, I disagree with Dr. Fox's assertion that "Halevy's disclosure of a database in which corresponding fields from different forms on different websites are mapped to the same SO-properties would have been recognized by a POSA as what the '378 patent refers to as a *universal variable map*." EX. 1003, ¶ 108. As I already discussed, there is nothing in Halevy's disclosures to suggest to a POSITA that Halevy's form database performs the required linking of a universal variable map as recited in the claims. Indeed, the only evidence Dr. Fox presents to support this assertion is a citation to col. 17:42-46 in the '378 specification. *Id.* But that portion of the specification does not have anything to do with the definition of a "universal variable map." Rather, it merely discusses different types of variables and fields that might appear in different types of forms. EX1001, 17:42-46 ("Variations of linking data variables and fields may include"). In my opinion, a POSITA reading this part of the specification would not understand it to have any bearing on what constitutes a "universal variable map."

2. **Claims 1, 13, and 23 (element [1D], [13F], [23D]):**
“automatically programmatically generating a deep-linked ad utilizing the universal variable map, the deep-linked ad linking one or more of a set of computer-readable field identifiers used by a first site or application with one or more of a set of computer-readable field identifiers used by a second site or application”

77. For the same reasons that I have already discussed above with respect to the “mapping” limitation of elements [1C], [13E], and [23C], it is my opinion that the combination of Belanger and Halevy also does not teach or suggest the limitation in elements [1D], [13F], and [23D] of “automatically programmatically generating a deep-linked ad utilizing the universal variable map, the deep-linked ad linking one or more of a set of computer-readable field identifiers used by a first site or application with one or more of a set of computer-readable field identifiers used by a second site or application.” Once again, Dr. Fox argues that Halevy’s form database is the “universal variable map” that is utilized to automatically programmatically generate a deep-linked ad, as required by the claim language for this element. EX1003, ¶ 113. But as I already discussed, Halevy’s form database does not meet the claim’s requirements for a “universal variable map.” Thus, by necessity the combination of Belanger and Halevy also does not teach or suggest “automatically programmatically generating a deep-linked ad utilizing the universal variable map.”

3. **Claims 1, 13, and 23 (element [1I], [13H3], [23F3]): “passing the values corresponding to the one or more of the set of computer-readable field identifiers used by the first site or application to the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or application such that the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or application are determined using the universal variable map . . .”**

78. For the same reasons that I have already discussed above with respect to the “mapping” limitation of elements [1C], [13E], and [23C], it is my opinion that the combination of Belanger and Halevy also does not teach or suggest the limitation in elements [1I], [13H3], and [23F3] of “passing the values corresponding to the one or more of the set of computer-readable field identifiers used by the first site or application to the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or application such that the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or application are determined using the universal variable map” For this element, Dr. Fox once again points to Halevy’s form database as the “universal variable map” that is utilized to determine the field identifiers of the first site or application that are “correspondingly linked [to] one or more of the set of computer-readable field identifiers used by the second site or application.” EX1003, ¶ 131. But as I previously discussed, Halevy’s form database is not a “universal variable map,” and does not provide any linking between field identifiers

of different sites or applications. Thus, by necessity the combination of Belanger and Halevy also does not teach or suggest “passing the values corresponding to” field identifiers of a first site/application to linked field identifiers of a second site/application “such that the correspondingly linked one or more of the set of computer-readable field identifiers used by the second site or application are determined using the universal variable map”

79. In summary, as I have shown above, the combination of Belanger and Halevy does not teach or suggest multiple limitations of claims 1, 13, and 23. For that reason, the combination of Belanger and Halevy does not render obvious any of these claims.

4. Dependent claims 2-6, 9-12, 14-16, 19-22, 24, and 26 are not obvious for the same reasons that the independent claims are not obvious.

80. Claims 2-6, 9-12, 14-16, 19-22, 24, and 26 of the '378 patent are all dependent on claims 1, 13, or 23. *See* EX1001, claims 2-6, 9-12, 14-16, 19-22, 24, 26. As such, they include all the limitations of the independent claims to which they depend. My discussion above regarding why claims 1, 13, and 23 are not obvious based on the combination of Belanger and Halevy therefore applies equally to these dependent claims. Claims 2-6, 9-12, 14-16, 19-22, 24, and 26 are therefore not rendered obvious by the combinations of Belanger and Halevy for the same reasons that claims 1, 13, and 23 are not obvious.

5. A POSITA would not have been motivated to combine Belanger and Halevy.

81. Even if Dr. Fox could show that the combination of Belanger and Halevy teaches all the elements of claims 1-6, 9-12, 13-16, 19-22, 23-24, and 26 of the '378 patent, it would still be my opinion that the combination does not render these claims obvious because a POSITA would not have been motivated to combine Belanger and Halevy. These two references relate to very different technologies designed to address very different problems, and thus a POSITA would not be motivated to combine them.

82. Belanger relates to an improved design of a website for a car rental service. The goal of Belanger's system is to improve the customer's experience with the reservation booking process on the site, by giving the customer greater freedom in how the customer completes a reservation on the site. As stated in Belanger, the alleged invention in that reference is "an on-line reservation transaction system wherein the customer can complete the stages of the reservation transaction via a customer-determined path, and not according to a strictly defined, straight-line architecture." EX1008, [0013].

83. By contrast, Halevy relates to an improved search engine system that facilitates searches of websites that include content accessible through fillable forms. As stated in Halevy, "the present invention relates to a method and an apparatus that facilitates searching through content which is not directly available on web pages,

but is instead accessible through queries entered into web-based forms.” EX1006, [0003]. The design goals described in Belanger and Halevy are therefore entirely different.

84. The architecture of Belanger and Halevy’s systems are also significantly different. In Belanger’s system, the user inputs information in various fields of forms presented on a web page as part of the process of booking a reservation for a vehicle, as shown in Figure 37 of Belanger:

Fig. 37

EX1008, Fig. 37. By contrast, in Halevy a user inputs a single search query as, for example, a string of words and numbers, to Halevy’s form engine to initiate a search through the form database for relevant forms. See EX1006, [0112] (discussing an

example user search query “Telephone David Ko 98102”). Given these differences in how the user interfaces with and inputs requests into these systems, it is my opinion that a POSITA would not have found it obvious to integrate Belanger’s reservation system with Halevy’s search engine system as proposed by Dr. Fox. The inputs and outputs of these systems are so different that it would not be clear to a POSITA how they could be combined into a single functioning system, or why there would ever be a reason to do so.

85. Because of these differences, it is my opinion that a POSITA would not be motivated to combine the teachings of Belanger and Halevy to create the inventions of the ’378 claims.

B. Ground 2: Claims 1-6, 9-16, 19-24, and 26 Are Not Obvious Based on the Combination of Belanger, Halevy, and APA

86. I also disagree with Dr. Fox’s opinion that claims 1-6, 9-16, 19-24, and 26 of the ’378 patent are obvious based on the combination of Belanger, Halevy, and what he refers to as “Applicant Admitted Prior Art” or “APA.” I understand that APA refers to purported disclosures in the ’378 specification of known methods and/or systems at the time of the ’378 invention, and that Dr. Fox relies on APA to support his obvious opinions “[t]o the extent that explicit disclosure is required regarding travel websites utilizing deep-link advertising.” EX1003, ¶ 160.

87. In my opinion, claims 1-6, 9-16, 19-24, and 26 of the ’378 patent are not obvious based on the combination of Belanger, Halevy, and APA for the same

reasons that these claims are not obvious based on the combination of Belanger and Halevy. Dr. Fox does not contend that APA teaches or suggests the limitations which I discussed earlier as being missing from the disclosures in Belanger and Halevy. Thus, the combination of Belanger, Halevy, and APA would still be missing those limitations.

88. In addition, I disagree with Dr. Fox's opinion that the need for automation of the mapping of fields and variables on websites, as discussed in the '378 specification, would have motivated a POSITA to look to Halevy's form database. EX1003, ¶ 163. As I already discussed, Halevy's form database does not teach the "universal variable map" recited in the '378 claims. Moreover, Halevy's system is not directed to online advertisements, but rather to search engine technology. Thus, in my opinion the need for automation as discussed in the '378 specification would not have motivated a POSITA to combine the teachings of Belanger with Halevy to create the inventions of the '378 claims.

C. Ground 3: Claims 7-8, 17-18, and 25 Are Not Obvious Based on the Combination of Belanger, Halevy, and Haveliwala

89. I also disagree with Dr. Fox's opinion that claims 7-8, 17-18, and 25 of the '378 patent are obvious based on the combination of Belanger, Halevy, and Haveliwala. All of these claims are dependent on claims 1, 13, or 23. Dr. Fox relies on Haveliwala solely for the purposes of the additional limitations in these dependent claims requiring the deep-linked ad to be generated or refined based on "information

provided by a user's implicit action on the page of the first site or application.”

EX1003, ¶¶ 165-170. Dr. Fox does not contend that Haveliwala teaches any of the limitations of independent claims 1, 13 or 23 that I discussed above as being missing from the teachings of Belanger and Halevy. Thus, for the same reasons that I discussed above with respect to claims 1, 13, and 23, Dr. Fox fails to show that the combination of Belanger, Halevy, and Haveliwala renders any of claims 7-8, 17-18, or 25 obvious.

90. In addition, it is my opinion that a POSITA would have no motivation to combine Haveliwala with Belanger, for the same reasons that I explained above as to why a POSITA would not have been motivated to combine Halevy with Belanger. Like Halevy, Haveliwala is directed to an improvement in search engine technology, which is very different from Belanger's focus on improving the user experience with the booking process for a car rental website. *See* EX1019, 1:10-12 (“The present invention relates generally to the field of search engines, and in particular, to a system and method of modulating a search result relevancy with user feedback.”). Because of this difference, a POSITA would not be motivated to combine the teachings in Halevy or Haveliwala with Belanger.

D. Ground 4: Claims 7-8, 17-18, and 25 Are Not Obvious Based on the Combination of Belanger, Halevy, Haveliwala, and APA

91. Finally, I also disagree with Dr. Fox's opinion that claims 7-8, 17-18, and 25 of the '378 patent are obvious based on the combination of Belanger, Halevy,

Haveliwala, and APA. Again, Dr. Fox relies on APA to support his obvious opinions only “to the extent that explicit disclosure is required regarding travel websites utilizing deep-link advertising.” EX1003, ¶ 171. As I previously discussed, APA has no impact on any of my opinions regarding the non-obviousness of any of the challenged claims. Thus, it is my opinion that claims 7-8, 17-18, and 25 are not obvious based on the combination of Belanger, Halevy, Haveliwala, and APA for the same reasons that these claims are not obvious based on the combination of Belanger, Halevy, and Haveliwala. APA also does not teach or suggest the limitations which I discussed earlier as being missing from the teachings of Belanger, Halevy, and Haveliwala.

IX. CONCLUSION

92. This declaration reflects my opinions as currently held. However, my analysis may continue such that I may consider additional information that may result in additional observations.

93. I hereby 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.

Executed this 28th day of January, 2025, at Irvine, California.

A handwritten signature in cursive script, appearing to read "Sam Malek", is written over a horizontal line.

Dr. Sam Malek